**agronomiis safuZvlebi**

 **Semdgeneli asoc. prof. n. maWavariani**

**sarCevi**

Tavi 1. **Sesavli, niadagi, rogorc mcenaris ganviTarebis are da soflis meurneobis warmoebis ZiriTadi saSualeba. Nniadagis warmoqmna da ganviTareba. Qqanebis gamofitva, qanis meqanikuri, qimiuri da biologiuri gamofitva. niadagis nayofiereba.**

Tavi 2. **klimati, mcenareuloba da cocxali organizmebi. reliefi, niadagis xnovaneba, adamianis sameurneo saqmianobis roli niadagwarmoqmnis procesSi. niadagi sasoflo-sameurneo warmoebis ZiriTadi sawarmoo saSualebi.**

Tavi 3. **niadagis Sedgeniloba da Tvisebebi. niadagis klasifikacia meqanikuri Sdgenilobis mixedviT. niadagis xvedriTi wona. niadagis moculobiTi wona. niadagis forianoba, plastikuroba. niadagis webovnebis Tviseba. gajirjveba da dajdoma. niadagis simwife. niadagis bmuloba (simagre) xvedriTi winaRoba.**

Tavi 4 **niadagis struqtura da misi simtkice. niadaguri haeri, Tavisufal adsorbciul da xsnad mdgomareobaSi, niadagis Tburi Tvisebebi. sxivSTanTqma, Tbotevadoba, sxivfrqveva.**

Tavi 5 **niadagis fiziko-qimiuri Tvisebebi. STanTqmisunarianoba. meqanikuri, fizikuri anu molekuluri, fizikur-qimiuri anu polaruli, qimiuri, biologiuri STanTqma. niadagis reaqcia pH, niadagis organuli nawili, niadagis qimiuri Sedgeniloba da kvebis reJi. azoti, fosfori, kaliumi, kalciumi, magniumi, rkina, gogirdi, bori.**

Tavi 6. **saqarTvelos niadagebis ZiriTadi tipebi da maTi mniSvneloba miwaTmoqmedebis produqtebis teqnologiaSi**. **dasavleT saqarTvelos niadagur olqi. Waobiani da eweri niadagebis zona, wiTelmiwebi da yviTelmiwebi. mTa-tyeTa niadagebi. mTa-mdelos niadagebi. aRmosavleT saqarTvelos niadagur olqi.-velebis Savmiwebi, wabla da naxevrad udabnos ruxi-mura niadagebi.**

7 **aRmosavleT saqarTvelos niadagur olqi.-velebis Savmiwebi, wabla da naxevrad udabnos ruxi-mura niadagebi. vakeTa da mTiswinebis gardamavali saxis tye-velisa da tyis niadagebi, mTa-tyeTa niadagebis zona; mTa-mdelos niadagebis zona. damlaSebuli niadagebi. aluviuri niadagebi.**

Tavi 8 **miwebis melioracia. wylis reJimi da mcenareTa produqtiuloba, wylis monawileoba mcenaris zrda-ganviTarebis procesSi. wylis odenoba da mdgomareoba mcenareSi. transpiracia da misi mniSvneloba mcenarisaTvis. mcenaris tenmoyvaruloba da gvalvagamZleoba. mcenareTa mier wylis xarjvis kritikuli periodebi. niadagis wylis formebi. morwyvis pirobebi. niadagis wyali da wylieri Tvisebebi. mcenareTa mier wylis xarjva. kapilaruli wyali. orTqliseburi wyali. wyalxarjvis koeficienti. rwyvis reJimi, sarwyavi norma.**

Tavi 9 **rwyvis specializacia sameurneo daniSnulebis mixedviT**, **rwyvis wesebi, maTi agroteqnikuri Sefaseba, samarago xvniswina, gamorecxviTi anu niadag gamwmendi, Tesviswina an dargviswina, damatebiTi Tesvis an dargvis Semdeg. damatebiT savegetacio an sxva rwyva. morigi savegetacio rwyvis vadebis gansazRvris meTodebi.**

 Tavi 10 **zedapiruli, dawvimebiTi da niadagqveSa rwyva. sasoflo-sameurneo kulturebis movla-moyvana limanuri rwyvis pirobebSi. sasoflo-sameurneo kulturebis Tesva moyvana Camonadeni wylebiT rwyvis pirobebSi. daSrobiTi melioracia, niadagis qimiuri melioracia sasuqebi da maTi gamoyeneba. mineraluri sasuqebi organuli sasuqebi.**

Tavi 11 **saqarTveloSi sarevela mcenareebis gavrcelebis mdgomareoba da maTi biologiuri Tavisebureba. sarevelebi da maT mier gamowveuli ziani. sarevela mcenareebis klasifikacia. sarevelebis winaaRmdeg brZolis biologiuri RonisZiebebi. gamafrTxilebeli da mospobiT brZolis RonisZiebebi. sarevela mcenareebis winaaRmdeg brZolis qimiuri RonisZiebebi.**

Tavi 12 **niadagis damuSavebis sistema. niadagis damuSavebis xerxebi da amocanebi. xvnis simwife, xvnis siRrme, xvnis wesi, xvna da masze wayenebuli ZiriTadi agroteqnikuri moTxovnebi. niadagis zedapiruli damuSavebis wesebi da iaraRebi. niadagis damuSavebis sistemebi. nawveralis damuSavebis sistema. saToxni kulturebisagan gaTavisuflebuli nakveTis mzral damuSavebis sistema. kordis damuSavebis sistema. yamiri da nasveni miwebis damuSavebis sistema. niadagis aneulad damuSavebis sistema, kulisebiani aneuli, moTesili aneulebi, sideraluri aneulebi, niadagis Tesviswina da TesvisSemdgomi damuSavebis sistema.**

Tavi 13 **Tesli da Tesva. Teslis xarisxi, Tesvis vadebi, Tesvis norma. Teslis CaTesvis siRrme. mobneviTi Tesva. mwkrivebad Tesva. Teslbrunva, misi SemoReba da aTviseba, TeslbrunvaSi ZiriTad kulturaTa winamorbedi. Sualeduri kulturebi TeslbrunvaSi, Teslbrunvis klasifikacia**

Tavi 14. **niadagis erozia. eroziis saxeebi. niadagis erozia da sasoflo sameurneo kulturaTa mosavali. niadagis eroziasTan brZolis agronomiuli saSualebebi. niadagis wylismieri erozia da masTan brZola. qarismieri erozia da masTan brZolis RonisZiebebi.**

Tavi 15 **miwaTmoqmedebis sistemebis warmoSoba da srulyofa. primitiuli sistemebi. axoian-cecxlovani sistema. tye-veliani sistema. yamirian da nasveniani sistema. miwaTmoqmedebis eqstensiuri sistemebi. miwaTmoqmedebis intensiuri sistemebi. miwaTmoqmedebis sistemebis Taviseburebani saqarTvelos niadagebis klimatur zonebSi**

Tavi 1. **Sesavli, niadagi, rogorc mcenaris ganviTarebis are da soflis meurneobis warmoebis ZiriTadi saSualeba. Nniadagis warmoqmna da ganviTareba. Qqanebis gamofitva, qanis meqanikuri, qimiuri da biologiuri gamofitva. niadagis nayofiereba.**

cnobebi niadagis calkeuli Tvisebebis Sesaxeb Soreul warsuls ekuTvnis. Ees cnobebi droTa viTarebaSi niadagis movla–patronobis wesebis gaumjobesebasTan erTad TandaTan srulyofili xdeba. Zveli egviptelebis, babilonelebis Cinelebis da sxvaTa soflis meurneobis warmoebaSi praqtikuli dakvirvebebis Sedegebis ganzogadoebis cdebs vxvdebiT Zvel saberZneTsa da romSi. A**aristoteles**  (IV saukune Cv. welTaRr.) da misi mowafis **Teofrastes** TxzulebebSi sayuradRebo cnobebia niadagis Tvisebebze da mcenaris kvebaze. Aamave periodSi romaelma **magonim** da ufro gvian (I saukune Cv. welTaRr) **lukreciusma**, gansakuTrebiT **virgiliusma** da sxvebma soflis meurneobis da niadagebis Sesaxeb mravali sagulisxmo azri gamoTqves.

Ees cnobebi niadagis Tvisebebis Sesaxeb, rasakvirvelia ar aris mecnieruli. Nniadagmcodneobas, rogorc mecnierebas ruseTSi safuZveli Caeyara XIX saukunis 80-ian wlebSi.

Ffeodalizmis mTeli epoqa xasiaTdeba miwaTmoqmedebis daqveiTebiT. amasTan erTad gamouyenebeli rCeba niadagis Tvisebebis Sesaxeb Zveli Sexedulebebi. Aam mxriv mxriv mkveTri Semobruneba iwyeba jer evropaSi, xolo Semdeg ruseTSi, cxovrebis kapitalizmis relsebze gadasvlisTanave. mosaxleobis SesamCnevi nawilis saqalaqo cxovrebis pirobebSi Cabmam mwvaved daayena sakiTxi soflis meurneobis produqciis raodenobis gazrdis Sesaxeb. Mmeti produqciis miRebis survilma gamoiwvia miwebis “mtacebluri” eqsploataciis gaZliereba. Aamas ramdenime xnis Semdeg mohyva mosavlianobis mkveTri Semcireba. Aam Cixidan gamosvlis mizniT maSindelma mecnierebma iwyes mosavlis Semcirebis mizezebis Zebna-mcenarisa da niadagis qimiuri analizebis saSualebiT. SemuSavda Teoriebi mcenaris kvebis Sesaxeb. M XIX saukunis dasawyisSi germanelma swavlulma agronomma **Teerma** wamoayena mcenaris humusiT kvebis Teoria. Aam Teoriis mixedviT mcenare ikvebeba humusiT da amitom niadagis nayofiereba (maSasadame, mosavlianoba) damokidebulia niadagSi humusis raodenobaze. SemdegSi damtkicda am Teoriis usafuZvloba. humusiT kvebis Teoriis yvelaze didi mowinaaRmdege iyo germaneli qimikosi **libixi.** man mkacrad gaakritika **Teeris Teoria** daTviTon wamoayena mcenaris mineraluri nivTierebebiT kvebis Teoria, libixis daskvna mcenaris mineraluri nivTierebebiT kvebis Sesaxeb 1842 wels eqsperimentiT daamtkices **vigmanom da polstorfma**. Aamave periodSi aRmoaCines (1837 w) parkosani mcenareebis mier niadagSi azotis dagrovebis Tviseba. daaxloebiT amave periods ekuTvnis mcenaris kvebis kidev erTi didi aRmoCena fotosinTezze-atmosferuli naxSiorJangis asimilaciis Sesaxeb. es aRmoCenebi (libixis Teoria) safuZvlad daedo mineraluri sasuqebis saqarxno mrewvelobas da sasuqebiT niadagebis farTo masStabiT ganoyierebis sistemas.

aRsaniSnavia, rom cxovrebis mier dasmuli mtkivneuli sakiTxi mosavlianobis gadidebis Sesaxeb, verc **libixis Teoriam** gadaWra, radgan es Teoria msgavsad am periodis sxva Teoriebisa, niadags Tvlida, inertul, ubralo miwis masad, romelSic rasac Seitan, imas gamoitans mcenare. winaaRmdeg aseTi Sexedulebisa, xSirad Sedegi sawinaaRmdego gamodioda.

Nniadagis warmoqmna-ganviTarebaze biologiuri faqtoris-mcenareebisa da cxovelebis mniSvnelobis Sesaxeb pirvelad swori azri gamoTqva rusma mecnierma **m. lomonosovma**. SiSvel qanebze xavsebisa da sxva dabalganviTarebuli mcenareebis dasaxlebiT iwyeba niadagis warmoqmna, rasac Tan mosdevs sxva mcenareebis dasaxleba da TviTon niadagis Semdgomi TandaTan ganviTareba. Aaseve originaluri azri gamoTqva man Savmiwebsa da torfze. L**lomonosovi** aRniSnavda, rom Savmiwebisa da torfnarebis warmoqmna istoriuli procesia da dakavSirebulia mcenareTa safaris ganviTarebasTan, amitom g. **vernadski lomonosovs** Tvlis ara marto pirvel rus niadagTmcodned aramed, saerTod, pirvel niadagTmcodned.

niadagebis Seswavla gansakuTrebiT farTo xasiaTs Rebulobs XIX saukunis meore naxevarSi, roca 1861 w. reformis (batonymobis gauqmeba) Semdeg ruseTi kapitalizmis ganviTarebis gzas daadga. Aam periodSi ruseTSi d.mendeleevi pirvelad safuZvels uyris kordian eweri niadagebze mineraluri sasuqebisa da mokirianebis mindvris cdebs, xolo **p. kostiCevi** atarebs Savmiwa niadagebis nayofierebis aRdgenis rigi RonisZiebebis Seswavlas.

Aamave periodSi “Tavisufali ekonomiuri sazogadoebis davalebiT, ruseTis Savmiwa niadagebis Seswavlas iwyebs **vasil dokuCaevi.**

**dokuCaevma** ruseTis Savmiwebis Seswavla daasrula klasikuri naSromiT ”ruseTis Savmiwebi”-is gamoqveynebiT. Ees Sroma, romelSic niadagcodneobis mecnierebis safuZvlebia mocemuli samarTlianad iTvleba klasikur sabunebismetyvelo Txzulebad, xolo misi avtori genezisuri naidagTcodneobis fuZemdeblad.

dokuCaevma daamtkica, rom niadagi niadagTwarmoqmnis faqtorebis erToblivi moqmedebis produqtia. amiT man cxadyo, rom dedamiwaze niadagebis ganawileba iseTive zonalur kanons eqvemdebareba, rogorc mis warmoqmnaSi monawile faqtorebi: klimati, mcenareuloba da sxv.

saqarTvelo Zveli kulturis qveyanaa. **daviT aRmaSeneblisa da Tamaris mefobis** dros Cvenma qveyanam ganviTarebis kulminacias miaRwia maSindeli soflis meurneobis produqciis mravali saxeoba maxlobel da Soreul qveynebSi gaqondaT. saqarTvelos miwaTmoqmedebis maRal doneze metyveleben Cveni samSoblos istoriuli, materialuri Zeglebi.

Sua saukuneebis saqarTveloSi ori umaRlesi saswavlebeli iyo-gelaTisa da iyalTos akademia. Aam akademiebSi sxva sagnebTan erTad iswavleboda biologiac. aswavlidnen agreTve soflis meurneobis safuZvlebsac. Bbevri istoriuli dokumentebiT dadasturebulia, rom Zvel saqarTveloSi memcenareobis swavleba ganviTarebis maRal safexurze idga. cxadia, rom imdroindel akademia damTavrebuli pirisTvis niadagis Tvisebebi cnobili iyo. Ees, rasakvirvelia cnobili iyo **saba-sulxan orbelianisa da vaxuSti batoniSvilisaTvis**ac, romlebmac TavianT naSromebSi mecnieruli, agronomiuli mosazrebebi gamoTqves.

saqarTvelSi miwaTmoqmedebis ganviTarebis saqmeSi didi roli Seasrula kavkasiis soflis meurneobis sazogadoebam, romelic 1850 wels daarsda TbilisSi. sazogadoebis wevrebs Soris iyvnen gamoCenili qarTveli moRvaweebi: **ilia WavWavaZe, dimitri yifiani, anton furcelaZe, giorgi wereTeli, rafiel erisTavi** da sxv

me-19 saukunis meore naxevris dasawyisidan qarTul agronomiul periodul gamocemebsa **(“guTnis deda”)** da calke wignebSi (**ilia winamZRvriSvili**) gvxvdeba garkveuli Sexedulebani niadagis Tvisebebze. amave periodSi i. **winamZRvriSvilis** mier gamocemuli iqna mevenaxeobis saxelmZRvanelo, romelic gankuTvnili iyo sasoflo-sameurneo skolis mowafeTaTvis. aRsaniSnavia agronom **oqromWedliSvilis** sagazeTo statiebi. igi im drois mecnieruli donis Sesabamisad sworad ganmartavs niadagis STanTqmis movlenebs. is wers ”...miwa izidavs fosforsa da kirs, amoniaks da sxvas rac ki gamosadegia mcenaris gamosakveebad”. sworad aqvs axsnili nivTierebaTa brunvis sakiTxi”... rasac erTis mxriv mozardi mcenare arTmevs haersa da miwas, is meore mxriT ubrundeba sicocxlemospobili mcenarisagan da cxovelisagan”, ambobs avtori. sagulisxmo azrebi aqvs gamoTqmuli tyis saerTo mniSvnelobisa kerZod niadagdacvis, eroziis sawinaaRmdego da sxva (nayofierebis, Teslbrunvebis Tvisebebis Sesaxeb.O

Tbilisis saxelmwifo universitetSi 1919 w. safuZveli eyreba niadagmcodneobis pirvel samecniero keras niadagmcodneobis kaTedris daarsebiT.

 1929 w. Tbilisis saxelmwifo universitetis agronomiuli fakultetis bazaze daarsda saqarTvelos sasoflo-sameurneo instituti, romlis samarTalmemkvidrec bolo wlebSi iyo saqarTvelos agraruli universiteti.

**da mainc ra aris niadagi?**

Tanamedrove ganmartebiT, niadagi dedamiwis gareTa Sreze myofi nayofierebis mqone mravalfunqciuri da mravalkomponentiani Ria mravalfaziani struqturuli sistemaa, romelic niadagwarmomqmneli faqtorebis erToblivi moqmedebis produqtia. niadagwarmomqmnel faqtorebs ki miekuTvneba: qani, reliefi, xnovaneba, mcenareebi da cxovelebi, klimati da adamianis sawarmoo moqmedeba anu anTropogenuli faqtori.

niadagi, rogorc bunebrivi warmonaqmni ganicdis ra ganuwyvetel ganviTarebas, aqtiurad monawileobs energiebisa da nivTierebebis gardaqmnis rTul procesebSi. masSi, umTavresad mwvane mcenareebis cxovelmyofelobiT, organuli nivTierebis saxiT grovdeba da konservirdeba mzis energia. umaRlesi mwvane mcenareebi aRWurvilni arian ra STanTqmiTi unarianobiT, fesvTa sistemis saSualebiT iTviseben deda qanSi gabneul mineralur nivTierebebs da agroveben maT niadagis zedapirul fenaSi organul-mineraluri SenaerTebis saxiT.

bunebaSi ganuwyvetliv mimdinareobs organuli nivTierebis daSla qlorofils moklebuli organizmebis moqmedebiT, romelTaTvisac organuli nivTiereba kvebis wyaros warmoadgens.

niadagSi organuli anarCenebi umTavresad iSleba baqteriebis, sokoebis da aqtinomicetebis (bateriebis da sokoebis Tvisebebis mqone organizmebis) saSualebiT. daSla (xrwnis) procesis siCqare gapirobebulia wylovan-haerovani da Tburi reJimebiT, organul narCenebSi nacris elementebisa da azotis arsebobiT.

organuli nivTierebebis sinTezi da mineralizacia, mcenaris kvebis elementebis dagroveba niadagSi, nivTierebebisa da energiis mudmivi cvla, cocxal organizmebsa da garemos Soris niadagwarmoqmnis procesis arss warmoadgens. mwvane mcenareebis bunebriv Tanasazogadoebebisa da maT Tanmdev mikroorganizmebs mcenareuli formaciebi ewodeba.

 merqnian mcenareulobaTa formacia Sedgeba mravalwliani mwvane mcenareTagan, romlebic axdenen organuli nivTierebebis sinTezs uqlorofilo organizmebisagan-umetesad sokoebisa da aqtinomicetebisagan, romlebic Slian tyis Camonacvenis organul nivTierebebs da xels uwyoben wiwvovani da foTlovani tyeebis zonaSi eweri da tyis ruxi niadagebis warmoqmnis process.

balaxa mcenareulobis formacia Seicavs mravalwlian da erTwlian balaxa mcenareulobas. mkvdari balaxa mcenareulobis organuli nawili umTavresad mineralizdeba baqteriebis monawileobiT. mTian raionebSi mdelos mcenareulobis qveS viTardeba kordiani da kordian-eweriani niadagebi.

stepis mcenareuli formacia wrmoadgens stepuri mcenareulobis Tanasazogadoebas. aq mineralizaciis, organuli nivTierebebis gardaqmnis procesi ZiriTadad baqteriulia. aerobuli bunebis stepis mcenareulobis qveS yalibdeba Savmiwa da wabla niadagebi. udabno velebis mcenareulobis qveS warmoiSoba ruxi, mura udabno-velebis da ruxi mura udabnos niadagebi.

amrigad, niadagwarmoqmnis procesSi wamyvan rols asrulebs urTierTmoqmedeba niadagsa da mcenareulobas Soris e.i. nivTierebaTa da energiebis cvla.

niadagi aris dedamiwis qerqis zedapiruli nawili, romelic warmoqmnilia mTis qanebis daSlisa da masze biologiuri faqtorebis, klimatis, xnovanebis da adgilis reliefis erToblivi moqmedebis Sedegad. mas rogorc sasoflo-sameurneo warmoebis ZiriTad saSualebas da, rogorc bunebriv sxeuls, gaaCnia mxolod misTvis damaxasaiTebeli Zlier mniSvnelovani Tavisebureba --**nayofiereba.**

niadagis nayofiereba aris mcenaris sasicocxlo moTxovnilebebis dakmayofilebis unari, miwieri faqtorebiT, Sesabamisi haerisa da Tburi reJimebis pirobebSi, Seqmnas sasoflo-sameurneo kulturebis mosavali.

arCeven niadagis **bunebriv (potenciur) da efeqtur** nayofierebis formebs. niadagis bunebrivi nayofiereba misi bunebrivi Tvisebaa, romelic gapirobebulia sakveb nivTierebaTa raodenobiTa da wylis reJimis xasiaTiT, xolo efeqtur nayofierebas gamoxatavs miRebuli mosavlis raodenoba, romelsac Tavis mxriv gansazRvravs adamianis Sroma-**agroteqnika** da damokidebulia niadagze, masze zemoqmedebisa da mecnierebisa da teqnikis doneze. efeqtur nayofierebaze msjeloben sasoflo-sameurneo kulturebis mosavlis odenobis mixedviT.

mecnierulad dasabuTebuli agroteqnologiis ganxorcieleba da uwinares yovlisa, niadagis racionaluri damuSaveba, xels uwyobs sasargeblo biologiuri procesebis warmoqmnas, xolo melioraciul RonisZiebebi qmnis optimaluri wylisa da haeris reJimebs. maSasadame, bunebis kanonebi da miwaTmoqmedebis mecnieulad dasabuTebuli sistemebis danergvis dros niadagis nayofierebis gaumjobeseba savsebiT eqvemdebareba adamianis zemoqmedebas.

niadagis nayofierebis programuli regulireba aucilebelia Tan sdevdes memcenareobis produqciis warmoebis gadidebas. igi unda iTvaliswinebdes: uaryofiTi movlenebis aRkveTas (erozia, gvalvebi, humusisa da kvebis elementebis maragebis Semcireba), niadagis melioraciis danergvas, optimaluri fiziko-qimiuri garemos Seqmnas, nayofierebis amaRlebis yvela gzis kompleqsur gamoyenebas, niadagis nayofierebis da sasoflo-sameurneo kulturebis mosavlianobis amaRlebis axali meTodebisa da xerxebis damuSavebas.

 mosavlianobis zrda saerTod damokidebulia mcenaris sasicocxlo faqtorebis regulaciaze. kerZod ki mcenaris normaluri zrda ganviTarebisaTvis saWiroa:

1. niadagi Seicavdes mcenarisaTvis misawvdomi formis sakveb nivTierebebs sakmao raodenobiT, mcenaris ganviTarebis yvela fazaSi.
2. mcenare vegataciis periodis ganmavlobaSi dakmayofilebuli iyos saWiro wylis raodenobiT;
3. niadgis haeri Seicavdes Jangbads sakmao raodenobiT, adgili hqondes niadagis da atmosferuli haeris sistematur mimocvlas;
4. niadagi xasiaTdebodes Sesabamisi siRrmiT da sifxvieriT, raTa mcenaris fesvTa sistema normalurad ganviTardes;
5. niadagi unda xasiaTebodes garkveuli Tburi TvisebebiT;
6. niadagSi ar unda iyos toqsikuri, mcenaris zrda–ganviTarebaze uaryofiTad moqmedi nivTierebani;
7. niadagi Tavisufali unda iyos sarevelebisagan.

niadagis aRniSnul TvisebaTa regulaciis saWiro saSualebani oTxgvariaa: **biologiuri, agrofizikuri, agroqimiuri da melioraciuli**.

 **biologiuri**  maCvenebeli gulisxmobs nayofierebis gadidebasa da gakulturebisaTvis ZiriTadi mcenareebisa da mikroorganizmebis racionalur gamoyenebas. mTavari amocana is aris, rom miRebuli iqnas niadagis organuli nivTierebis dadebiTi balansi, humusis xarjvas unda sWarbobdes misi dagroveba. niadagSi humusis Semcveloba misi nayofierebisa da gakulturebis mTavari maCvenebelia.

**agrofizikuri** maCvenebeli gulisxmobs wylis, haeris, siTbos optimaluri reJimis Seqmnas, rac Tavis mxriv niadagSi mimdinare biologiur procesebs aZlierebs da Setanili sasuqis gamoyenebas efeqtur xasiaTs aZlevs. aqve unda aRiniSnos, rom niadagis gakulturebis erT-erTi mTavari pirobaa kulturul naTesebsa da nargavebSi sarevelebs mospoba.

**agroqimiur RonisZiebebs,** mineraluri da organuli sasuqebis daniSnulebisamebr swor gamoyenebas mosavlianobis zrdis saqmeSi gansakuTebuli mniSvneloba aqvs. torfis, nakelis, kompostis da sxva organul sasuqebis farTod gamoyenebas mosavlianobis zrdis mZlavri faqtoria.

**melioraciul RonisZiebebs** niadagis wylis, haeris, siTbos, bioqimiur da sxva TvisebaTa regulaciis dargSi arsebiTi mniSveloba aqvs.

gvalvian raionebSi xelovnuri morwyva, ganoyierebasTan erTad mosavlianobis zrdis ZiriTadi pirobaa. aqve unda aRiniSnos, rom morwyviTi melioracia maRal agroteqnikas moiTxovs, raTa meoradi daWaobebisa da damlaSebis movlenebi Tavidan aviciloT.

bunebriv istoriul pirobebTan Sexamebuli agronomiuli RonisZiebaTa mTeli kompleqsis danergvas umagaliTo donemde ahyavs niadagis nayofiereba.

dedamiwis zedapirze SiSvldeba sxvadasxva warmoSobisa da Sedgenilobis qanebi, romlebzec mimdinare procesebis Sedegad viTardeba niadagi.

yvelaze srulad niadagis ganmarteba mogvca v. dokuCaevma: \_**niadagi es aris TviTmyofi bunebrivi istoriuli sxeuli, romelic warmoqmnilia niadagTwarmomqmneli faqtorebis: qanis, reliefis, klimatis, xnovanebis, mcenareulobis da adamianis sameurneo zemoqmedebis Sedegad.**

qanis gardaqmnis process niadagad ewodeba **niadagTwarmoqmna.** rogorc miRebulia, qani gadaiqceva niadagad ori ZiriTadi, erTdroulad mimdinare procesebis: **gamofitvisa da niadagTwarmoqmnis Sedegad.**

niadagTwarmoqmnis procesis msvlelobaSi didi mniSvneloba eniWeba qanebs, maTi amgebi mineralebis raobas da maTi gamofitvis process.

gamofitvis procesi, esaa dedaqanebis da maTi amgebi mineralebis ngrevis, daqucmacebis da Secvlis procesi dedamiwis zedapirze, mzis radiaciis, wylis, yinulis, temperaturis Secvlis, organizmebis da sxva fizikuri da qimiuri movlenebis gavleniT. gamofitvis gamomwvevi faqtorebis mixedviT arCeven: 1. **fizikur, 2. qimiur, 3. biologiur gamofitvas.**

sxvadasxva qanebis fizikuri gamofitvis siswrafe gansxvavebulia. qanebis mdgomareoba da daSlis xasiaTi gamofitvisadmi gapirobebulia misi SemadgenlobiT da klimaturi pirobebiT.

***fizikuri gamofitvis*** gamomwvevi faqtorebia: temperaturis mkveTri ryeva, rac iwvevs qanebis da mineralebis daSla-daqucmacebas; wylis, yinulis da qaris damangreveli moqmedeba. fizikuri gamofitvis dros ar icvleba qanebisa da mineralebis natexebis qimiuri buneba. gamofitvis intensivoba da Sedegi sxvadasxva regionebSi ganisazRvreba klimaturi pirobebiT, qanebis SemadgenlobiT, feriT, struqturiT. es parametrebi gansazRvraven qanis mdgradobis Tvisebebs da TviT gamofitvis procesis xangrZlivobas. rac ufro kontinenturia hava, miT ufro intensiurad vlindeba fizikuri gamofitva.

myife qanebi advilad imsxvreva, xolo mkvrivi–naklebad. magaliTad, diabazebi Semdgari gagrZelebuli, uwesrigod ganlagebuli mineralebisagan Znelad skdebian da iSlebian. amitom, ukanasknelni kargad arian gamoxatuli amaRlebebis, Txemebis saxiT. fizikuri gamofitvisas warmoiSobian qanebisa da mineralebis sxvadasxva sididis natexebi 0,05 mm-dan metrze meti. cicabo farTobebidan, gamofituli, daqucmacebuli masala swrafad irecxeba da amitom procesi ganuwyvetliv mimdinareobs. iq sadac reliefi mosworebulia, grovdeba gamofitvis produqtebis mZlavri fena, romelic icavs ZiriTad qanebs msxvrevisagan.

tipiuri fizikuri gamofitvis magaliTs warmoadgens myinvaruli amoxvna-aSmuSvna. myinvari Tavisi moZraobis dros dedamiwis zedapiridan aqerclavs-amotexs qanis natexebs. es natexebi Seitaceba yinulis masis mier; amave dros isini ar ganicdian Secvlas da mineraluri da qimiuri SedgenilobiT dedaqanebis Semadgenlobis analogiuri rCebian.

myinvaruli erozia ar TamaSobs mniSvnelovan rols gamofitvis procesis saerTo suraTSi, radgan myinvarebs ukaviaT xmeleTis farTobis 12 %-mde da amave dros cnobilia 6 didi gamyinvareba TiToeulis da xangrZlivoba ramdenime milioni wliT ganisazRvreba, rac Zalze mcirea zemoqmedebis TvalsazrisiT. udabnoebSi gamofitvis procesi ZiriTadad fizikuria, wyals gaaCnia meorexarisxovani roli. aq gamofitvis ZiriTad agents warmoadgens qari, romelic aitacebs mcire zomis nawilakebs da maTi saSualebiT xexavs gaSiSvlebul zedapirs.

***qimiuri gamofitva.*** qimiuri gamofitva procesTa kompleqss warmoadgens. igi dedamiwis qerqis periferiuli fenebis Termodinamikur da qimiur pirobebSi mimdinareobs. qimiuri gamofitvis produqtebs maTi warmoqmnis pirobebSi, simyare da dagrovebis Tviseba axasiaTebT.

qimiuri gamofitva ewodeba qanebis qimiuri Sedgenilobis cvlilebas. qimiuri gamofitvis dros warmoiqmnebian axali, qanis Semadgeneli nivTierebebisagan Tvisobrivad gansxvavebuli produqtebi. fizikuri gamofitvis Sedegad daqucmacebuli qani atmosferos da wylis moqmedebiT ganicdis qimiuri xasiaTis rig cvlilebebs. qani, ramdenadac metad aris daqucmacebuli, imdenad ufro energiulia da mravalmxrivia es cvlileba.

qimiuri gamofitvisaTvis yvelaze xelsayrelia cxeli da zomieri tropikuli hava, maRali saSualo wliuri temperatura xSiri naleqebiT da wvimiani da mSrali amindebis morigeobiT. aseT pirobebSi qimiuri gamofitva Zalze intensiuria. gamofitvis mTavari faqtori zedapiruli da gruntis wyalia, romelSic gaxsnilia mTeli rigi nivTierebebi: Jangbadi, naxSirorJangi da sxv.

wylis moqmedeba qanebze da gansakuTrebiT maT amgeb mineralebze vlindeba: Jangva-aRdgeniT, gaxsniT, hidrataciiT, hidroliziT, rodesac wyali CaiJoneba niadagSi da qanebSi (gansakuTrebiT pirvelSi), igi mdidrdeba organuli mJaveebiT, mineraluri SenaerTebiT, rac wyals aZlevs garkveul Tvisebebs.

wyali met–naklebi raodenobiT xsnis qanebis Semadgenel TiTqmis yvela minerals. wyalSi absoluturad uxsnadi nivTierebebi dedamiwis qerqis SedgenilobaSi ar moipoveba. qanis Semadgeneli nivTierebebi wyals, gaxsnis gamo, qimiurad moqmed, aqtiur mdgomareobaSi gadahyavs, riTac xels uwyobs am nivTierebaTa Soris Semdgom reaqciebs.

 qimiuri gamofitvis mniSvnelovan faqtorad CaiTvleba naxSirorJangi, romelic wyalTan SeerTebiT warmoSobs naxSirmJavas. misi arseboba dabla swevs pH–is mniSvnelobas. mJave wylebi energiulad xsnian karbonatebs da gamodevnian silikatebis fuZeebs. garda amisa, qimiuri gamofitvisaTvis didi mniSvneloba aqvs bunebriv wylebSi sxvadasxva mJavebis (huminis da sxva) arsebobas, rac zrdis gamofitvis procesis intensivobas. siRrmeSi gamofitvis intensivoba klebulobs. qimiuri gamofitvis siRrme ganpirobebulia gruntis wylis doniT.

gamofitvis qerqSi qimiuri elementebis qceva ganisazRvreba maTi qimiuri bunebiT, bioklimaturi pirobebiT, qanis SemadgenlobiT. mineralebi xasiaTdebian cvalebadi unariT gamofitvisadmi da swored es gansazRvravs elementebis migraciis intensivobas. tute ***amfiboli*** ufro advilad ifiteba, vidre ***albiti,*** amitom amfibolis **Na** ufro migraciulia, vidre albitis **Na,** romelic mineralSi aris dakavebuli.

farTod gavrcelebuli elementebi maTi xsnadobisa da migraciuli Tvisebebis mixedviT, dayofilia xuT jgufad:

1. **energiulad gaitanebian** **Cl, Br, I, S.**

2. **advilad gaitanebian** **Ca, Mg, Na, K, F, SiO2** (silikatebis Semadgen-lobaSi).

3**. moZravni** **P, Mn, Ni, Cu, Co**.

4. **inertulni** **Fe, Al, Te.**

5. **praqtikulad uZravni** **SiO2** (kvarci).

am TanmimdevrobiT gamoiyo qimiuri gamofitvis (polinovi, 1934) oTxi stadia:

***1. namsxvrevi*** – qanebi gadaiqcnen fxvier namsxvrev masad, maT ar ganucdiaT jer qimiuri Secvla.

***2. gakarbonatebuli*** \_iwyeba silikatebis daSla, qimiuri gamofitvis dasawyisi stadiaa, romlis drosac qanebi Semdgari alumosilikatebisagan iSlebian; daSlas Tan sdevs **K, Na, Ca, Mg** gamotana. isini ganapirobeben garemos tute reaqcias, warmoiSobian gardamavali Tixa\_mineralebi (montmoriloniti, beideliti da sxv.). am dros eluvioni-gamofitvis qerqi mdidrdeba kiriT, **Si, Al** –iT.

***3. gaTixebis –*** mimdinareobs silikatebis daSla, fuZeebis gatana ( **K, Na, Ca, Mg ).** mJave qanebze warmoiSoba kaolinuri Tixebi (mag. SroSis sabado), xolo fuZe qanebze ki monTmorilonituri, beidelituri, nonTronituli naSTuri (narCeni) Tixebi. **CaCO3** gamoitaneba wyliT, gansakuTrebiT humiduri havis pirobebSi.

***4. laterituli*** –qimiuri gamofitvis bolo stadiaa. gamoiyofa da gadaitaneba silikatebis siliciumi, grovdeba kvarci da Zalze mdgradi **Al, Fe** –is Jangis hidratebi naSTuri Tixis produqtebis saxiT.

yvela stadia warmoadgens erT mTlian sivrces, romelsac saboloo damTavrebisaTvis esaWiroeba mravali milioni weli.

tropikebSi da subtropikebSi qimiuri gamofitva aRwevs lateritul stadias, xolo zomieri havis pirobebSi ki\_gaTixebis stadias.

gamofitvisadmi mineralTa mdgradoba damokidebulia maT Semadgenlobasa da Tvisebebze. arCeven qimiur da meqanikur mdgradobas, romlebic erTmaneTTan urTierTkavSirSia da avseben erTmaneTs. meqanikuri mdgradoba dakavSirebulia mineralis da qanis simagreze, tkeCvadobaze da sxvadasxva fizikur Tvisebebze, xolo qimiuri mdgradoba ki Semadgenlobaze, agebulebaze, dispersiulobis xarisxze, wyalSi xsnadobaze.

qimiuri gamofitva Zirfesvianad cvlis mineralebs, romlebic warmoiSobian maRali wnevisa da temperaturis pirobebSi, gardaqmnis maT im mineralebad, romlebic mdgradia dedamiwis zedapirze. qimiuri gamofitvisas, metwilad rTuli naerTebi icvlebian, warmoiSobian ufro martivni (gaitaneba kaTionebi, icvleba kristaluri meseri), iJangebian da hidratirdebian, ganicdian **hidrolizs.** nivTiereba xSir SemTxvevaSi gadadis koloidur da WeSmarit xsnarSi. gamofitvis paralelurad mimdinareobs wylis migrantebis akumulaciis procesi, ris Sedegadac niadagSi gamofitvis qerqSi kontinentur naleqebSi warmoiSobian mtkiced Secementebuli horizontebi (iluviuri, gakaJebuli horizontebi, TabaSiris qerqi da sxv.).

***biologiuri gamofitva*** qanebisa da mineralebis biologiuri gamofitvis procesi cocxali organizmebis uSualo monawileobiT mimdinareobs. amdenad, biologiuri gamofitvis procesi amave dros, niadagTwarmoqmnis process warmoadgens.

erT-erTi gadamwyveti mniSvneloba biologiur gamofitvaSi eniWebaT mikroorganizmebs, romlebic farTod arian gavrcelebuli bunebaSi da axasiaTebT uzarmazari aqtiuroba. qanebidan isini iTviseben qimiur elementebs da SenaerTebs da gamoyofen maT Tavisi sikvdilis Semdeg cxovelmyofelobis naSTebis saxiT. amrigad, cocxali organizmebis aqtiuri monawileobis Sedegad mineraluri nivTierebebi gadadian organulSi, xolo organuli ki piriqiT\_mineralurSi. mimdinareobs nivTierebaTa ganuwyveteli wrebrunva, rac faqtobrivad warmoadgens **niadagwarTmoqmnas.** amis Sedegad gamofitvis zeda fena mdidrdeba organuli nivTierebiT, ganicdis bioqimiur gardaqmnas da gardaiqmneba niadagad\_ pirvelad iSleba alumosilikatebis meserSi mtkice kavSirebi-**Al2O3 da SiO2** –s Soris. organuli naSTebis daSlis da lpobis Sedegad warmoqmnili organuli mJaveebi xels uwyoben silikatebisa da alumo- silikatebis daSlas, kaTionebis\_natriumi, kaliumi da wyalbadis gacemas. mcenareebi niadagebidan da qanebidan iTviseben advilad xsnad mineralur nivTierebebs (**PP, S, Ka, Mg, Ca, Fe, Mn, Na** da sxva). haeridan **C, H, O, N** axdenen maT koncentracias da gardaqmnian organul nivTierebad. organuli nivTierebis daSlis procesSi adgili aqvs biogenur mineralwarmoqmnas. mcenareTa da organizmTa sxeulebSi warmoiSobian (perelmani, 1975) mineralebi, romlebic ConCxis, niJaris, javSnis SemadgenlobaSi Sedian da maTi patronebis sikvdilis Semdgom niadagSi gadadian.

dadgenilia, rom **CaCO3** bevri umaRlesi mcenareebis qsovilSi aRiniSneba, zogi minerali ki warmoiSoba organizmTa cxovelmyofelobis Sedegad.

rogorc vxedavT, gamofitvis procesi ZiriTadad mimdinareobs dedamiwis zedapirze\_xmeleTze; aseve arsebobs wyalqveSa gamofitvis procesi\_**halmirolizi.** halmirolizis procesi gulisxmobs aramarto nawilakebis, natexebis gadamuSavebas da axali mineralebis gaCenas, aramed rig procesebs: gaxsnas, hidratacias, daJangvas da sxv.

qanebis daSlis procesSi monawileoben rogorc martivi\_mikroskopuli organizmebi, ise mwvane mcenareebic. mikroorganizmebidan gansakuTrebiT aRsaniSnavia **qemobaqteriebi**, kerZod, **nitrobaqteriebi,** romelTa cxovelmyofeli moqmedebis Sedegad naSalSi atmosferuli azotis fiqsaciiTa da sxva procesebiT warmoiqmneba azotis mZlavri mJava. gamokvleulia, rom es baqteriebi cxovroben maRali mTebis gaSiSvlebuli qanebis namsxvrev masalazec ki. **akad. vernadskim** daamtkica, rom diatomebi uSualod kaolinze cxovroben da iwveven mis qimiur cvlilebas.

gansakuTrebiT aRsaniSnavia liqenebis roli qanebis gamofitvis procesSi. liqenebi qanSi CaSvebuli hifebiT da gamoyofili naxSiroJangis saSualebiT qans Slian rogorc qimiurad, ise meqanikurad. aseve intensiur gamofitvas apirobeben merqniani mvenareebi Tavisi mZlavri fesvTa sistemiT. fesvTa sistema xels uwyobs qanebis nabzarebs Soris arsebuli napralebis gafarToebas da mis meqanikur da qimiur daSlas.

Tavi 2.

**klimati, mcenareuloba da cocxali organizmebi. reliefi, niadagis xnovaneba, adamianis sameurneo saqmianobis roli niadagwarmoqmnis procesSi. niadagi sasoflo-sameurneo warmoebis ZiriTadi sawarmoo saSualebi.**

yvelaze srulad niadagis ganmarteba mogvca v. dokuCaevma: \_**niadagi es aris TviTmyofi bunebrivi istoriuli sxeuli, romelic warmoqmnilia niadagTwarmomqmneli faqtorebis: qanis, reliefis, klimatis, xnovanebis, mcenareulobis da adamianis sameurneo zemoqmedebis Sedegad.**

**qani.** rogorc cnobilia, qani niadagis mineralur nivTierebaTa wyaroa. qanis gamofitviT warmoqmnili naSalis e.w. deda qanis mineralogiur Sedgenilobasa da fizikur Tvisebebze bevrad aris damokidebuli niadagwarmoqmnis xasiaTi da niadagis Sedgeniloba. rac meti raodenobiT Seicavs qani fosfors, kaliums, gogirds da sxva nivTierebebs imdenad metia isini aseT qanze warmoqmnil niadagSi. advilad xsnadi marilebiT mdidar qanze mlaSe niadagebi viTardeba, kirqvaze neSompala-karbonatuli, xolo rkiniT mdidar kirqvebze-terarosa. Tixian qanebze Cveulebrivad mZime meqanikuri Sedgenilobis niadagebi gvxvdeba, vidre qviSian qanebze. amonaRvar mJave qanebze warmoqmnili niadagi silas meti raodenobiT Seicavs vidre fuZe qanebze ganviTarebuli niadagi.

dedamiwis qerqis da mTlianad dedamiwis Semadgenlobis dasadgenad Seiswavleba qanebis da mineralebis qimiuri Semadgenloba. dedamiwis qerqSi Warbobs sami elementi Jangbadi, kaJmiwa (Si) da alumini. maTi wili 82,58%-ia. 6 elementze -rkina, kalciumi, kaliumi, titani, magniumi, natriuni modis 15 %. danarCen elementebze ki 2,26%.

dedamiwis qerqSi qimiuri elementebi warmoqmnian mineralebs, qanebis da madneulis Semadgenel nawilebs, romlebic gansxvavdebian qimiuri SemadgenlobiT da fizikuri TvisebebiT.

minerali warmoadgens bunebriv qimiur SenaerTs an elementarul nivTierebas, romelic warmoSobilia qerqSi an mis zedapirze mimdinare rTuli geologiuri procesebis Sedegad.

mineralTa udidesi nawili myar, kristalur nivTierebas warmoadgens: kaJmiwa, mindvris Spatebi, qarsebi, piroqsenebi. mcire nawili gazobriv mdgomareobaSia: gogirdwyalbadi, naxSirorJangi, alofani da sxv. aris Txevadi mineralebi: wyali, navTobi, vercxliswyali da sxv.

qanebis amgebi mineralebi iyofa **pirvelad da meorad mineralebad**. pirveladi gamokristaldeba uSualod magmidan, xolo meoradebi Cndebian pirveladi mineralebis daSlis da Secvlis Sedegad. mag. feldSpatebis Secvlis Sedegad Cndeba kaolini.

metamorfuli mineralwarmoqmnis procesi mimdinareobs dedamiwis qerqis siRrmeSi (6-10 km) adre warmoSobili magmuri, danaleqi metamorfuli qanebi geologiuri procesebis Sedegad xvdebian siRrmeSi, maRali wnevis, temperaturis, gazebis wylis orTqlis moqmedebiT ganicdian Rrma cvlilebebs, meorad gadakristalebas da warmoiSobian axali mineralebi.

mineralTa warmoSobis sami ZiriTadi procesia cnobili magmuri anu endogenuri, danaleqi anu egzogenuri da metamorfuli.

magmuri mineralebi warmoiSobian mdnari magmidan, maTi kristalizacia mimdinareobs garkveuli TanmimdevrobiT, pirvel rigSi gamokristaldebian is minaralebi romelTac dnobis maRali temeperatura aqvT. aseTebia rkina da magniumi. pegmatituri mineralwarmoSoba iwyeba 5000-dan da mTavrdeba7000. narCeni mdnaris bolo stadiaze romelic am dros gamdidrebulia siliciumiT, orTqliT airebiT warmoiSveba mindvris Spatebi, kvarci, madneuli radiaqtiuri da sxva mineralebi. 5000ze dabla iwyeba hidroTermuli procesi.

egzogenuri mineralwarmoqmna mimdinareobs dedamiwis zedapirze. misi mimdinareobisas didi mniSvneloba eniWeba gamofitvas, romlis drosac xdeba qanebis daSla -daqucmaceba da gardaqmna. gamofitvis procesi mimdinareobs dedamiwis qerqis sul zeda nawilSi da mas **gamofitvis qerqi** ewodeba. mineralebi, romlebic warmoiSobian egzogenuri procesebis dros yovelTvis meoradia,

danaleqi qanebi ageben dedamiwis qerqis 80%-s. warmoiSobian dedamiwis qerqis zedapirze, uzarmazari raodenobis mineraluri masebis dagrovebis Sedegad da warmoiSobian dedamiwis zedapirze gaSiSvlebuli qanebis temperaturis, Jangbadis, naxSirorJangis, wylis zemoqmedebiT amotyorcnili vulkanuri ferflis da sxva namsxvrevi masalis daleqvis Sedegad.

metamorfuli qanebi warmoiSobian magmuri danaleqi da metamorfuli qanebis gardaqmnis Sedegad. igi mimdinareobs maRali wnevis da temperaturis pirobebSi.

**reliefi da niadagwarmoqmnis procesi.** reliefi warmoadgens mocemuli nakveTis zedapiris saxes da xasiaTs. reliefi ferdobebis eqspoziciis da daxrilobis mixedviT warmoadgens mzis radiaciis, naleqebis gadanawilebis mTavar faqtors da gavlenas axdens wylovan, sakveb, HJangva-aRdgeniT da marilianobis reJimebze.

 reliefis daxasiaTeba emyareba mis geneziss (teqtonikuri, sufozuri, myinvarul akumulaciuri, eoluri formebi) da formas (geomorfologia).

reliefis formis sam jgufs arCeven: makroreliefi, mezoreliefi da mikroreliefi.

**makroreliefi** aris reliefis yvelaze didi forma romelic gansazRvravs didi teritoriis saerTo iers.: vakeebi, plato, mTis sistemebi. makroreliefis formireba umTavresad dakavSirebulia teqtonikur movlenebTan dedamiwis qerqSi.

**mezoreliefi** warmoadgens saSualo zomis reliefis formebs: beqobebi, borcvebi, Rartafebi, velebi, terasebi da sxvadasxva daqanebis ferdobebi. mezoreliefis warmoSoba ZiriTadad dakavSirebulia egzogenur geologiur procesebTan (denudaciuri procesebi, kontinentaluri nafenebis warmoqmna) razedac did gavlenas axdenen xmeleTis calkeuli nakveTebis neli awevebi da Cawevebi.

**mikroreliefis** qveS igulisxmeba reliefis wvrili formebi, romlebic ikaveben umniSvnelo farTobebs, ramdenime kvadratuli decimetridan ramdenime aseul kvadratul metramde. maT miekuTvneba borcvebi.

niadagebis formirebisa da niadaguri safaris ganviTarebaSi reliefis mniSvneloba didia da mravalferovani.

 reliefis yoveli elementi SeiZleba ganxiluli iqnes Semdegi parametrebiT:. **simaRle zRvis donidan, daxriloba, eqspozicia, mdgomareoba reliefis saerTo konfiguraciaSi.** es parametrebi Tavisi mniSvnelobiT ar aris tolfasi. zogierTi **maTgani uSualo gavlenas axdens procesebze** da **niadagwarmoqmnis xasiaTze** (ferdobis daxriloba da nakveTis mdgomareoba), **sxvani (**zRvis donidan simaRle, eqspozicia) moqmedeben **iribad**, ganapirobeben klimatis, mcenareulobis da cxovelebis garkveul cvlilebebs, rac Tavis mxriv aisaxeba niadagwarmoqmnaSi.

ferdobis daqaneba, rodesac **120 da metia**, aseTi ferdobis damuSaveba gaZnelebulia da igi SeiZleba gamoyenebuli iyos saTibad da saZovrad.

arsebobs ferdobebis daxrilobis Semdegi klasifikacia:

1. **damreci ferdobi\_daqaneba** **50 naklebi**
2. **daqanebuli ferdobi** (5-200) niadaguri safari zogierT adgilas **garRveulia**
3. **cicabi** (20-400) aq nawilakebis gadaadgileba xdeba simZimis ZaliT, Warbobs denudacia, niadaguri safari wyvetilia, xSiria mTis qanebis gaSiSvlebebi
4. **flatovani ferdobebi** (450 meti). simZimis ZaliT gamofitvis produqtebis met-naklebad sruli mocileba. niadaguri safari gvxvdeba mxolod nawilebad.

reliefis ZiriTadi tipebis gaTvaliswinebiT SesaZlebelia motanili iqnes niadagwarmoqmnis Semdegi Taviseburebani:

1. dabali mTebis niadaguri safari, ZiriTadSi warmodgenilia kargad ganviTarebuli niadagebiT; igive SeiZleba iTqvas zeganis niadagebze.
2. saSualo mTebis niadagebi xasiaTdeba\_xirxatianobiT ferdobis zeda nawilebSi da wvrilmiwianobiT mis qveda nawilebSi; simZlavris zrdiT imave mimarTulebiT; xSirad niadagebsa da qanebs Soris genetikuri kavSirebis uqonlobiT ferdobis qveda nawilSi; niadagebSi xSirad deluviuri fenebis an gadamarxuli niadagebis arseboba.
3. maRali mTebis niadagebi saxiaTdeba maRali xirxatianobiT, mcire simZlavriT, horizontebis susti gamoxatulebiT, naidaguri safaris Zlieri darRveviT.
4. velebis niadagebi xasiaTdeba Zlier cvalebadi meqanikuri SedgenilobiT, susti diferencaciiT niadagur horizontebze, xSiriad SreobriobiT.

**reliefis iribi mniSvneloba**\_simaRle zRvis donidan da ferdobis eqspozicia, gavlenas axdens klimatze, zedapiruli wylebis, mcenareulobis ganawilebaze.

1. reliefis mniSvneloba klimaturi pirobebisaTvis, reliefis gavlena klimatur pirobebis xasiaTze aRiniSneba sami mimarTulebiT: 1. xmeleTis erTi nakveTis amaRlebiT sxva nakveTze xdeba klimatis cvla vertikaluri mimarTulebiT\_iqmneba vertikaluri klimaturi zonebi, 2. mocemuli nakveTis horizontaluri mdgomareobidan gadaxris gamo icvleba mzis energia da naleqebis raodenoba xmeleTis zedapiris erTeulze. rac ufro Zlieri es gadaxra, miT ufro naklebi siTbo da teni modis niadagebis zedapiris erTeulze. 3. daxrili nakveTebis gansxvavebuli eqspoziciis gamo, gansxvavebuli niadagebi iReben siTbos da tenis araTanabari raodenobas da xasiaTdebian gansxvavebuli wylovani, Tburi da haerovani reJimiT.

mTian pirobebSi sawinaaRmdego ferdobebis niadagebs Soris gansxvaveba xSirad Zalian mkveTria. Tbilisis midamoebSi, wyneTis Tavze TrialeTis qedis CrdiloeT ferdobebze viTardeba yorali niadagebi, xolo samxreT ferdobebze yavisferi karbonatuli niadagebi.

2.reliefis gavlena zedapiruli wylebis ganawilebaze. is atmosferuli naleqebi, romlebic ver aRweven niadagSi, Camosrialdebian reliefis amozneqil da amaRlebul nawilebidan CaRrmavebul da dadablebul nawilebSi, ris Sedegadac xdeba am ukanasknelis datenianeba. es procesi mkveTrad aisaxeba niadagwarmoqmnaze (niadagebis Carecxva, neSompalis dagroveba da sxv.)

3. reliefis gavlena mcenareulobis ganawilebaze. mTebSi arsebuli klimatis, mcenareulobis da niadagebis vertikaluri sartylianoba aris simaRlis matebasTan erTad haeris temperaturis dawevis da datenianebis cvlilebis mizezi. yovelive es iwvevs sxvadasxva mcenareulobis dasaxlebas da ganviTarebas, organuli nivTierebis sinTezsa da daSlaSi arsebiT gansxvavebas, niadaguri mineralebis gardaqmnas da saboloo jamSi reliefis sxvadsxva pirobebSi gansxvavebuli niadagebis warmoqmnas.

reliefis mdgomareobiT da naleqebis gadanawilebiT gamoyofen niadagebis Semdegi jgufebs an datenianebis rigebs.

**avtomorfuli niadagebi**\_formirdebian swor zedapirze da ferdobebze, zedapiruli wylebis Tavisufali Camonadenis pirobebSi, gruntis wylebis Rrma dgomisas (6 m da ufro Rrmad).

**naxevradhidromorfuli niadagebi**\_zedapiruli wylebis xanmokle gaCerebisas an gruntis wylebis dgomisas 3-6 metrze.

**hidromorfuli niadagebi\_**wylebis xangrZlivi zedapiruli gaCerebisas an gruntis dgomisas 3 m nakleb siRrmeze.

reliefi did gavlenas axdens eroziuli procesebis ganviTarebaze. niadagwarmoqmnaze reliefis Taviseburebebis gavlenas didi mniSvneloba aqvs miwaTmoqmedebaSi, radganac sasoflo-sameurneo savargulebze reliefis nairferovneba ganapirobebs mcenareebis moyvanis niadaguri pirobebis araerTgvarovnebas, diferencirebuli agroteqnikis gamoyenebis aucileblobas.

reliefi did gavlenas axdens siTbosa da naleqebis ganawilebaze, denudaciur da akumulaciur procesebze, niadagis xsnaris da masSi gaxsnili nivTierebebis gadaadgilebaze.

dedamiwis zedapirze siTbos mTavar wyaros mzis sxivuri energia warmoadgens. aRniSnul energas dedamiwa Rebulobs pirdapiri da gafantuli radiaciis saxiT da Seadgens 17%-s, romelic ixarjeba transpiraciaze fotosinTezze da fizikur aorTqlebaze.

reliefi did gavlenas axdens kavkasiis calkeuli nawilebis klimatze. mTis pirobebSi klimaturi elementebis cvalebadobis Sesabamisad icvleba mcenareuli safari da niadagebi. kolxeTis tipis tye, mdidari maradmwvane qvetyiT warmodgenilia wiTelmiwa niadagebiT. 400 metris zemoT wiTelmiwebi icvleba yviTel-yomrali niadagebiT 800 metris zemoT foTlovani tyis qveS viTardeba yomrali niadagebi. simaRlis matebasTan erTad foTlovani tye gadadis Sereul da wiwvovan tyeSi. 1800-2000 metrze gvxvdeba mTa-tye-mdelos niadagebi. amgvarad, mTian porobebSi kargadaa gamoxatuli mcenareebisa da niadagebis vertikaluri zonaloba.

mniSvnelovania reliefis roli niadagis myari nivTierebis da xsnaris migraciis procesSi. niadagis zedapiridan naleqebis da Tovlis nadnobi wyliT gadairecxeba niadags moscildeba zeda nayofieri fena da misi akumulacia xdeba Cadablebuli reliefis pirobebSi.

saqarTvelos tenian suptopikebSi zedapiruli Camonadeni iwvevs MmTel rig arasasurvel movlenebs: niadagebis Camorecxvas, xevebis warmoqmnas, sakvebi nivTierebebis Semcirebas da niadagis zeda horizontebis simZlavris Semcirebas. m.daraselia monacemebiT axalgazrda Cais plantaciaSi daxril ferdobebidan weliwadSi gaitaneba 50-80 tona niadagi.

amrigad, reliefis zedapiri mniSvnelovan rols TamaSobs niadagwarmoqmnaSi, atmosferuli naleqebis gadanawilebaSi, maTTan erTad myari da gaxsnilmdgomareobaSi myofi elementebis migraciasa da gamotanaSi. am dros adgili aqvs garkveul geoqimiur procesebs, rac xels uwyobs damlaSebuli, konglomeratiani fenis warmoqmnas da sxvadasxva saxis konkreciiebis dagrovebas, gansakuTrebiT gamofitvis qerqSi.

**klimati.** didia klimatis roli niadagwarmoqmnis procesSi. is moqmedebs TviT biosferoze, qanebis gamofitvis xasiTze, gamofitvis produqtebis transportireba-gadanawilebaze da sxv. klimatur zonaSi niadagwarmoqmnis procesi erTimeorisagan aSkarad gansxvavdeba.

**k**limatis elementebidan niadagwarmoqmnis procesSi gansakuTrebiT did rols TamaSobs temperatura da atmosferuli naleqebi. isisni gansazRravenniadagis siTbos da tenis reJims. klimatis am elementebze did galenas axdensmcenareTa safari, amitom yovel calke niadagur kategoriaSi misi Sesaferisi niadaguri klimatia.

miuxedavad imisa, rom yovel niadags Tavisi tenisa da siTbos reJimi axasiaTebs, niadaguri klimati mainc didadaa damokidebuli mxaris (regionis) saeTo klimatze.

savegetacio periodis aqtiur temperaturaTa jamis mixedviT( >10 saSualo dReRamuri) gamoyofen klimatis Semdeg Termul jgufebs:

1.civi (polaruli) <6000

2. zomierad civi (borialuri)-600-20000

3.zomierad Tbili (subborialuri)- 20000-38000

4.Tbili (subtropikuli) 38000-80000

5. cxeli (tropikuli)->80000

atmosferuli naleqebis (datenianebis koeficienti) mixedviT gamoyofen klimatis Semdeg mTavar jgufebs:

1. Zlierteniani >3
2. teniani (humiduri) 1-3
3. naxevrad teniani (semihumiduri) 0,5-1
4. naxevrad mSrali (semiariduli) 0,3-0,5
5. mSrali (ariduli) 0,1-0,3
6. Zlier mSrali(eqstraariduli) <0,1

es koeficienti gamoxatavs, naleqebis raodenobis Sefardebas wylis zedapiridan aorTqlebuli tenis raodenobasTan.

datenianebis koeficientis mixedviT icvleba niadagis tenis reJimi (erTnairi reliefis elementebze), Jangva-aRdgenis potenciali, qanebis gamofitvisa da gamotutulobis xarisxi.

niadagwarmoqmnis procesSi, didi mniSvneloba aqvs naleqebis ganawilebas weliwadis droebis mixedviT, haeris SefardebiT tenianobas da qarebs.

civi klimatis pirobebSi qanebis fizikuri gamofitva Warbobs qimiurs, amasTan biologiuri procesebis aqtivobac daqveiTebulia, ris gamoc TviTon niadagwarmoqmnis procesi SezRudulia. zomieri da gansakuTrebiT cxeli klimatis pirobebSi, aRniSnuli procesi Tavisi gamoxatulebis mwvervalzea. saerTod ki niadagwarmoqmnis procesis yvela safexurs misi Sesaferisi klimati, kerZod naleqebisa da temperaturis reJimi axasiaTebs.

**xnovaneba da niadagwaroqmnis procesi.** niadagi, rogorc bunebrivi-istoriuli sxeuli dRevandeli saxiT warmoqmnisTanave ar yofilia, misi warmoqmna da ganviTareba xangrZliv istoiul, geologiur periodSi mimdinareobda. niadags warmoqmnidan dRemde garkveuli dro dasWirda. niadagwarmoqmnis procesi yvelgan erTdroulad ar dawyebula, vinaidan xmeleTis calkeuli ubnebis ganTavisuflebas wylidan da yinulisagan sxvadasxva periodi dasWirda. amdenad dedamiwaze arsebul niadagebs gaaCniaT sxvadasxva **xnovaneba anu asaki.**

niadagi icvleba drosa da sivrceSi. niadagis xnovanebas ukavSirdeba ori cneba\_ganviTareba da evolucia.

niadagis ganvTarebSi arCeven sawyiss fazas, romelic Seesabameba niadagwarmoqmnis pirvel etaps, am dros xdeba niadaguri reJimebis Camoyalibeba, Cndeba fragmentuli niadaguri horizontebi, aRiniSneba bunebrivi nayofierebis Casaxva. niadagwarmoqmnis Semdgo etapze Seucvlel ekologiur pirobebSi niadagi aRwevs mwife fazas, sruliad ganviTarebuli genetikuri profiliT, bunebrivi nayofierebis dadgenili doniT.

niadagis evolucias adgili aqvs im SemTxvevaSi, rodesac niadagis ganviTarebis garemosTan gawonasworebul mdgomareobaSi icvleba ekologiuri faqtorebi. am dros niadagi Sedis axal, evoluciuri ganviT- arebis fazaSi, romelsac Tan axlavs niadaguri profilis horizontebis gardaqmna, niadagebis Tvisebebis da bunebrivi nayofierebis Secvla.

amasTan kavSirSi niadaguri masis Tvisebebi iyofa sam jgufad: narCeni Tvisebebi, SemorCenili niadagwarmomqmneli qanidan. recentruli\_ ganviTarebis procesSi SeZenili niadagis mier. reliqturi\_ Semorcenili evoluciic processi, niadagis ganvitarebis wina stadiidan.

Tanamedrove niadaguri safari warmoadgens rTul sxvadasxva asakis warmonaqmns.

niadagebis evoluciaSi arCeven ramodenime cikls:

1. biologiurs an niadagis ganviTarebis cikls sistemaSi **niadagi-mcenare**.

2. biogeomorfologiuri, romelSic niadagi monawileobs mTel landSaftTan erTad, dedamiwis zedapiris reliefis evoluciis Sedegad.

3. bioklimaturi an niadagis ganviTarebis cikli sistemaSi niadagi-mcenare, romelic dakavSirebulia klimatis da bunebrivi garemos SecvlasTan geologiuri epoqebis manZilze. yvela CamoTvlili cikli urTierTSeTanawyobilia, nidagi maTSi erTdroulad monawileobs.

biologiuri cikli anu '"TviTganviTarebis" etapi. es cikli xasaiTdeba niadagebis an damoukidebeli faqtorebis SedarebiT stabiluri mdgomareobiT da iyofa or fazad. niadagis warmoqmna mTis qanidan da niadagis ganviTareba. es procesi mimdinareobs asi aTasi. aTeul aTasi wlis ganmavlobaSi zomieri sartylis fxvier qanebze is sruldeba 1000-3000 wlis ganmavlobaSi. yvelaze swrafad formirdebian aluviuri niadagebi 100-150 weli. niadagebis TviTganviTarebis saintereso magaliTs warmoadgens kolxeTis dablobis niadaguri safaris evolucia. dablobis zogierTi adgilis niadagebis progresuli daWaobeba gamowveulia niadagebis TviTganviTarebiT\_ lamiani Waobiani niadagebi ganicdian evolucias torfian -Waobiani niadagebSi.

biogeomorfologiur ciklSi reliefis ganviTarebasTan dakavSirebul evolucias niadagi ganicdis mTel landSaftTan erTad. dedamiwis zedapiri endogenuri da egzogenuri Zalebis urTierTqmedebiT ganicdis mudmiv gardaqmnas, romelic gavlenas axdens niadaguri safaris ganviTarebaze, ZiriTadad niadagwarmoqmnis hidroTermuli reJimebis Secvlis Sedegad (Camonadeni, drenaJi, gruntis datenianeba).

bioklimaturi an niadagis ganviTarebis cikli dakavSirebulia drois geologiur monakveTSi klimatis arsebiT cvlilebasTan, rac ganporobebulia zogad planetarul an kosmosur mizezebiT (daTboba, aciveba). klimaturi zonebis sazRvrebis gadaweva iwvevs cvlilebebs mcenareul safarSi, niadagebis Tbur da wylovan Tvisebebze, rac gavlenas axdens niadagwarmoqmnis procesze da aisaxeba niadagis TvisebebSi.

 saqarTveloSi evoluciis bioklimaturi ciklis magaliTs SeiZleba mivakuTvnoT centralur kavkasionze, subalpur sartyelSi reliefis wynari formebis pirobebSi, SedarebiT mZlavri niadagebis ganviTareba, romlebsac gaaCniaT tyis piorbebisaTvis damaxasiaTebeli niadagwarmoqmnis maCveneblebi (kaklovani struqtura, Tixis gadaadgilebis niSnebi da sxv.). amave xasiaTis evoluciis magaliTs warmoadgenen aRmosavleT saqarTvelos yavisfer da yomrali niadagebSi reliqturi, wiTeli feris Sreebis arseboba.

arCeven **SefardebiT da absolutur xnovanebas.** **absoluturi xnovaneba** warmoadgens dros niadagis formirebidan dRemde. is meryeobs ramodenime wlidan milion wlamde. yvelaze didi xnovaneba aqvs tropikul niadagebs, romlebmac ar ganicades sxvadasxva saxis darRveva. saqarTveloSi 1000 metris zemoT niadagebs aqvT **holocenuri asaki** (10000-12000 weli) am niSnulis qvemoT niadagebi ufro xnieria, yvelaze axalgazrda niadagebi viTardebian WalebSi.

 **fardobiTi asaki** axasiaTebs niadagwarmoqmnis procesis siswrafes, is dakavSirebulia niadagwarmoqmnis procesis siswrafesTan da mimarTulebasTan, qanebis SedgenilobasTan da TvisebebTan, reliefis pirobebis gavlenasTan.

niadagebis evoluciis sakiTxebis Sesaswavlad gamoiyeneba sxvadasxva meTodi: **niadaguri profilis genetikuri analizi, stacionaruli meTodi, modelirebis meTodi, SedarebiT geografiuli meTodi, SedarebiT-qronologiuri meTodi, paleogeografiuli meTodi, istoriuli meTodi, radiowyalbadis** meTodi\_niadagebis absoluturi asakis dadgenis erT-erTi ZiriTadi meTodia, romlis drosac asakis dadgena xdeba 14C gamoyenebiT.

**mcenareuloba.** biologiuri faqtori, kerZod kerZod, mcenareuloba da mikroorganizmebi, niadagwarmoqmnis procesSi pirvelxarisxovan rols asrulebs.

cocxali organizmebis moqmedeba niadagwarmoqmnis procesSi, erTic mxriv aqtiuri, xolo meores mxriv, pasiuri xasiaTisaa. pirveli gamoixateba imaSi, rom mcenaris (da mikrobTa) saSualebiT xdeba nayofierebis elementebis-sakvebi nivTierebebis akumulacia niadagSi. amave dros es organizmebi TavianTi gamonayofi nivTierebebis (organuli mJavebi, CO2 da sxv) moqmedebiT qanze da xirxatze, aZliereben gamofitvis process. organizmebis pasiuri moqmedeba mdgomareobs imaSi, rom maTi naSTebi rCeba niadagSi, humusis wyarod. garda aRniSnulisa mcenareuli safari udides gavlenas axdens klimatur reJimze saerTod da, kerZod ki,mikroklimatsa da niadagis klimatze.

dadgenilia, rom merqniani mcenareebi qimiuri SedgenilobiTa da fizikur–meqanikuri TvisebebiT, balaxovan mcenareebisgan gansxvavdebian. merqniani mcenareebi, rogorc mravalwliani mcenareebi, niadags miwisqveSa narCenebiT TiTqmis arafers ar mateben, da priqiT miwiszeda narCenebiT ki yovelwliurad amdidreben mas. merqniani mcenreebis naSTebi-tyis mkvdari safari, romelSic didi raodenobiTaa celuloza, xasaTdeba sifxvieriT da kargi aeraciiT. Tumca yvela balaxovani mcenare merqnianisgan gansxvavebiT yovelwliurad niadagSi didi raodenobiT tovebs fesvis naSTebs, rac Tavis mxriv gavlenas axdens niadagis nayofierebaze.

mcenareTa safaris ganviTareba da cvalebadoba apirobebs niadagebis evolucias.

niadagwarmoqmnaSi mniSvnelovani roli ekuTvnis cxovelur organiznmebsac; umartivesebs, uxerxemloebsa da mTxrel xerxemlianebs. uxerxemloebidan yvelaze met gavlenas axdenen Wiayelebi, romlebic TavianT organizmSi 10 tonamde niadagis masas atareben TiToeul heqtarze. amitom Wiayelebi niadagis nayofierebis erT–erTi biologiuri maCvenebelia, xerxemliani cxovelebi (Txunelebi, Triebi, zazunebi miwis kurdRlebi, memindvriebi) Txrian soroebs ureven organul nivTierebebs mineralurSi, SesamCnevad amaRleben niadagis, wylis da haeris gamtarianobas. rac Tavis mxriv xels uwyobs mcenareuli narCenebis xrwnas.

adamianis sawarmoo moqmedeba(anTropogenuli faqtori) miwaTmoqmedebas adamiani misdevs uxsovari droidan, roca adamianebi mcenareebis Segrovebidan maT gamravlebaze gadavidnen. am droidan niadagi gaxda Sromis obieqti da warmoebis ZiriTadi saSualeba. adamiani Tavis sameurneo moqmedebiT udides gavlenas axdens niadagwarmoqmnis procesze. es gavlena SeiZleba iyos dadebiTi an uaryofiTi. dadebiTia, rac niadagis gakulturebas da nayofierebas iwvevs, xolo uaryofiTia-roca nayofiereba ecema (erozia, arakvalificiuri eqsploatacia, dabinZureba meoradi daWaobeba da damlaSeba).

swori agroteqnikis pirobebSi niadagi TandaTan kulturul niadagad iqceva, e.i. iseT niadagad, romelsac axasiaTebs mtkice struqtura, Rrma saxnavi fena, kargi fizikuri Tvisebebi, sakvebi elementebis didi raodenoba da Tavisufalia rogorc sarevelebisagan ise mavne mikro da makrofaunisagan.

sasoflo-sameurneo kulturebi mTeli sicocxlis ganmavlobaSi garemosTan mudmiv urTierTobaSi arian. Tu garemo ver akmayofilebs mcenareuli organizmebis zrda–ganviTarebisaTvis saWiro moTxovnilebebs, maSin mcenare iRupeba da piriqiT mcenareTa dakmayofileba sicocxlis yvela faqtorebiT uzrunvelyofs maT biologiur SesaZleblobaTa gamovlinebas maqsimaluri mosavlis saqmeSi.

sasicocxlo faqtorebi iyofa or jgufad: kosmosuri anu energetikuli (sinaTle da siTbo); miwieri, anu materialuri (wyali, sakvebi, haeri).

sasicocxlo faqtorebis garda mcenaris zrda-ganviTarebaze gavlenas axdens garemo pirobebi. garemo pirobebis qveS igulisxmeba gare viTareba, romlis Sesabamisad vlindeba sasicocxlo faqtorebis moqmedeba.

garemo pirobebs yofen sam jgufad: 1.niadagobrivi-(saxnavi fenis agebuleba, struqtura simkvrive are da sxv.)

2.fitologiuri (kulturul mcenareebze sarevelebis, mavneblebisa da avadmyofobaTa uaryofiTi moqmedeba)

3 agroteqnikuri (agroteqnikis drouli da xarisxiani Catareba).

mcenaris zrdis faqtorebis raodenobriv cvalebadobasa da mcenaris zrda-ganviTarebas Soris kanonzomieri damokidebulebaa. mcenaris moTxovnileba savegetacio periodis manZilze sasicocxlo faqtorebis mimarT sxvadsxvaa. mcenarisaTvis sinaTlis ZiriTadi wyaro mzis sxivebia, Tunca es wyaro adamianis marTvas ar eqvemdebareba. magram misi energiis gamoyenebis done fotosinTezisaTvis bevradaa damokidebuli Catarebul agroteqnikaze.

siTbo sinaTlesTan erTad warmoadgens mcenaris zrda-ganviTarebis erT-erT ziriTad sasicocxl faqtors daniadagSi mimdinare biologiuri, qimiuri da fizikuri procesebis aucilebel pirobas. TviTeul mcenares Tavisi ganviTarebis fazebTan dakavSirebiT misadmi gansazRvruli moTxovnileba aqvs.

wyali da sakvebi nivTierebani niadagobriv sasicocxlo faqtorebs warmoadgenen, naxsirorJangis garda,romelsac mcenare haeridan iTvisebs,\. amitom wyalsa da sakveb nivTierebebs niadagis nayofierebis elementebs uwdeben.

haeri mcenarisaTvis da mikroorganizmebisaTvis aucilebelia, rogor Jangbadis wyaro, is warmoadgens naxSirbadis wyaros, romelsac mcenare iyenebs fotosinTezis procesSi.

haeri aucilebelia niadagSi mimdinare mikrobiologiur procesebSi, ris Sedegadac aerobul procesebis wyalobiT niadagis organuli nivTierebani ixrwneba da warmoiSoba azotis, fosforis,kaliumis da sxva nivTierebebis xsnadi formebi. aqve unda aRiniSnos, rom mcenaris sasicocxlo faqtorebi urTierTSeucvladia, arc erTi faqtoris sxva fatoriT ecvla ar SeiZleba. amasTan Zalzed mniSvnelovania is rom mcenaris yvela sasicocxlo faqtori fiziologiurad tolfasia, rac imas niSnavs, rom isini yvela erTnairad aucilebeli mcenarisaTvis. zrdis faqtorebis met-naklebi raodenobis gavlenas mosavlis odenobaze gansazRvravs is faqtori romelic minimumSia. rac ar unda gavzardoT sxva faqtorebis zemoqmedeba, mosavlis raodenoba ver gadaaWarbebs im dones, romelsac minimumSi myofi nivTiereba akmayofilebs.

sabolood vrwmundebiT, rom yvela es sasicocrlo faqtorebi mcenarisaTvis optimalur donemde zrdis mis mosvals Tu romelime maTgana gadaaWarnba optimalur dones maSin Cven viRebT mosavlis sagrZnob klebas.

Tavi 3

niadagis Sedgeniloba da Tvisebebi. niadagis klasifikacia meqanikuri Sdgenilobis mixedviT. niadagis xvedriTi wona. niadagis moculobiTi wona. niadagis forianoba, plastikuroba.niadagis webovnebis Tviseba. gajirjveba da dajdoma, niadagis simwife, xvedriTi winaRoba

yvelaze srulad niadagis ganmarteba mogvca v. dokuCaevma: \_niadagi es aris TviTmyofi bunebrivi istoriuli sxeuli, romelic warmoqmnilia niadagTwarmomqmneli faqtorebis: qanis, reliefis, klimatis, xnovanebis, mcenareulobis da adamianis sameurneo zemoqmedebis Sedegad.

qani. rogorc cnobilia, qani niadagis mineralur nivTierebaTa wyaroa. qanis gamofitviT warmoqmnili naSalis e.w. deda qanis mineralogiur Sedgenilobasa da fizikur Tvisebebze bevrad aris damokidebuli niadagwarmoqmnis xasiaTi da niadagis Sedgeniloba. rac meti raodenobiT Seicavs qani fosfors, kaliums, gogirds da sxva nivTierebebs imdenad metia isini aseT qanze warmoqmnil niadagSi. advilad xsnadi marilebiT mdidar qanze mlaSe niadagebi viTardeba, kirqvaze neSompala-karbonatuli, xolo rkiniT mdidar kirqvebze-terarosa. Tixian qanebze Cveulebrivad mZime meqanikuri Sedgenilobis niadagebi gvxvdeba, vidre qviSian qanebze. amonaRvar mJave qanebze warmoqmnili niadagi silas meti raodenobiT Seicavs vidre fuZe qanebze ganviTarebuli niadagi.

dedamiwis qerqis da mTlianad dedamiwis Semadgenlobis dasadgenad Seiswavleba qanebis da mineralebis qimiuri Semadgenloba. dedamiwis qerqSi Warbobs sami elementi Jangbadi, kaJmiwa (Si) da alumini. maTi wili 82,58%-ia. 6 elementze -rkina, kalciumi, kaliumi, titani, magniumi, natriuni modis 15 %. danarCen elementebze ki 2,26%.

dedamiwis qerqSi qimiuri elementebi warmoqmnian mineralebs, qanebis da madneulis Semadgenel nawilebs, romlebic gansxvavdebian qimiuri SemadgenlobiT da fizikuri TvisebebiT.

minerali warmoadgens bunebriv qimiur SenaerTs an elementarul nivTierebas, romelic warmoSobilia qerqSi an mis zedapirze mimdinare rTuli geologiuri procesebis Sedegad.

mineralTa udidesi nawili myar, kristalur nivTierebas warmoadgens: kaJmiwa, mindvris Spatebi, qarsebi, piroqsenebi. mcire nawili gazobriv mdgomareobaSia: gogirdwyalbadi, naxSirorJangi, alofani da sxv. aris Txevadi mineralebi: wyali, navTobi, vercxliswyali da sxv.

qanebis amgebi mineralebi iyofa pirvelad da meorad mineralebad. pirveladi gamokristaldeba uSualod magmidan, xolo meoradebi Cndebian pirveladi mineralebis daSlis da Secvlis Sedegad. mag. feldSpatebis Secvlis Sedegad Cndeba kaolini.

metamorfuli mineralwarmoqmnis procesi mimdinareobs dedamiwis qerqis siRrmeSi (6-10 km) adre warmoSobili magmuri, danaleqi metamorfuli qanebi geologiuri procesebis Sedegad xvdebian siRrmeSi, maRali wnevis, temperaturis, gazebis wylis orTqlis moqmedebiT ganicdian Rrma cvlilebebs, meorad gadakristalebas da warmoiSobian axali mineralebi.

mineralTa warmoSobis sami ZiriTadi procesia cnobili magmuri anu endogenuri, danaleqi anu egzogenuri da metamorfuli.

magmuri mineralebi warmoiSobian mdnari magmidan, maTi kristalizacia mimdinareobs garkveuli TanmimdevrobiT, pirvel rigSi gamokristaldebian is minaralebi romelTac dnobis maRali temeperatura aqvT. aseTebia rkina da magniumi. pegmatituri mineralwarmoSoba iwyeba 5000-dan da mTavrdeba 7000. narCeni mdnaris bolo stadiaze romelic am dros gamdidrebulia siliciumiT, orTqliT airebiT warmoiSveba mindvris Spatebi, kvarci, madneuli radiaqtiuri da sxva mineralebi. 5000ze dabla iwyeba hidroTermuli procesi.

egzogenuri mineralwarmoqmna mimdinareobs dedamiwis zedapirze. misi mimdinareobisas didi mniSvneloba eniWeba gamofitvas, romlis drosac xdeba qanebis daSla -daqucmaceba da gardaqmna. gamofitvis procesi mimdinareobs dedamiwis qerqis sul zeda nawilSi da mas gamofitvis qerqi ewodeba. mineralebi, romlebic warmoiSobian egzogenuri procesebis dros yovelTvis meoradia,

danaleqi qanebi ageben dedamiwis qerqis 80%-s. warmoiSobian dedamiwis qerqis zedapirze, uzarmazari raodenobis mineraluri masebis dagrovebis Sedegad da warmoiSobian dedamiwis zedapirze gaSiSvlebuli qanebis temperaturis, Jangbadis, naxSirorJangis, wylis zemoqmedebiT amotyorcnili vulkanuri ferflis da sxva namsxvrevi masalis daleqvis Sedegad.

metamorfuli qanebi warmoiSobian magmuri danaleqi da metamorfuli qanebis gardaqmnis Sedegad. igi mimdinareobs maRali wnevis da temperaturis pirobebSi.

reliefi da niadagwarmoqmnis procesi. reliefi warmoadgens mocemuli nakveTis zedapiris saxes da xasiaTs. reliefi ferdobebis eqspoziciis da daxrilobis mixedviT warmoadgens mzis radiaciis, naleqebis gadanawilebis mTavar faqtors da gavlenas axdens wylovan, sakveb, HJangva-aRdgeniT da marilianobis reJimebze.

 reliefis daxasiaTeba emyareba mis geneziss (teqtonikuri, sufozuri, myinvarul akumulaciuri, eoluri formebi) da formas (geomorfologia).

reliefis formis sam jgufs arCeven: makroreliefi, mezoreliefi da mikroreliefi.

makroreliefi aris reliefis yvelaze didi forma romelic gansazRvravs didi teritoriis saerTo iers.: vakeebi, plato, mTis sistemebi. makroreliefis formireba umTavresad dakavSirebulia teqtonikur movlenebTan dedamiwis qerqSi.

mezoreliefi warmoadgens saSualo zomis reliefis formebs: beqobebi, borcvebi, Rartafebi, velebi, terasebi da sxvadasxva daqanebis ferdobebi. mezoreliefis warmoSoba ZiriTadad dakavSirebulia egzogenur geologiur procesebTan (denudaciuri procesebi, kontinentaluri nafenebis warmoqmna) razedac did gavlenas axdenen xmeleTis calkeuli nakveTebis neli awevebi da Cawevebi.

mikroreliefis qveS igulisxmeba reliefis wvrili formebi, romlebic ikaveben umniSvnelo farTobebs, ramdenime kvadratuli decimetridan ramdenime aseul kvadratul metramde. maT miekuTvneba borcvebi.

niadagebis formirebisa da niadaguri safaris ganviTarebaSi reliefis mniSvneloba didia da mravalferovani.

 reliefis yoveli elementi SeiZleba ganxiluli iqnes Semdegi parametrebiT:. simaRle zRvis donidan, daxriloba, eqspozicia, mdgomareoba reliefis saerTo konfiguraciaSi. es parametrebi Tavisi mniSvnelobiT ar aris tolfasi. zogierTi maTgani uSualo gavlenas axdens procesebze da niadagwarmoqmnis xasiaTze (ferdobis daxriloba da nakveTis mdgomareoba), sxvani (zRvis donidan simaRle, eqspozicia) moqmedeben iribad, ganapirobeben klimatis, mcenareulobis da cxovelebis garkveul cvlilebebs, rac Tavis mxriv aisaxeba niadagwarmoqmnaSi.

ferdobis daqaneba, rodesac 120 da metia, aseTi ferdobis damuSaveba gaZnelebulia da igi SeiZleba gamoyenebuli iyos saTibad da saZovrad.

arsebobs ferdobebis daxrilobis Semdegi klasifikacia:

damreci ferdobi\_daqaneba 50 naklebi

daqanebuli ferdobi (5-200) niadaguri safari zogierT adgilas garRveulia

cicabi (20-400) aq nawilakebis gadaadgileba xdeba simZimis ZaliT, Warbobs denudacia, niadaguri safari wyvetilia, xSiria mTis qanebis gaSiSvlebebi

flatovani ferdobebi (450 meti). simZimis ZaliT gamofitvis produqtebis met-naklebad sruli mocileba. niadaguri safari gvxvdeba mxolod nawilebad.

reliefis ZiriTadi tipebis gaTvaliswinebiT SesaZlebelia motanili iqnes niadagwarmoqmnis Semdegi Taviseburebani:

dabali mTebis niadaguri safari, ZiriTadSi warmodgenilia kargad ganviTarebuli niadagebiT; igive SeiZleba iTqvas zeganis niadagebze.

saSualo mTebis niadagebi xasiaTdeba\_xirxatianobiT ferdobis zeda nawilebSi da wvrilmiwianobiT mis qveda nawilebSi; simZlavris zrdiT imave mimarTulebiT; xSirad niadagebsa da qanebs Soris genetikuri kavSirebis uqonlobiT ferdobis qveda nawilSi; niadagebSi xSirad deluviuri fenebis an gadamarxuli niadagebis arseboba.

maRali mTebis niadagebi saxiaTdeba maRali xirxatianobiT, mcire simZlavriT, horizontebis susti gamoxatulebiT, naidaguri safaris Zlieri darRveviT.

velebis niadagebi xasiaTdeba Zlier cvalebadi meqanikuri SedgenilobiT, susti diferencaciiT niadagur horizontebze, xSiriad SreobriobiT.

reliefis iribi mniSvneloba\_simaRle zRvis donidan da ferdobis eqspozicia, gavlenas axdens klimatze, zedapiruli wylebis, mcenareulobis ganawilebaze.

reliefis mniSvneloba klimaturi pirobebisaTvis, reliefis gavlena klimatur pirobebis xasiaTze aRiniSneba sami mimarTulebiT: 1. xmeleTis erTi nakveTis amaRlebiT sxva nakveTze xdeba klimatis cvla vertikaluri mimarTulebiT\_iqmneba vertikaluri klimaturi zonebi, 2. mocemuli nakveTis horizontaluri mdgomareobidan gadaxris gamo icvleba mzis energia da naleqebis raodenoba xmeleTis zedapiris erTeulze. rac ufro Zlieri es gadaxra, miT ufro naklebi siTbo da teni modis niadagebis zedapiris erTeulze. 3. daxrili nakveTebis gansxvavebuli eqspoziciis gamo, gansxvavebuli niadagebi iReben siTbos da tenis araTanabari raodenobas da xasiaTdebian gansxvavebuli wylovani, Tburi da haerovani reJimiT.

mTian pirobebSi sawinaaRmdego ferdobebis niadagebs Soris gansxvaveba xSirad Zalian mkveTria. Tbilisis midamoebSi, wyneTis Tavze TrialeTis qedis CrdiloeT ferdobebze viTardeba yorali niadagebi, xolo samxreT ferdobebze yavisferi karbonatuli niadagebi.

2.reliefis gavlena zedapiruli wylebis ganawilebaze. is atmosferuli naleqebi, romlebic ver aRweven niadagSi, Camosrialdebian reliefis amozneqil da amaRlebul nawilebidan CaRrmavebul da dadablebul nawilebSi, ris Sedegadac xdeba am ukanasknelis datenianeba. es procesi mkveTrad aisaxeba niadagwarmoqmnaze (niadagebis Carecxva, neSompalis dagroveba da sxv.)

3. reliefis gavlena mcenareulobis ganawilebaze. mTebSi arsebuli klimatis, mcenareulobis da niadagebis vertikaluri sartylianoba aris simaRlis matebasTan erTad haeris temperaturis dawevis da datenianebis cvlilebis mizezi. yovelive es iwvevs sxvadasxva mcenareulobis dasaxlebas da ganviTarebas, organuli nivTierebis sinTezsa da daSlaSi arsebiT gansxvavebas, niadaguri mineralebis gardaqmnas da saboloo jamSi reliefis sxvadsxva pirobebSi gansxvavebuli niadagebis warmoqmnas.

reliefis mdgomareobiT da naleqebis gadanawilebiT gamoyofen niadagebis Semdegi jgufebs an datenianebis rigebs.

avtomorfuli niadagebi\_formirdebian swor zedapirze da ferdobebze, zedapiruli wylebis Tavisufali Camonadenis pirobebSi, gruntis wylebis Rrma dgomisas (6 m da ufro Rrmad).

naxevradhidromorfuli niadagebi\_zedapiruli wylebis xanmokle gaCerebisas an gruntis wylebis dgomisas 3-6 metrze.

hidromorfuli niadagebi\_wylebis xangrZlivi zedapiruli gaCerebisas an gruntis dgomisas 3 m nakleb siRrmeze.

reliefi did gavlenas axdens eroziuli procesebis ganviTarebaze. niadagwarmoqmnaze reliefis Taviseburebebis gavlenas didi mniSvneloba aqvs miwaTmoqmedebaSi, radganac sasoflo-sameurneo savargulebze reliefis nairferovneba ganapirobebs mcenareebis moyvanis niadaguri pirobebis araerTgvarovnebas, diferencirebuli agroteqnikis gamoyenebis aucileblobas.

reliefi did gavlenas axdens siTbosa da naleqebis ganawilebaze, denudaciur da akumulaciur procesebze, niadagis xsnaris da masSi gaxsnili nivTierebebis gadaadgilebaze.

dedamiwis zedapirze siTbos mTavar wyaros mzis sxivuri energia warmoadgens. aRniSnul energas dedamiwa Rebulobs pirdapiri da gafantuli radiaciis saxiT da Seadgens 17%-s, romelic ixarjeba transpiraciaze fotosinTezze da fizikur aorTqlebaze.

reliefi did gavlenas axdens kavkasiis calkeuli nawilebis klimatze. mTis pirobebSi klimaturi elementebis cvalebadobis Sesabamisad icvleba mcenareuli safari da niadagebi. kolxeTis tipis tye, mdidari maradmwvane qvetyiT warmodgenilia wiTelmiwa niadagebiT. 400 metris zemoT wiTelmiwebi icvleba yviTel-yomrali niadagebiT 800 metris zemoT foTlovani tyis qveS viTardeba yomrali niadagebi. simaRlis matebasTan erTad foTlovani tye gadadis Sereul da wiwvovan tyeSi. 1800-2000 metrze gvxvdeba mTa-tye-mdelos niadagebi. amgvarad, mTian porobebSi kargadaa gamoxatuli mcenareebisa da niadagebis vertikaluri zonaloba.

mniSvnelovania reliefis roli niadagis myari nivTierebis da xsnaris migraciis procesSi. niadagis zedapiridan naleqebis da Tovlis nadnobi wyliT gadairecxeba niadags moscildeba zeda nayofieri fena da misi akumulacia xdeba Cadablebuli reliefis pirobebSi.

saqarTvelos tenian suptopikebSi zedapiruli Camonadeni iwvevs MmTel rig arasasurvel movlenebs: niadagebis Camorecxvas, xevebis warmoqmnas, sakvebi nivTierebebis Semcirebas da niadagis zeda horizontebis simZlavris Semcirebas. m.daraselia monacemebiT axalgazrda Cais plantaciaSi daxril ferdobebidan weliwadSi gaitaneba 50-80 tona niadagi.

amrigad, reliefis zedapiri mniSvnelovan rols TamaSobs niadagwarmoqmnaSi, atmosferuli naleqebis gadanawilebaSi, maTTan erTad myari da gaxsnilmdgomareobaSi myofi elementebis migraciasa da gamotanaSi. am dros adgili aqvs garkveul geoqimiur procesebs, rac xels uwyobs damlaSebuli, konglomeratiani fenis warmoqmnas da sxvadasxva saxis konkreciiebis dagrovebas, gansakuTrebiT gamofitvis qerqSi.

klimati. didia klimatis roli niadagwarmoqmnis procesSi. is moqmedebs TviT biosferoze, qanebis gamofitvis xasiTze, gamofitvis produqtebis transportireba-gadanawilebaze da sxv. klimatur zonaSi niadagwarmoqmnis procesi erTimeorisagan aSkarad gansxvavdeba.

klimatis elementebidan niadagwarmoqmnis procesSi gansakuTrebiT did rols TamaSobs temperatura da atmosferuli naleqebi. isisni gansazRravenniadagis siTbos da tenis reJims. klimatis am elementebze did galenas axdensmcenareTa safari, amitom yovel calke niadagur kategoriaSi misi Sesaferisi niadaguri klimatia.

miuxedavad imisa, rom yovel niadags Tavisi tenisa da siTbos reJimi axasiaTebs, niadaguri klimati mainc didadaa damokidebuli mxaris (regionis) saeTo klimatze.

savegetacio periodis aqtiur temperaturaTa jamis mixedviT( >10 saSualo dReRamuri) gamoyofen klimatis Semdeg Termul jgufebs:

1.civi (polaruli) <6000

2. zomierad civi (borialuri)-600-20000

3.zomierad Tbili (subborialuri)- 20000-38000

4.Tbili (subtropikuli) 38000-80000

5. cxeli (tropikuli)->80000

 atmosferuli naleqebis (datenianebis koeficienti) mixedviT gamoyofen klimatis Semdeg mTavar jgufebs:

Zlierteniani >3

teniani (humiduri) 1-3

naxevrad teniani (semihumiduri) 0,5-1

naxevrad mSrali (semiariduli) 0,3-0,5

mSrali (ariduli) 0,1-0,3

Zlier mSrali(eqstraariduli) <0,1

es koeficienti gamoxatavs, naleqebis raodenobis Sefardebas wylis zedapiridan aorTqlebuli tenis raodenobasTan.

datenianebis koeficientis mixedviT icvleba niadagis tenis reJimi (erTnairi reliefis elementebze), Jangva-aRdgenis potenciali, qanebis gamofitvisa da gamotutulobis xarisxi.

niadagwarmoqmnis procesSi, didi mniSvneloba aqvs naleqebis ganawilebas weliwadis droebis mixedviT, haeris SefardebiT tenianobas da qarebs.

civi klimatis pirobebSi qanebis fizikuri gamofitva Warbobs qimiurs, amasTan biologiuri procesebis aqtivobac daqveiTebulia, ris gamoc TviTon niadagwarmoqmnis procesi SezRudulia. zomieri da gansakuTrebiT cxeli klimatis pirobebSi, aRniSnuli procesi Tavisi gamoxatulebis mwvervalzea. saerTod ki niadagwarmoqmnis procesis yvela safexurs misi Sesaferisi klimati, kerZod naleqebisa da temperaturis reJimi axasiaTebs.

xnovaneba da niadagwaroqmnis procesi. niadagi, rogorc bunebrivi-istoriuli sxeuli dRevandeli saxiT warmoqmnisTanave ar yofilia, misi warmoqmna da ganviTareba xangrZliv istoiul, geologiur periodSi mimdinareobda. niadags warmoqmnidan dRemde garkveuli dro dasWirda. niadagwarmoqmnis procesi yvelgan erTdroulad ar dawyebula, vinaidan xmeleTis calkeuli ubnebis ganTavisuflebas wylidan da yinulisagan sxvadasxva periodi dasWirda. amdenad dedamiwaze arsebul niadagebs gaaCniaT sxvadasxva xnovaneba anu asaki.

niadagi icvleba drosa da sivrceSi. niadagis xnovanebas ukavSirdeba ori cneba\_ganviTareba da evolucia.

niadagis ganvTarebSi arCeven sawyiss fazas, romelic Seesabameba niadagwarmoqmnis pirvel etaps, am dros xdeba niadaguri reJimebis Camoyalibeba, Cndeba fragmentuli niadaguri horizontebi, aRiniSneba bunebrivi nayofierebis Casaxva. niadagwarmoqmnis Semdgo etapze Seucvlel ekologiur pirobebSi niadagi aRwevs mwife fazas, sruliad ganviTarebuli genetikuri profiliT, bunebrivi nayofierebis dadgenili doniT.

niadagis evolucias adgili aqvs im SemTxvevaSi, rodesac niadagis ganviTarebis garemosTan gawonasworebul mdgomareobaSi icvleba ekologiuri faqtorebi. am dros niadagi Sedis axal, evoluciuri ganviT- arebis fazaSi, romelsac Tan axlavs niadaguri profilis horizontebis gardaqmna, niadagebis Tvisebebis da bunebrivi nayofierebis Secvla.

amasTan kavSirSi niadaguri masis Tvisebebi iyofa sam jgufad: narCeni Tvisebebi, SemorCenili niadagwarmomqmneli qanidan. recentruli\_ ganviTarebis procesSi SeZenili niadagis mier. reliqturi\_ Semorcenili evoluciic processi, niadagis ganvitarebis wina stadiidan.

Tanamedrove niadaguri safari warmoadgens rTul sxvadasxva asakis warmonaqmns.

niadagebis evoluciaSi arCeven ramodenime cikls:

1. biologiurs an niadagis ganviTarebis cikls sistemaSi niadagi-mcenare.

2. biogeomorfologiuri, romelSic niadagi monawileobs mTel landSaftTan erTad, dedamiwis zedapiris reliefis evoluciis Sedegad.

3. bioklimaturi an niadagis ganviTarebis cikli sistemaSi niadagi-mcenare, romelic dakavSirebulia klimatis da bunebrivi garemos SecvlasTan geologiuri epoqebis manZilze. yvela CamoTvlili cikli urTierTSeTanawyobilia, nidagi maTSi erTdroulad monawileobs.

biologiuri cikli anu '"TviTganviTarebis" etapi. es cikli xasaiTdeba niadagebis an damoukidebeli faqtorebis SedarebiT stabiluri mdgomareobiT da iyofa or fazad. niadagis warmoqmna mTis qanidan da niadagis ganviTareba. es procesi mimdinareobs asi aTasi. aTeul aTasi wlis ganmavlobaSi zomieri sartylis fxvier qanebze is sruldeba 1000-3000 wlis ganmavlobaSi. yvelaze swrafad formirdebian aluviuri niadagebi 100-150 weli. niadagebis TviTganviTarebis saintereso magaliTs warmoadgens kolxeTis dablobis niadaguri safaris evolucia. dablobis zogierTi adgilis niadagebis progresuli daWaobeba gamowveulia niadagebis TviTganviTarebiT\_ lamiani Waobiani niadagebi ganicdian evolucias torfian -Waobiani niadagebSi.

biogeomorfologiur ciklSi reliefis ganviTarebasTan dakavSirebul evolucias niadagi ganicdis mTel landSaftTan erTad. dedamiwis zedapiri endogenuri da egzogenuri Zalebis urTierTqmedebiT ganicdis mudmiv gardaqmnas, romelic gavlenas axdens niadaguri safaris ganviTarebaze, ZiriTadad niadagwarmoqmnis hidroTermuli reJimebis Secvlis Sedegad (Camonadeni, drenaJi, gruntis datenianeba).

bioklimaturi an niadagis ganviTarebis cikli dakavSirebulia drois geologiur monakveTSi klimatis arsebiT cvlilebasTan, rac ganporobebulia zogad planetarul an kosmosur mizezebiT (daTboba, aciveba). klimaturi zonebis sazRvrebis gadaweva iwvevs cvlilebebs mcenareul safarSi, niadagebis Tbur da wylovan Tvisebebze, rac gavlenas axdens niadagwarmoqmnis procesze da aisaxeba niadagis TvisebebSi.

 saqarTveloSi evoluciis bioklimaturi ciklis magaliTs SeiZleba mivakuTvnoT centralur kavkasionze, subalpur sartyelSi reliefis wynari formebis pirobebSi, SedarebiT mZlavri niadagebis ganviTareba, romlebsac gaaCniaT tyis piorbebisaTvis damaxasiaTebeli niadagwarmoqmnis maCveneblebi (kaklovani struqtura, Tixis gadaadgilebis niSnebi da sxv.). amave xasiaTis evoluciis magaliTs warmoadgenen aRmosavleT saqarTvelos yavisfer da yomrali niadagebSi reliqturi, wiTeli feris Sreebis arseboba.

arCeven SefardebiT da absolutur xnovanebas. absoluturi xnovaneba warmoadgens dros niadagis formirebidan dRemde. is meryeobs ramodenime wlidan milion wlamde. yvelaze didi xnovaneba aqvs tropikul niadagebs, romlebmac ar ganicades sxvadasxva saxis darRveva. saqarTveloSi 1000 metris zemoT niadagebs aqvT holocenuri asaki (10000-12000 weli) am niSnulis qvemoT niadagebi ufro xnieria, yvelaze axalgazrda niadagebi viTardebian WalebSi.

 fardobiTi asaki axasiaTebs niadagwarmoqmnis procesis siswrafes, is dakavSirebulia niadagwarmoqmnis procesis siswrafesTan da mimarTulebasTan, qanebis SedgenilobasTan da TvisebebTan, reliefis pirobebis gavlenasTan.

niadagebis evoluciis sakiTxebis Sesaswavlad gamoiyeneba sxvadasxva meTodi: niadaguri profilis genetikuri analizi, stacionaruli meTodi, modelirebis meTodi, SedarebiT geografiuli meTodi, SedarebiT-qronologiuri meTodi, paleogeografiuli meTodi, istoriuli meTodi, radiowyalbadis meTodi\_niadagebis absoluturi asakis dadgenis erT-erTi ZiriTadi meTodia, romlis drosac asakis dadgena xdeba 14C gamoyenebiT.

mcenareuloba. biologiuri faqtori, kerZod kerZod, mcenareuloba da mikroorganizmebi, niadagwarmoqmnis procesSi pirvelxarisxovan rols asrulebs.

cocxali organizmebis moqmedeba niadagwarmoqmnis procesSi, erTic mxriv aqtiuri, xolo meores mxriv, pasiuri xasiaTisaa. pirveli gamoixateba imaSi, rom mcenaris (da mikrobTa) saSualebiT xdeba nayofierebis elementebis-sakvebi nivTierebebis akumulacia niadagSi. amave dros es organizmebi TavianTi gamonayofi nivTierebebis (organuli mJavebi, CO2 da sxv) moqmedebiT qanze da xirxatze, aZliereben gamofitvis process. organizmebis pasiuri moqmedeba mdgomareobs imaSi, rom maTi naSTebi rCeba niadagSi, humusis wyarod. garda aRniSnulisa mcenareuli safari udides gavlenas axdens klimatur reJimze saerTod da, kerZod ki,mikroklimatsa da niadagis klimatze.

dadgenilia, rom merqniani mcenareebi qimiuri SedgenilobiTa da fizikur–meqanikuri TvisebebiT, balaxovan mcenareebisgan gansxvavdebian. merqniani mcenareebi, rogorc mravalwliani mcenareebi, niadags miwisqveSa narCenebiT TiTqmis arafers ar mateben, da priqiT miwiszeda narCenebiT ki yovelwliurad amdidreben mas. merqniani mcenreebis naSTebi-tyis mkvdari safari, romelSic didi raodenobiTaa celuloza, xasaTdeba sifxvieriT da kargi aeraciiT. Tumca yvela balaxovani mcenare merqnianisgan gansxvavebiT yovelwliurad niadagSi didi raodenobiT tovebs fesvis naSTebs, rac Tavis mxriv gavlenas axdens niadagis nayofierebaze.

mcenareTa safaris ganviTareba da cvalebadoba apirobebs niadagebis evolucias.

niadagwarmoqmnaSi mniSvnelovani roli ekuTvnis cxovelur organiznmebsac; umartivesebs, uxerxemloebsa da mTxrel xerxemlianebs. uxerxemloebidan yvelaze met gavlenas axdenen Wiayelebi, romlebic TavianT organizmSi 10 tonamde niadagis masas atareben TiToeul heqtarze. amitom Wiayelebi niadagis nayofierebis erT–erTi biologiuri maCvenebelia, xerxemliani cxovelebi (Txunelebi, Triebi, zazunebi miwis kurdRlebi, memindvriebi) Txrian soroebs ureven organul nivTierebebs mineralurSi, SesamCnevad amaRleben niadagis, wylis da haeris gamtarianobas. rac Tavis mxriv xels uwyobs mcenareuli narCenebis xrwnas.

adamianis sawarmoo moqmedeba(anTropogenuli faqtori) miwaTmoqmedebas adamiani misdevs uxsovari droidan, roca adamianebi mcenareebis Segrovebidan maT gamravlebaze gadavidnen. am droidan niadagi gaxda Sromis obieqti da warmoebis ZiriTadi saSualeba. adamiani Tavis sameurneo moqmedebiT udides gavlenas axdens niadagwarmoqmnis procesze. es gavlena SeiZleba iyos dadebiTi an uaryofiTi. dadebiTia, rac niadagis gakulturebas da nayofierebas iwvevs, xolo uaryofiTia-roca nayofiereba ecema (erozia, arakvalificiuri eqsploatacia, dabinZureba meoradi daWaobeba da damlaSeba).

swori agroteqnikis pirobebSi niadagi TandaTan kulturul niadagad iqceva, e.i. iseT niadagad, romelsac axasiaTebs mtkice struqtura, Rrma saxnavi fena, kargi fizikuri Tvisebebi, sakvebi elementebis didi raodenoba da Tavisufalia rogorc sarevelebisagan ise mavne mikro da makrofaunisagan.

sasoflo-sameurneo kulturebi mTeli sicocxlis ganmavlobaSi garemosTan mudmiv urTierTobaSi arian. Tu garemo ver akmayofilebs mcenareuli organizmebis zrda–ganviTarebisaTvis saWiro moTxovnilebebs, maSin mcenare iRupeba da piriqiT mcenareTa dakmayofileba sicocxlis yvela faqtorebiT uzrunvelyofs maT biologiur SesaZleblobaTa gamovlinebas maqsimaluri mosavlis saqmeSi.

sasicocxlo faqtorebi iyofa or jgufad: kosmosuri anu energetikuli (sinaTle da siTbo); miwieri, anu materialuri (wyali, sakvebi, haeri).

sasicocxlo faqtorebis garda mcenaris zrda-ganviTarebaze gavlenas axdens garemo pirobebi. garemo pirobebis qveS igulisxmeba gare viTareba, romlis Sesabamisad vlindeba sasicocxlo faqtorebis moqmedeba.

garemo pirobebs yofen sam jgufad: 1.niadagobrivi-(saxnavi fenis agebuleba, struqtura simkvrive are da sxv.)

2.fitologiuri (kulturul mcenareebze sarevelebis, mavneblebisa da avadmyofobaTa uaryofiTi moqmedeba)

3 agroteqnikuri (agroteqnikis drouli da xarisxiani Catareba).

mcenaris zrdis faqtorebis raodenobriv cvalebadobasa da mcenaris zrda-ganviTarebas Soris kanonzomieri damokidebulebaa. mcenaris moTxovnileba savegetacio periodis manZilze sasicocxlo faqtorebis mimarT sxvadsxvaa. mcenarisaTvis sinaTlis ZiriTadi wyaro mzis sxivebia, Tunca es wyaro adamianis marTvas ar eqvemdebareba. magram misi energiis gamoyenebis done fotosinTezisaTvis bevradaa damokidebuli Catarebul agroteqnikaze.

siTbo sinaTlesTan erTad warmoadgens mcenaris zrda-ganviTarebis erT-erT ziriTad sasicocxl faqtors daniadagSi mimdinare biologiuri, qimiuri da fizikuri procesebis aucilebel pirobas. TviTeul mcenares Tavisi ganviTarebis fazebTan dakavSirebiT misadmi gansazRvruli moTxovnileba aqvs.

wyali da sakvebi nivTierebani niadagobriv sasicocxlo faqtorebs warmoadgenen, naxsirorJangis garda,romelsac mcenare haeridan iTvisebs,\. amitom wyalsa da sakveb nivTierebebs niadagis nayofierebis elementebs uwdeben.

haeri mcenarisaTvis da mikroorganizmebisaTvis aucilebelia, rogor Jangbadis wyaro, is warmoadgens naxSirbadis wyaros, romelsac mcenare iyenebs fotosinTezis procesSi.

haeri aucilebelia niadagSi mimdinare mikrobiologiur procesebSi, ris Sedegadac aerobul procesebis wyalobiT niadagis organuli nivTierebani ixrwneba da warmoiSoba azotis, fosforis,kaliumis da sxva nivTierebebis xsnadi formebi. aqve unda aRiniSnos, rom mcenaris sasicocxlo faqtorebi urTierTSeucvladia, arc erTi faqtoris sxva fatoriT ecvla ar SeiZleba. amasTan Zalzed mniSvnelovania is rom mcenaris yvela sasicocxlo faqtori fiziologiurad tolfasia, rac imas niSnavs, rom isini yvela erTnairad aucilebeli mcenarisaTvis. zrdis faqtorebis met-naklebi raodenobis gavlenas mosavlis odenobaze gansazRvravs is faqtori romelic minimumSia. rac ar unda gavzardoT sxva faqtorebis zemoqmedeba, mosavlis raodenoba ver gadaaWarbebs im dones, romelsac minimumSi myofi nivTiereba akmayofilebs.

sabolood vrwmundebiT, rom yvela es sasicocrlo faqtorebi mcenarisaTvis optimalur donemde zrdis mis mosvals Tu romelime maTgana gadaaWarnba optimalur dones maSin Cven viRebT mosavlis sagrZnob klebas.

 dajdoma. niadagis simwife. niadagis bmuloba (simagre) xvedriTi winaRoba.

ni­a­da­gi Sed­ge­ba or­ga­nu­li, mi­ne­ra­lu­ri da kom­pleq­su­ri or­ga­nul-mi­ne­ra­lu­ri na­er­Te­bi­sa­gan. mi­ne­ra­lu­ri niv­Ti­e­re­be­bis wya­ros ni­a­dag­Si de­da qa­ne­bi war­mo­ad­gens; mi­ne­ra­lu­ri niv­Ti­e­re­ba­ni ni­a­da­gis mTli­a­ni ma­sis wo­nis 80-90%-ia. da­nar­Ce­ni ki or­ga­nu­li na­wi­lia.

niadagi, rogorc mravalfaziani bunebrivi sxeuli, warmodgenilia: myari, Txevadi, gazisebri da cocxali fazebis rTuli kompleqsiT, igi gansakuTrebiT mniSvnelovani sistemaa niadagwarmoqmnis procesSi da mcenaris cxovelmyofelobis mTeli periodis ganmavlobaSi.

myari faza -Sedgeba sxvadasxva sididis mineraluri nawilakebisagan da sxvadasxva xarisxiT mineralizebuli organuli narCenebisagan. pirveladi da meoradi mineralebiT warmodgenli niadagis mineralizebuli nawilis Sedgeniloba damokidebulia niadagwarmomqmnel qanebze. dedaqani mineralogiuri da qimiuri Sedgenilobis mixedviT erTmaneTisagan mkveTrad gansxvavdeba. dedaqanebi Seicaven, rogorc pirvelad-ZiriTadi qanebis aseve meorad-gamofitvis Sedegad warmoqmnil mineralebs. gamofitvis xarisxzea damokidebuli am mineralTa raodenobrivi Tanafardoba dedaqanSi. qimiurad sustad gamofitul dedaqanSi pirveladi mineralebi Warbobs, qimiurad Zlier gamofitul niadagSi ki piriqiT meoradi mineralebi. pirveladi mineralebidan dedaqanebSi gamofitvis procesisadmi gamZle mineralebia gavrcelebuli: kaJi, mindvris Spatebi, ufro naklebi raodenobiT ki qarsebi, rqatyuara, piroqsenebi da sxv. es mineralebi warmoadgenen magmuri qanebis ZiriTad masas, niadagis inertul nawils da ZiriTadad Sedian qviSnar niadagebSi.

.

 meoradi mineralebidan gamoyofen: martiv marilebs, Jangebsa da hidroJangebis mineralebs da Tixa-mineralebs. martiv marilebs miekuTvneba kalciti, magneziti, dolomiti, soda, TabaSiri, mirabiliti da sxv. Jangebisa da hidroJangebis mineralebs miekuTvneba rkinis, aluminis, magniumis hidroJangebi, romlebic yalibdebian pirveladi mineralebis gamofitvis Sedegad.

Tixa-mineralebi warmoiSobian meoradi alumo\_ da fersilikatebisagan. niadagSi yvelaze metad gavrcelebul Tixa\_mineralebs miekuTvnebian\_ montmorilonitis, kaolinis, hidroqarsebis mineralebi. es mineralebi Sedian bunebrivi Tixebis SedgenilobaSi.

 Tixa-mineralebisaTvis damaxasiaTebelia fenobrivi kristaluri agebuleba, maRali dispersiuloba, STanTqmis maRali tevadoba, Tumca TviToeul am jgufs axasiaTebs specifikuri Sedgeniloba.

im rolis mixedviT, romelsac mineralebi asruleben ama Tu im magmuri qanis SedgenilobaSi, SeiZleba gamoiyos mTavari da meorxarisxovani qanTmaSeni mineralebi. Tumca, es imas ar niSnavs, rom esa Tu is minerali mTavari iyos yvela qanSi. magaliTad, minerali kvarci mTavaria granitSi da granodioritSi, xolo meorexarisxovania sienitSi da araa gabroSi. igive iTqmis apatitis Sesaxeb, romelic rig qanebSi meorexarisxovania, nefelinian sienitebSi ki mTavar qanTmaSenad iTvleba.

meoradi Tixa-mineralebi gavlenas axdenen mcenaris fesvur kvebaze, niadagis struqturis warmoqmnaze, niadagis fizikur, qimiur, wylovan da haerovan Tvisebebze, romlebic ganszrvrven mis nayofierebas. Tixovani mineralebis Semcvelobaze damokidebulia niadagis mwebareba, wyalgamtaroba da higroskopuloba.

Txieri faza anu niadagis xsnari, niadagis yvelaze aqtiuri- dinamiuri nawilia. misi monawileobiT mineralizirdeba organuli nivTierebebi, icvleba meoradi mineralebi, warmoiqmneba organul-mineraluri SenaerTebi. niadagis xsnaris moZraobasTanaa dakavSirebuli sxadasxva nivTierebis gadaadgileba. niadagis xsnari wylisa da sakvebi elementebis uSualo wyaroa, romelsac mcenare niadagidan iTvisebs. amiT ganisazRvreba misi roli sasoflo-sameurneo kulturebis kvebasa da produqtiulobaSi. im regionebSi sadac zamTris temperatura dabalia niadagis Txieri faza gadadis myarSi (iyineba), xolo maRali temperaturis pirobebSi ki niadagis Txieri fazis nawili orTqldeba da gadadis niadagis gazisebr fazaSi.

haerovani faza anu niadaguri haeri, niadagis ganuyofeli nawilia da mWidrod aris dakavSirebuli myar, Txevad da cocxal fazasTan. niadaguri haeri hqvia gazebis narevs, romelic avsebs wylisgan Tavisufal niadagur forebs.

niadagis haerovan fazis mTavari wyaroa atmosferuli haeri da gazi, romelic TviTon niadagSi warmoiSveba. atmosferuli haeridan niadagSi xvdeba Jangbadi, romelic aucilebelia mcenareTa fesvebis sunTqvis, aerobuli baqteriebisa da niadaguri faunisaTvis. niadaguri haeris mimocvlis process atmosferul haerTan ewodeba aeracia. niadagis haerSi Jangbadis ukmarisobisa da momatebuli naxSirorJangis dros mcenareebis fesvTa zemoqmedebis garda Jangbadis ukmarisoba iwvevs Jangva –aRdgenis potencialis sistemis zrdis procesi ferxdeba da mcenare iRupeba. pirdapiri Senelebas.

niadagis cocxali fazas warmoadgenen is organiznebi, romlebic monawileoben niadagwarmoqmnis procesSi. es organizmebi iyofa makro da mikro organizmebis jgufebad, xolo TviTeuli maTgani Tavis mxriv florisa da faunis jgufis organizmebad.

niadagebis klasifikacia meqanikuri Sedgenilobis mixedviT. gamofitvis procesSi qanebi imsxvreva sxvadasxva sididis nawilakebad, daqucmaceba an disperiuloba midis manamde, sanam ar miaRwevs ama Tu im nivTierebisaTvis damaxasiaTebel ukidures siwvriles. am zomamde man unda ganvlos ufro msxvili sididis stadiebi, bunebaSi mimdinareobs ara marto daSla da daqucmaceba, aramed misi sapirispiro procesebic. uwvrilesi nawilakebis koagulaciiT miiReba SedarebiT msxvili nawilakebi. e. i erTdroulad mimdinareobs ori procesi-daqucmaceba da koagulacia. amiT aixsneba is, rom gamofitvis produqtebSi Cven gvxvdeba erTmaneTSi areuli sxvadasxva sididis nawilaki. dedaqanis an niadagis am sxvadasxva zomis nawilakTa garkveuli raodenobrivi Semcveloba gansazRvravs dedaqanisa da niadagis meqanikur Sedgenilobas. niadagis xarisxi da agroteqnikuri Tvisebebi mniSvnelovanwilad damokidebulia meqanikur Sedgenilobaze, sxvadasxva zomis mineraluri nawilakebis SedarebiT Semcvelobaze.

im meTods, romlis saSualebiTac xdeba naSalis an niadagis Seswavla-marcvlebis sididis mixedviT – meqanikuri analizi anu granulometruli analizi ewodeba. xolo xirxatian (qvian) niadagebSi mimarTaven xirxatis analizsac. niadagis meqanikuri Sedgeniloba gulisxmobs sxvadasxva zomis elementarul meqanikuri nawilakebis fardobiT Semcvelobas niadagSi. niadagis elementaruli meqanikuri nawilakebi ewodeba mineralur, organul da organul-mineraluri warmoSobis, kristalur an amorfuli agebulebis gancalkevebul nawilakebs. am nawilakebis diametri metad farTo farglebSi meryeobs (santimetridan milimikronamde). analizis saSualebiT xdeba daaxloebiT Tanabari sididis nawilakebis gamoyofa, romelTac meqanikuri an granulometruli fraqciebi ewodeba; isini erTmaneTisagan gansxvavebian ara marto sididiT, aramed qimiuri da fizikuri TvisebebiTac.

niadagis meqanikur elementebs, saerTod, sididis (nawilakTa diama­tris) mixedviT ajgufeben, arCeven niadagis meqanikuri elementebis Semdeg ZiriTad fraqciebs:

xirxats \_ romelTa zoma 1 mm-ze metia,

`fizikur~ silas \_ romelTa zoma 1-0,01 mm-ia,

`fizikur~ Tixas \_ romelTa zoma <0,01 mm-ze

 da leqs, romelTa zoma 0,001-ze naklebia.

qarTuli nomeklaturiT kldis yoveli monatexi qvad iwodeba. lodi udidesi qvaa, kaWari-wylis nagorebi, nalesi; RvinWa, RorRi- momcro zomis, kenWi –wvrili qvaa cercvis odena, qviSa- xorblis odenaa, xolo uwvriles nawilakTa Sesatyvisad xmaroben Slams, lamsa da leqs.

niadagis meqanikuri nawilakebi gansxvavdebian struqturuli erTeulebisagan (agregatebisagan). es ukanaskneli Tavis mxriv meqanikur nawilakTa Sewebebis Sedegad warmoSobili rTuli da msxvili erTeulebia.

imis mixedviT, Tu sxvadasxva zomis nawilakebi (fraqciebi) ra raodenobiT moipoveba niadagSi, arCeven Tixa, Tixnar, qviSnar da a.S. meqanikuri Sedgenilobis niadagebs.

niadagebis klasifikacia meqanikuri Sedgenilobis

mixedviT (n. a. kaCinski)

|  |  |
| --- | --- |
| fizikuri Tixis (<0,01 mm) Semcveloba %-obiT | niadagis saxelwodeba meqanikuri Sedgenilobis mixedviT |
| n i a d a g i |
| ewerniadagTwarmoqmnis tipi | stepuri niadagwarmoqmnis tipi, wiTelmiwebi da yviTelmiwebi | bicobi da Zlier bicobiani niadagebi |
| 1 | 2 | 3 | 4 |
| 0-110-2020-3030-4040-5050-6565-80 >80 | 0-1010-2020-3030-4545-6060-7575-85 >85 | 0-1010-1515-2020-3030-4040-5050-65 >65 | qviSaqviSnarimsubuqi TixnarisaSualo TixnarimZime Tixnarimsubuqi TixasaSualo TixamZime Tixa |

.

niadagis meqanikuri Sdgeniloba did gavlenas axdens mis agrosawarmoo Tvisebebze, gardaqmnasTan, gadaadgilebsaTan da dagrovebasTan dakavSirebul mraval procesTa intensivobaze. igi gansazRvravs niadagis fizikur, fizikur-meqanikur da wylier Tvisebebs, mis haerovan da Tbur reJimebs, agreTve mcenareTa fesvuri kvebis elementebis Semcvelobas.

meqanikuri Sdgenilobis cvla saSualebas iZleva davaxasiaToT niadagebi da maTi nayofiereba. qviSiani niadagebi advilad eqvemdebarebian damuSavebas, aRiWurvebian kargi wyalgamtarobiT da xelSemwyobi haeris reJimiT, magram gaRaribebulebi arian humusiT da naklebi wyaltevadobiT xasaTdebian.

 Tixnari da Tixiani niadagebi gansxvavebiT qviSianisgan ufro maRali mwebaobiT da wyaltevadobiT, da gamoirCevian naklebi wyalgamtarobiT. am niadagebis damuSaveba moiTxovs meti energiis xarjvas. amitom maT uwodeben mZimes. datenianebis dros Tixnar niadagebs aqvT meti siblante da mwebareba, TiTqmis ar ifSvnebian da ar fxvierdebian.

naleqebis mosvlis dros es niadagebi iWinWyleba,gamoSrobisas ki mkvrivdeba da warmoqmnis qerqs, romelic xels uSlis Teslis gaRivebasa da aRmocenebas.

agroteqnikuri TvalsazrisiT, ukeTesia msubuqi da saSualo Tixnari niadagebi. isini Tixnari da qviSiani nawilakebis iseTi erTobliobiT xasaTdebian, romelTa dros iqmneba airebis gacvlisa, niadagis tenis reJimisa da mcenareTa ganvitarebis optimaluri pirobebi.

niadagis damamuSavebeli manqanebis samuSao organoebs cveTis mixedviT hyofen sam jgufad: mcire, saSualo da Zlier cveTadad. pirvels miekuTvneba Tixiani da Tixnari niadagebi. guTnisa da saxnisebis cveTa 2-dan 3 g/ha-mde meryeobs. meoreSi Sedis qviSiani da qviSnari niadagebi, qvebis umniSvnelo CarTviT. saxnisebis xvedriTi cveTa 30-100 g/ha, mesame jgufs ki miekuTvneba qviSani niadagebi, qvbis didi xvedriTi wiliT. saxnisebis xvedriTi cveTaa 100 g/ha-ze.

niadagis simkvrive anu kuTri wona. niadags, rogorc yvela sxva bunebriv sxeuls, axasaTebs kuTri wona. es aris niadagis myari fazis(nawilis) wonis Sefardebas imave moculobis wylis wonasTan.

kuTri wona damokidebulia niadagis Semadgenel nivTierebebze. humusiT mdidari niadagis kuTri wona dabalia, kidev ufro dabalia torfian-Waobiani niadagebis da mTa-mdelos kordiani niadagebisa. humusis niadagis profilSi ganawilebis Sesabamisad zedafenebis kuTri wona yovelTvis ufro mcirea, vidre qveda fenebisa, mTeli rigi niadagebis iluviur fenaSi, magaliTad ewerebi, wiTelmiwa da sxva, sadac rkinis raodenoba momatebulia kuTri wona maRalia 2,7-2,8.

niadagis simkvrive saSualod meryeobs 2,4- 2,9 –mde, torfianebSi 1,8. da is TiTqmis uvlelia. agronomiuli TvalsazrisiT es sidide ver iZleva niadagis safuZvlian daxasiaTebas, magram gamoiyeneba sxva sayuradRebo maCveneblebis dasadgenad.

niadagis agronomiul SefasebaSi gansakuTrebuli mniSvneloba eniWeba mis saSualo simkvrives-moculobiT masas. e.i. moculobiTi wona aris daurRveveli moculobis niadagis wonis Sefardeba misive moculobis wylis wonasTan, anu rac igivea ( radgan 1 ml wylis wona udris 1 g-s) niadagis moculobiTi wona gramobiT gamoxatuli, daurRveveli niadagis 1 sm3 –is wonaa(g/sm3).

moculobiTi wona niadagis mniSvnelovani damaxasiaTebeli agronomiuli niSania, radgan is migviTiTebs niadagis sifxviereze. fxvieri agebulebis niadagis moculobiTi wona dabalia, e.i. forianobisa da moculobiTi wonis sidideebs Soris ukuproporciuli damokidebulebaa. niadagis moculobiT wonas gansazRvravs niadagis struqtura,meqanikuri da qimiuri Sedgeniloba. Cveulebrivad msubuqi meqanikuri Sedgenilobis niadagebis moculobiTi wona ufro maRalia, vidre mZime meqanikuri Sedgenilobis, radgan pirvelis forianoba, meoresTan SedarebiT naklebia.

humusis Semcvelobis gadideba niadagSi iwvevs moculobiTi wonis Semcirebas (gastruqturebis gamo) da piriqiT,kleba moculobiTi wonis gadidebas.

niadagis tipebs Soris moculobiTi wona struqturis cvalebadobis Sesabamisad icvleba. Savmiwa struqturiani niadagebis moculobiTi wona naklebia, eweri da bicobi niaagebis maRali. niadagis moculobiTi wona vertikalur profilSi siRrmeze matulobs, akumulaciur fenebSi is ufro dabalia vidre iluviurSi.

niadagis moculobiTi wona saSualod 1,1-1,4 (1,6) farglebSi meryeobs. struqturis cvalebadobisa da agroteqnikur RonisZiebaTa Sesabamisad niadagis moculobiT wonas axasiaTebs sezonuri dinamika.

niadagis forianoba. niadagis elementebsa da struqturul agregatebs Soris Tavisufali adgilebi sxvadasxva formis Rruebs-sicarieleebs anu forebs ukaviaT.maTi saerTo raodenoba niadaagis forianobas gamoxatavs.

niadagis forianoba damokidebulia niadagis warmoqmnis pirobebze, meqanikur da struqturul Sedgenilobaze. am ukanasknelTa wyoba gansazRvravs ara marto niadagis saerTo forianobas, aramed mis xasiaTsac (formas, diametrs da sxv.)

myari fazis araerTgvarovani meqanikuri Sedgenilobisa da araTanabari diametriani struqturianobis gamo niadagsi sxvadasxva xasiaTis forebia warmodgenili.

n. kaCinskis mixedviT niadagSi Semdegi saxis forebia. 1. saerTo forianoba, 2. agregatuli forianoba, 3. agregatSorisi forianoba; 4. mtkicedbmuli wyliT dakavebuli forebi; 5. faSaradbmuli wyliT dakavebuli forebi; 6.kapilaruli wyliT dakavebuli forebi; 7.yvela saxis wyliT dakavebuli forebi; 8. haeriT dakavebili forebi. kaCinski niadagis forebis aseT cal-calke saxeebad dayofas, diferenciul forianobas uwodebs. niadagis haerisa da wylis Tvisebebi damokidebulia imaze, Tu ra adgili ukavia saerTo forianobaSi diddiametrian forebs. agronomiulad kargi mdgomareoba maSinaa niadagSi, roca agregatul da agregatSoris forianobis raodenoba saerTo forianobs 20%-ze naklebia ar iqneba.

niadagis forebi Sevsebulia wyliTa da haeriT. yoveli saxis forSi adsorbirebul (STanTqmul) wyals met-nakebi adgili ukavia. amis gamo forebis es nawili haeris Semcvelobis mxriv pasiuria, danarCeni nawili ki sadac haeria- aqtiuri.

kaCinski saerTo forianobis da adsorbirebuli wyliT dakavebuli forebis sxvaobis naSTs –aqtiur forianobas uwodebs. aqtiuri forianoba niadagis meqanikuri Sedgenilobis mixedviT did farglebSi meryeobs.

msubuqi meqanikuri Sedgenilobis niadagebis saerTo forianobaSi aqtiur forianobas ufro meti adgili ukavia, vidre mZime meaqnikuri Sedgenilobis niadagebSi.

 saerTo forianoba pirdapir damokidebulebaSia niadagis Tixa-nawilakebis raodenobasTan. Tixiani niadagebis saerTo forianoba maRalia (60-70% da meti) xolo Tixnari da silnari niadagebisa ki dabali (20-30 %).

niadagis forianobas didi praqtikuli mniSvneloba aqvs. niadagSi wylis da haeris raodenoba maTi moZraobis unari da sxv. damokidebulia niadagis forianobaze.wvrildiametrian forebSi (kapilarul forebSi) wyalia moTavsebuli, diddiametrian forebSi (arakapilauli) ki Cveulebriv haeri.

plastikuroba. mSrali (Tixiani) niadagi wylis TandaTanobiTi mimatebiT icvlis fizikur Tvisebebs.magari mdgomareobidan is jer naxevrad magar mdgomareobaSi gadadis, Semdeg ki plastikurSi. niadagis palastikurobis Tviseba wylis garkveuli raodenobiT mimatebis Semdeg mJRavndeba.

niadagis unars ganicados deformireba garegani meqanikuri zemoqmedebiT erTianobis daunawevrianeblad da SeinarCunos mocemuli forma plastikuroba ewodeba. plastikur mdgomareobaSi niadags axasiaTebs drekadobis kargad gamoxatuli Tviseba.

niadagis plastikurobis Tviseba mraval pirobazea damokidebuli.kerZod igi damokidebulianiadagis meqanikur, mineralogiur, qimiur Sedgenilobaze da gamovlindeba tenianobis gansazRvrul diapazonebSi. mSral da gadaWarbebuli tenin mdgomareobaSi niadagi ar amJRavnebs plastikurobas.

Svedma mecnierma a. aTerbergma wamoayena e.w. plastikurobis zRvrebi, rac axasaiTebs niadagis gadasvlas erTi konsistenciidan meoreSi. dasaxelebul sidides zomaven plastikurobis ricxviT. igi warmoadgens tenianobas Soris sxvaobas plastikurobis zeda da qveda zRvars Soris;

rac ufro didia mocemuli maCvenebeli, miT ufro plastikuria niadagi. yovel niadags aqvs tenianobis garkveuli intervali, romlis drosac vlindeba plastikuroba. niadagebs plastikurobis sididis mixedviT yofen klasebad:

|  |  |  |
| --- | --- | --- |
| klasi | niadagi | plastikurobis ricxvi |
| 1 | maRalplastikuri (Tixebi) | 17 |
| 2 | plastikurebi (Tixnarebi) | 17-7 |
| 3 | sustad plastikurebi (qviSnarebi) | 7-0 |
| 4 | araplastikuri (qviSebi) | 0 |

plastikurobis qveda zRvari es aris niadagis tenianobis zeda sazRvari, romlis drosac SesaZlebelia misi meqanikuri damuSaveba. plastikurobis zeda zRvrebis dadgena mniSvnelovania niadagis wylismieri eroziisadmi winaaRmdegobis gansasazRvravad. plastikurobis zeda sazRvars gadacilebuli tenianobis dros niadagi iZens daqanebiTi moZraobis unars. plastikurobis zeda zRvari erTdroulad aris denadobis qveda zRvaric.

niadagis webovnebis Tviseba. webovnebas uwodeben niadagis nawilakebis Tvisebas garkveuli tenianobis pirobebSi miewebos erTmaneTs da gareSe sxeuls.

niadagis webovnebas apirobebs meqanikuri Sedgeniloba, tenis raodenoba, STanTqmul fuZeTa Sedgeniloba da sxv. mZime meqanikuri Sedgenilobis niadagebis webovneba gacilebiT didia, vidre msubuqisa. webovnebis Tviseba cvalebadobs tenis raodenobis mixedviT. mSral niadags webovnebis Tviseba ar axasiaTebs. garkveul sazRvramde tenis mateba adidebs webovnebas (Semdgom momatebas ki webovnebis Semcireba mosdevs Tan). niadagi, romelic STanTqmul fuZeTa Soris Na-s Seicavs, tenian mdgomareobaSi maRali webovnebis TvisebiT xasiaTdeba.

webovneba gavlenas axdens niadagis weviTi winaRobis unarze. maRali webovnebis Tvisebis mqone niadagebis weviTi winaRobis Zala didia, xolo optimaluri tenianobis pirobebSi niadagi, webovnebis gamo, agregirebas ganicdis, ris gamoc misi weviTi winaRobis Zala mcirdeba. webovneba izomeba Zalis im sididiT, romelic saWiroa niadagis Sewebebuli nawilakebis erTmaneTisagan an niadagze miwebebuli gareSe sagnis mosacileblad. webovnebis Zalas gamosaxaven g/sm2-iT.

webovnebis gansazRvrisaTvis iyeneben n. kaCinskis, v. oxotinis, m. rozenis savele xelsawyos, a. pavlovis mier Soperis saxecvlil saswors da sxv.

niadagis webovnebis klasifikaciisaTvis gamoiyeneba n. kaCinskis

Semdegi skala:

Zalian Zlieri siblantis niadagebi . . . . . . . . . . . . . . . . . . . . > 15

Zlieri siblantis niadagebi . . . . . . . . . . . . . . . . . . . . . . . . . . 5\_15

saSualo siblantis niadagebi . . . . . . . . . . . . . . . . . . . . . . . . . 2\_5

susti siblantis niadagebi . . . . . . . . . . . . . . . . . . . . . . . . . . . 0,5\_2

bneuli niadagebi . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 0,1\_0,5

simwife aris niadagis dasamuSaveblad mzadyofna, mdgomareoba, roca niadagi advilad muSavdeba gamwovi Zalis minimaluri danaxarjiT da kargad ifSvneba koStebad. meqanikuri Sedgenilobis mxriv Tixnari SavmiwebisaTvis fizikuri simwife dgeba zRvruli wyaltevadobis 40-70%-sas, TixianebisaTvis-50-65 %-sas.

 niadagis bmuloba(simagre), misi mkvrivi fazis SeWidulobis xarisxis gamosaxavs, e.i. gviCvenebs niadagis simagris xarisxs. niadagis simagre gare meqanikuri Zalisadmi winaRobis unariT izomeba. mas gansazRvraven specialuri xelsawyoTi – simagris mzomiT da gamoxataven kg-obiT 1sm2 –ze.

niadagis bmulobis unari damokidebulia meqanikur Sedgenilobaze, struqturianobaze, humusis Semcvelobaze, STanTqmul kaTionebze, tenianobaze, meqanikuri elementebisa da struqturuli agregatebis wyobis xasiaTze da sxv. maRali simagre-cudi fizikur-qimiuri da agrofizikur iTvisebebis mqone niadagebis niSanTvisebaa. aseT pirobebSi saWiroa bevri energiis xarjva damuSavebaze, uaresdeba mcenaris zrda-ganviTareba, gaZnelebulia Teslis gaRiveba, fesvebi cudad aRweven niadagSi.

siRrmis kontrolisa da damuSavebisatvis mzadyofnis gansazRvrisas, miwaTmoqmedebaSi aucilebebia gamovikvlioT niadagis simagre. mocemuli maCveneblebiT angariSoben kuTr winaRobas-wevis Zalas, romelic unda daixarjos beltis 1 sm2 ganivi moWrisas. niadagis simagre, romelic kg/sm2 gamoixateba, farTo farglebSi meryeobs 5\_60 kg/sm2.

xvedriTi winaRoba aris Zala, romelic ixarjeba beltis mosaWrelad, mis gadasabruneblad da samuSao organoebze xaxunis gadasalaxavad.

wevis Zalis (wZ) sidide moxvnis dros ganisazRvreba kuTri winaRobiT (wZ=kw) da izomeba kg/sm2.

niadagis kuTri winaroba meqanikuri Sedgenilobaze, fiziko-qimiur Taviseburebasa da tenianobazea damokidebulebiT Seadgens 0,2-1,2 kg/sm2.

yvelaze mcire kuTri winaRoba aqvsUfuZeebiT gajerebul msubuq niadagebs (qviSiani da qviSnari). yvelaze didi bicobebs, romlebic Seicaven natriums 20-30 %-is zemoT mSTanTqav kompleqsSi. kuTr winaRobaze arsebiT gavlenas axdens datenianebuli niadagebi. maqsimaluri kuTri winaRoba xdeba wknobis koeficientTan axlo mdgomi tenianobis dros.

sasoflo-sameurneo kulturebis movla-moyvanis dros kuTri winaRoba mniSvnelovnad icvleba, saToxni kulturebis qveS is mcirea, vidre marcvleuli da sakveb balaxebSi, kuTri winaRobis sidide damokidebulia niadagis dasarevelianebaze, gansakuTrebiT fesvnayari da fesuriani sarevelebiT.

ma­ri­le­bis gan­la­ge­bis siR­rme da ga­mo­dev­nis Se­saZ­leb­lo­ba gaT­va­lis­wi­ne­bu­li un­da iyos ni­a­dag­Tmkvle­va­ris mi­er, ma­Ti di­ag­nos­ti­kis dros.

ad­vi­lad xsna­di ma­ri­le­bis gan­saz­Rvra dam­la­Se­bul ni­a­da­ge­bis pro­fil­Si, xde­ba fe­ris mi­xed­viT, xo­lo dam­la­Se­bis do­nis dad­ge­na la­bo­ra­to­ri­ul pi­ro­beb­Si ni­a­da­gis wyliT ga­mo­na­wu­riT.

wyliT ga­mo­na­wu­ris mo­sam­za­deb­lad ni­a­da­gis gar­kve­ul ra­o­de­no­bas (wo­nas) Cay­ri­an kol­ba­Si, da­as­xa­men ga­mox­dil wyals, an­jRre­ven, ad­vi­lad xsna­di ma­ri­le­bi ga­da­di­an xsnar­Si (wyal­Si). mi­Re­bul ga­mo­na­wur­Si an­ga­ri­So­ben ad­vi­lad xsna­di ma­ri­le­bis sa­er­To ra­o­de­no­bas, mya­ri na­wi­lis mi­xed­viT, ase­ve swav­lo­ben cal­ke­u­li ma­ri­le­bis Sem­cve­lo­bas.

ni­a­da­gis di­ag­nos­ti­kis gan­saz­Rvris saq­me­Si, erT-erT mniS­vne­lo­van rols Ta­ma­Sobs kar­bo­na­te­bi, ro­mel­Ta gan­saz­Rvri­saT­vis iye­ne­ben mar­tiv qi­mi­ur re­aq­ci­ebs. ni­a­da­gis pa­ta­ra go­rox­ze da­as­xa­men ram­de­ni­me wveT 10%-ian ma­ril­mJa­vas, ro­me­lic kar­bo­na­te­bT­an re­aq­ci­is Se­de­gad iw­yebs Si­Sins.

ni­a­da­gis var­gi­si­a­no­bis da­sad­ge­nad mniS­vne­lo­va­nia ag­reT­ve ni­a­da­gis fi­zi­kur-wylo­va­ni Tvi­se­be­bi, ro­go­ri­caa wyal­gam­ta­ro­ba, wyal­te­va­do­ba, wya­lda­ka­ve­ba, ae­ra­cia da sxva.

ni­a­da­gis ha­e­ro­va­ni Tvi­se­be­bi di­da­daa da­mo­ki­de­bu­li ni­a­dag­Si ha­e­ris SeR­we­va­do­bas­Tan: ker­Zod Jan­gba­dis, ro­me­lic ha­e­ri­dan Se­dis ni­a­da­gis fo­reb­Si.

ha­e­ris na­ka­di ga­ni­saz­Rvre­ba Zi­ri­Ta­dad ni­a­da­gis fo­re­bis mo­cu­lo­biT, ro­me­lic Sev­se­bu­lia ni­a­da­gis ha­e­riT (an ni­a­da­gis xsna­riT).

ni­a­dag­Si te­nis SeR­we­va xde­ba ni­a­da­gis fo­re­bis wyliT Sev­se­biT da wylis fil­tra­ci­iT. am mov­le­ne­bis Ta­naw­yo­bas `wyal­gam­ta­ro­bas~ uwo­de­ben. ni­a­da­gebs wylis Se­wo­vis siC­qa­ris mi­xed­viT ajgufe­ben: kar­gad, sa­Su­a­lod da sus­tad wyal­gam­ta­rebad

ni­a­da­gis mi­er wylis Se­ka­ve­bis unars uwo­de­ben wyal­te­va­do­bas, ga­nas­xva­ve­ben: maq­si­ma­lu­rad ad­sor­ba­ci­re­bul wyal­te­va­do­bas ka­pi­la­ruls da um­ci­res (sa­ve­le), wyal­te­va­do­bebs.

ka­pi­la­ru­li wyal­te­va­do­ba da­kav­Si­re­bu­lia ag­ro­no­mi­u­lad mniS­vne­lo­van cne­bas­Tan, ka­pi­la­ru­l ar­Si­as­Tan. ka­pi­la­ru­li ar­Sia ewo­de­ba te­nis mTel fe­nas, ro­me­lic mo­Tav­se­bu­lia grun­tis wyle­bis do­nesa da ni­a­da­gis da­mas­ve­le­bel ze­da saz­Rvrebs So­ris.

um­ci­re­si (sa­ve­le) ten­te­va­do­ba es aris te­nis maq­si­ma­lu­ri ra­o­de­no­ba, ro­me­lic Se­nar­Cun­de­ba ni­a­dag­Si (an grun­tSi) bu­neb­riv pi­ro­beb­Si ro­de­sac ar xde­ba aor­Tqle­ba da wylis na­ka­dis mi­wo­de­ba ga­re­dan.

ni­a­da­gis ten­te­va­do­ba da­mo­ki­de­bu­lia mis me­qa­ni­kur, qi­mi­ur, mi­ne­ra­lo­gi­ur Sed­ge­ni­lo­ba­ze, sim­kvri­ve­ze, fo­ri­a­no­ba­ze da a. S.

ae­ra­cia, wyal­gam­ta­ro­ba, ten­te­va­do­ba da sxva wylo­van-fi­zi­ku­ri Tvi­se­be­bi war­mo­ad­ge­nen ni­a­da­gis mniS­vne­lo­van ma­xa­si­a­Teb­lebs, rom­le­bic moq­me­de­ben mis na­yo­fi­e­re­ba­ze, mis sa­me­ur­neo fa­se­u­lo­ba­ze.

ni­a­da­gis mi­er wylis Se­ka­ve­bis unars uwo­de­ben wyal­te­va­do­bas, ga­nas­xva­ve­ben: maq­si­ma­lu­rad ad­sor­ba­ci­re­bul wyal­te­va­do­bas ka­pi­la­ruls da um­ci­res (sa­ve­le), wyal­te­va­do­bebs.

ka­pi­la­ru­li wyal­te­va­do­ba da­kav­Si­re­bu­lia ag­ro­no­mi­u­lad mniS­vne­lo­van cne­bas­Tan, ka­pi­la­ru­l ar­Si­as­Tan. ka­pi­la­ru­li ar­Sia ewo­de­ba te­nis mTel fe­nas, ro­me­lic mo­Tav­se­bu­lia grun­tis wyle­bis do­nesa da ni­a­da­gis da­mas­ve­le­bel ze­da saz­Rvrebs So­ris.

um­ci­re­si (sa­ve­le) ten­te­va­do­ba es aris te­nis maq­si­ma­lu­ri ra­o­de­no­ba, ro­me­lic Se­nar­Cun­de­ba ni­a­dag­Si (an grun­tSi) bu­neb­riv pi­ro­beb­Si ro­de­sac ar xde­ba aor­Tqle­ba da wylis na­ka­dis mi­wo­de­ba ga­re­dan.

ni­a­da­gis ten­te­va­do­ba da­mo­ki­de­bu­lia mis me­qa­ni­kur, qi­mi­ur, mi­ne­ra­lo­gi­ur Sed­ge­ni­lo­ba­ze, sim­kvri­ve­ze, fo­ri­a­no­ba­ze da a. S.

ae­ra­cia, wyal­gam­ta­ro­ba, ten­te­va­do­ba da sxva wylo­van-fi­zi­ku­ri Tvi­se­be­bi war­mo­ad­ge­nen ni­a­da­gis mniS­vne­lo­van ma­xa­si­a­Teb­lebs, rom­le­bic moq­me­de­ben mis na­yo­fi­e­re­ba­ze, mis sa­me­ur­neo fa­se­u­lo­ba­ze.

Tavi 4

niadagis struqtura da misi simtkice. niadaguri haeri, Tavisufal adsorbciul da xsnad mdgomareobaSi, niadagis Tburi Tvisebebi. sxivSTanTqma, Tbotevadoba, sxivfrqveva.

niadagis struqtura ewodeba sxvadasxva formisa da zomis agregatebs, romlebisganac Sedgeba niadagis masa, xolo mis unars daiSalos sxvadasxva formisa da zomis agregatebad, struqturianoba ewodeba.

agregatebi formis mixedviT sxvadasxvagvaria: beltovani, koStovani, marcvliseburi, svetisebri, fiqalovani struqtura da sxv.

niadagis struqturianoba misi gakulturebis maCvenebelia. agronomiuli TvalsazrisiT karg struqturad iTvleba iseTi struqtura, romelic uzrunvelyofs niadagis nayofierebas. aseT struqturad iTvleba koStovan-mrcvlovani struqtura. struqturis warmoqmniT umjobesdeba niadagis wyalgamtaroba, tentevadoba, haergamtaroba.

struqturul erTeulebSi gamoyofen: mikrostruqtura -0,25 mm-ze naklebi, makrostruqtura-0,25-10 mm-de, mega anu goroxovani struqtura 10 mm-ze meti. agronomiuli TvalsazrisiT, struqturul agregatebad iTvleba mxolod iseTi agregatebi, romelTa zomac 0,25-10 mm fargalSia.

ni­a­da­gis struq­tu­ra ni­a­da­gu­ri ge­ne­zi­su­ri ma­xa­si­a­Teb­le­bis jgufs mi­e­kuT­vne­ba da erT-erT mniS­vne­lo­van rols as­ru­lebs ni­a­da­gis ag­ro­no­mi­u­li Se­fa­se­bis dros. ni­a­da­gis struq­tu­ris qveS igu­lis­xme­ba ni­a­da­gis ag­re­ga­te­bis struq­tu­rul er­Te­u­le­bad daS­lis una­ri, mas­ze me­qa­ni­ku­ri ze­moq­me­de­bis Se­de­gad - ni­a­da­gis struq­tu­ra da­mo­ki­de­bu­lia TviT ni­a­dag­ze, aqe­dan ga­mom­di­na­re yve­la ni­a­da­gi­saT­vis is Ta­vi­se­bu­ria, amas­Tan ni­a­da­gur pro­fil­Si cal­ke­u­li ge­ne­zi­su­ri fe­ne­bi­saT­vis xSi­rad mniS­vne­lov­nad gan­sxva­ve­bu­lia.

ni­a­da­gis hu­mu­si­a­ni fe­ni­saT­vis da­ma­xa­si­a­Te­be­lia: mar­­cvlo­va­ni, mar­cvlo­van-koS­to­va­ni, kak­lo­va­ni da sxv. formis struqturuli agregatebi.

elu­vi­u­ri ho­ri­zon­ti­saT­vis: fi­qa­lo­va­ni, fur­clo­va­ni, qer­clo­va­ni, plas­ti­ku­ri, xo­lo ilu­vi­u­ri fe­ni­saT­vis: sve­to­va­ni, priz­mu­li, wax­na­go­va­ni struq­tu­re­bi



sur. 2. ni­a­da­gis struq­tu­ris ti­pe­bi da sa­xe­e­bi:

I ti­pi - 1) ku­bu­ri, 2)msxvil­go­ro­xo­va­ni, 3) go­ro­xo­va­ni, 4) wvril­go­ro­xo­va­ni, 5) msxvil­kak­lo­va­ni, 6) kak­lo­va­ni, 7) wvril­kak­lo­va­ni, 8) msxvil­mar­cvlo­va­ni, 9) mar­cvlo­va­ni, 10) wvril­mar­cvlo­va­ni, 11) sa­fan­ti­seb­ri;

II ti­pi – 12) priz­mu­li, 13) sve­ti­seb­ri, 14) wvril­sve­ti­seb­ri, 15) priz­mi­seb­ri, 16) wvril­priz­mi­seb­ri;

III ti­pi – 18) fi­qa­li­seb­ri, 19) fi­qa­lo­va­ni, 20) firfi­ti­­sebri, 22) fur­cvlo­va­ni, 23) naWuWisebri, 24) uxeSqi­co­va­ni, 25) wvrilqicovani.

meqanikuri Sedgenilobis mixdviT, mZime (saSualo Tixnari, mZime Tixnari da Tixnari) niadagebis nayofiereba mniSvnelovanwilad damokidebulia struqturaze, radgan igi gansazRvravs Tbur, wylier, haerisa da MmTlianad kvebis reJims. erTnairi agroteqnikis pirobebSi, mosavali struqturian niadagze ufro maRalia, vidre gamtverianebulze.

agroteqnikuri moTxovnilebebis TvalsazrisiT faseulad unda CaiTvalos mxolod wvrilkoStovani damarcvlovani struqtura 0,25-10 mm –iani foriani agregatebiT. mcenareTa zrdisa da ganviTarebisaTvis optimalur pirobebs uzrunvelyofen saxnavi miwebi mtkice struqturiT. isini SesaZleblobas iZlevian maRalxarisxovnad Catardes damuSaveba da sxva niadagebze ufro naklebad ganicdian wylismier da qarismier erozias, uaryofiT zemoqmedebas, gamkvrivebas.

niadagis struqturis xarisxis mniSvnelovan maCvenebels waarmoadgens wyalgamZleoba (agregatebis gadarecxva wylisagan).

makrostruqtursTan erTad (0,25 mm-iani msxvili agregatebi) niadagis Taiseburebebis Sesafaseblad did rols asrulebs mikrostruqtura (0,25 mm-ze naklebi sididis agregatebi). igi agreTve unda iyos wyalgamZle da foriani. mikrostruqturis saukeTeso zomebia 0,25-0,01 mm. aseTi mikrostuqtura aris agreTve wyagamZle. magaliTad, wiTelmiwebsa da yvitelmiwebSi dadebiT Tvisebebs aniWeben mikroagregatebs. amis garda, igi adidebs niadagis wyaltevadobas, aumjobesebs wyal da haergamtarobas. mikroagregatebs axasiaTebs agregatSigniTa TavisTavadoba, aq Tavs iyris wyali da mikroorganizmebi, sadac Sedis fesvis bususebi, amiT SeiZleba aixsnas ruxi niadagebis damakmayofilebeli Tvisebebi, Tumca maTi mikrostruqtura gamoxatulia sutad, aseTi niadagebi gajerebulia kalciumis ionebiT, ris Sedegadac isini gamoirCevian kargad gamoxatuli wyalgamZle mikrostruqturiT 0,25-0,01 mm-iani agregatebiT.

yvela niadagur-klimaturi zonisaTvis optimaluri struqturis standartuli parametrebi ar arsebobs, rac ufro maRalia wyliT uzrunvelyofa, miT ufro msxvili unda iyos agregatis optimaluri sidide.

struqturis agronomiuli mniSvneloba damokidebulia agregatebis forianobaze. maRali forianoba simtkicesTan erTad uzrunvelyofs niadagis yvelze ukeTes fizikur mdgomareobas, mis agronomiul Rirebulebas.

bunebriv pirobebSi niadagis struqtura warmoiqmneba niadagSi mimdinare sxvadasxva procesebis meSveobiT, mcenareulobaTa Tanacxovrebis garkveuli zegavleniT. kargad gamokveTili mtkice struqtura axasiaTebs yamir Savmiwebs.

niadags axasiaTebs garkveuli sididis bmuloba, rasac gansazRvravs meqanikuri Zalis sidide, romelic saWiroa nawilakebisa da agregatebis urTierTdasaSoreblad (gasafxviereblad). struqturul-wvrilkoStovan niadags mcire bmuloba aqvs, ustruqturos-didi. amis gamo struqturuli niadagebis damuSavebaze 20-25 % -iT naklebi energa ixarjeba, vidre ustruqturoze.niadagis gakulturebis procesSi misi struqturianobis gaumjobesebasTan erTad mcirdebamisi bmuloba, advildeba daekonomikuri xdeba niadagis damuSavebis teqnologia.

niadagis struqturis gauaresebas iwvevs Semdegi mizezebi:

1.niadagis damamuSavebeli iaraRebis meqanikuri zemoqmedeba. transportisa da traqtorebis gadaadgileba mSral pirobebSi, iwvevs niadagis koStebis daqucmacebas da gamtverianebas, xolo Warbtenianobis pirobebSi ki mis dabekvnas da daglesvas. aqedan gamomdinare niadagi unda damuSavdes mxolod misi fizikuri ”simwifis” periodSi.

2. niadagis struqturas arRvevs fizikur-qimiuri xasiaTis movlenebi. am mxriv aRsaniSnavia amoniumis marilebi, romelsac ama Tu im raodenobiT yovelTvis Seicavs atmosferuli naleqebi, niadagSi moxvedrili am marilebis kaTionebi humusidan devnis kalciums da TviTon ikavebs mis adgils. struqturis darRvevas iwvevs agreTve fiziologiurad tute sasuqi (mag. NaNO3).

3. biologiuri faqtorebis moqmedeba. niadagis yoveli saxis damuSaveba aZlierebs masSi aerobuli baqteriebis gaaqtiurebas da xels uwyobs mcenarisTvis saWiro sakveb nivTierebaAgaZlierebul mobilizacias, rac iwvevs struqturis dakargvas. amitom mizanSeuwonelia niadagis zedmeti xSiri damuSaveba.

struqturis aRdgena da regulirebisTvis umTavresia miwaTmoqmedebis swori sistemis ganxorcieleba, kerZod iseTi Teslbrunvebis da naTesebis struqturis gatareba, romelic yvelaze ufro metad Seuwyobs xels niadagis wvrilkoStovani struqturis warmoqmnasa da SenarCunebas. es Tavis gamoxatulebas poulobs organuli naerTebis dadebiT balansSi.amisaTvis ki didi mnisvneloba aqvs TeslbrunvaSi sxvadasxva biologiur-sawarmoo jgufis mcenareebs-mTliannaTess da saToxni kulturebis, mravalwliani da erTwliani sakvebi balaxebis swori Sefardebis dacvas.

struqturis aRdgenis karg saSualebad iTvleba niadagSi mcxovrebi cxovelebi da mwerebi. dadasturebuli, rom Wiayelebi, WianWvelebi, matlebi afxviereben niadags da xels uwyoben wvrilkoStovani struqturis Camoyalibebas.

 niadagis nayofierebis erT-erTi faqtoria Hhaeri. niadagis haers udidesi mniSvneloba aqvs niadagwarmoqmnis, niadagSi mcenareTa fesvebis, mikrobTa sasococxlo procesebis, Jangva-aRdgenis movlenebisa da sxva TvisebebisTvis. damtkicebulia, rom mcenareTa fesvis yovel 1 gr mSral nivTierebas dRe-Ramis ganmavlobaSi 1 mg Jangbadi Wirdeba(kudriaceva).

niadagi, rogorc foriani sxeuli, yovelTvis Seicavs haers, romelic atmosferodan Sedis da gazebs, romlebic warmoiqmneba niadagSi mimdinare bioqimiuri procesebis Sedegad. uhaero niadagi rogorc v. vernadski aRniSnavda niadags ar warmoadgens.

niadagSi haeri samgvar mdgomareobaSi gvxvdeba: 1. Tavisufali, 2. adsorbciuli, 3. wyalSi xsnad mdgomareobaSi. raodenobrivad Cveulebriv, Tavisufali haeri Warbobs danarCen ors (gamonaklisia Waobiani niadagebi, romelSic Tavisufali haeri mcirea).

niadagis haeris saerTo raodenoba damokidebulia niadagis forianobasa da tenis raodenobaze. Tavisufal haers ukavia wylisgan Tavisufali forebi, adsorbciuli haeri niadagis wvrildispersiuli nawilis zedapirzea STanTqmul mdgomareobaSi. adsorbciuli haeri koloidebiT mdidar niadagSi metia, koloidebiT Rarib niadagSi-mcire. xsnadi haeri niadagis tenSia gaxsnili. haeris Semadgeneli nivTierebebidan yvelaze meti xsnadobis unari naxSirorJangs aqvs. 50 C temperaturaze-14,24 ml 1 litr wyalSi. Jangbadis xsnadoba SedarebiT mcirea (50C -0,51 ml 1 litr wyalSi ). zamTarSi da adre gazafxulze niadagSi xsnadi haeris raodenoba ufro metia, vidre zafxulSi. wyalSi gaxsnili Jangbadi da naxSirorJangi did rols asruleben niadagSi mimdinare Jangva-aRdgenis procesebSi, sakveb nivTierebaTa mcenarisaTvis SesaTvisebel mdgomareobaSi gadasvlaSi. haeris Sedgeniloba mudmivad ganicdis cvalebadobas. cvalebadobis mizezia dedamiwis zedapirze mimdinare geologiuri, biologiuri da adamianis moqmedebis Sedegad gamowveuli procesebi. niadagisa da atmosferos haeri Seadgenen wonasworul dinamikur sistemas, romelic regulirdeba fizikis, qimiis, da biologiis kanonebiT. amitom aseTi sistema mocemul Termodinamikur pirobebSi miiswrafis SeinarCunos mdgradi wonasworoba.

atmosferos haeri, romelic gaTavisuflebulia tenisa da mtvrisagan, zRvis donis simaRleze dedamiwis yvela adgilas TiTqmis erTnairia da Seicavs azots-79.01%, Jangbads 20.96% naxSirorJangs- 0,03%, danarCeni modis wyalbadze, argonze, heliumze, ozonze da sxva gazebze.

niadagis haeri Tavisi SedgenilobiT gansxvavdeba atmosferuli haerisgan. niadaguri haeri naxSirorJangs bevrad meti raodenobiT Seicavs vidre atmosferuli, Jangbadi ki niadagis haerSi mcirea, atmosfeulTan SedarebiT.

niadagur haerSi Jangbadis simcire da naxSirorJangis didi raodenoba gamowveulia bioqimiuri procesebiT. amis gamo niadagur haerSi Jangbadis raodenoba niadagSi organuli nivTierebebis Semcvelobisa da bioqimiuri procesebis intensivobis zrdis Sesabamisad mcirdeba. niadagur haerSi miT metia naxSirorJangis raodenoba, rac ufro energiulia masSi bioqimiuri procesebi. aris iSviaTi SemTxvevebi, roca niadagur haerSi naxSirorJangis raodenoba 10 % -sac ki scildeba, (indoeTi). naxSirorJangis garkveul zomamde gadidebas is mniSvnelobac aqvs, igi adidebs sxvadasxva Zneladxsnadi SenaerTebis xsnadobas. da amiT aumjobesebs mcenareTa kvebis pirobebs, magram Tu naxSirorJangis koncentraciam niadagis haerSi 1%-s gadaaWarba, is ukve kulturuli mcenareebis udidesi nawilisaTvis toqsikuria. saSualod ki niadagis haerSi CO2 raodenoba 0,15-0,65 %-ia.

niadagis haeris Sedgeniloba damokidebulia mTel rig procesebze. niadaguri florisa da faunis cxovelmyofelobaze, lpobisa da xrwnis bioqimiur procesebis Sedegad niadagis haeridan ixarjeba Jangbadi da piriqiT gamoiyofa naxSiroroJangi. azotfiqsatorebi niadaguri haeridan azots nTqaven da amiT mis raodenobas amcireben, denitrifikatorebi ki piriqiT niadagur haerSi gamoyofen molekulur azots.

niadagisa da atmosferos haeris gansxvavebuli Sedgeniloba warmoadgens gazTa cvlis ZiriTad mizezs. igi miT ufro intensiuria, rac metia es gansxvaveba. TviT is garemoeba, rom niadagis haerSi metia CO2-is raodenoba, vidre atmosferoSi iwvevs mis difuzias atmosferoSi. maSasadame, niadagSi met-naklebi cvalebadi intensivobiT mimdinareobs haeris ganaxleba, winaaRmdeg SemTxvevaSi CO2-is raodenoba saxnav fenaSi 1,5 saaTSi gaorkecdeboda, xolo 14 saaTSi 10-jer gadiddeboda.

CO2 niadagSi ar dagrovdeba maSin, TuU niadaguri haeris ganaxleba warmoebs ganuwyvetliv. niadaguri haeris CO2-is didi nawili atmosferoSi amodis, nawili wyalSi gaxsnili Cadis niadagis Rrma fenebSi. am process ZiriTadad apirobeben Semdegi faqtorebi: airebis difuzia, temperaturis cvalebadoba, barometruli wnevis cvalebadoba, naleqebi da sxva.

rogorc aRiniSna niadagsa da atmosferos Soris gazTa cvlis erT-erT pirobas temperaturis dRe-Ramuri ryeva warmoadgens. temperaturis gadideba dRisiT iwvevs haeris gafarToebas, is veRar eteva forebSi da nawilobriv uerTdeba atmosferul haers. RamiT ki piriqiT, niadagis gacivebis gamo haeri ikumSeba da moculobis danaklisi ivseba JangbadiT. aeraciis pirobebs aumjobesebs sarwyavi wyali da gansakuTrebiT atmosferuli naleqebi. niadagis forebidan gamoidevneba haeri mis adgils ki ikavebs wyali. SemdgomSi niadagis gamoSrobis, aorTqlebisa da fesvebis mier wylis Sewovis Sedegad forebi TandaTanobiT Tavisufldeba da haeri “ brundeba” niadagis forebSi.

qari aCqarebs gazebis cvlas da saerTod aorTqlebas. niadagSi gazTa cvlis intensivoba damokidebulia, agreTve mis fizikur Tvisebebze-niadagis meqanikur Sedgenilobaze, struqturaze, fori-anobaze, simkvrivesa da maTTan dakavSirebiT, haertevadobis da haergamtarobisa unarze.

haertevadoba anu aeracia ewodeba niadagis unars, gaataros haeri Tavis masaSi. gasagebia, rom amas agreTve forianobac gansazRvravs. niadagebis sxvadasxva tips araerTnairi haeris reJimi axasiaTebs. meti aeracia aqvs struqturian, fxvier da ara mZime meqanikuri Sedgenilobis niadagebs, romlebSic metia msxvili forebi da kargi wyalgamtaroba axasiaTebs. mcenareebis umetesobisaTvis niadagis xsnarsa da haers Soris Sefardeba Seadgens (%): wyali 60-s da gazovani faza 40-s. kartofils, parkosnebs da Zirxvenebs Wirdeba kargi aeracia, brinji da zogierTi sxva kultura ki Warbtenian niadagzec normalurad izrdeba.

gazebis gacvla-gamocvlas niadagsa da atmosferos Soris didi mniSvneloba aqvs niadagis nayofierebis da mcnareTa produqtiulobisTvis. haeris mudmivi gacvla-gamocvlis gareSe niadgis haeri sruliad gamousadegari iqneboda sasoflo-sameurneo kulturebis mosayvanad.

 umniSvnelovanes faqtors, razedac gazebis gacvla-gamocvlis siCqarea damokidebuli miekuTvneba forianoba. struqturiani niadagebisaTvis damaxasiaTebeli arakapilaruli forianobis dros niadagis haeris gacvla atmosferuliT swrafad xdeba. niadagis qerqi amcirebs agreTve gazebis gacvla-gamocvlas. vegetaciis periodSi haeris reJimi niadagis qerqis daSliT umjobesdeba.

 gazebis gacvla-gamocvlaze gavlenas axdens niadagis simkvrive, xelSemwyobi haeris reJimis Sesaqmnelad tardeba moxvna, dafarcxva, kultivacia. daWaobebul da drodadro Warbi tenianobis niadagebze haeris reJimi daSrobiT regulirdeba.

niadagis Tburi Tvisebebi. niadagis siTbos wyaroebia: 1. mzis sxivuri energia, 2. niadagSi mimdinare bioqimiuri procesebis Sedegad gamoyofili siTbo,3. sveladobis siTbo 4 dedamiwis Rrma fenebidan amoweuli siTbo.

mcenareSi mimdinare fiziologiuri procesebis warmarTvisTvis saWiroa rogorc haeris miwiszeda fenis Sesaferis temperatura, ise niadagis garkveuli siTburi reJimi.

Tesli garkveul moTxovnilebas uyenebs niadagis temperaturas. Tesvis vadis dadgenisas, mniSvnelovania vicodeT Teslis garivebisa da sicocxlisunariani aRmocenebis minimaluri temperatura, romelic sxvadasxva kulturisaTvis 1-150 fargalSi meryeobs. praqtikulad niadagSi mimdinare yvela fiziko-qimiuri da biologiuri procesebi damokidebulia temperaturaze. niadagis mikroorganizmebis cxovelmyofeloba da masTan dakavSirebuli organuli nivTierebebis xrwnis procesebi gapirobebulia temperatoruli faqtorebiT. mikrofloris didi nawilisaTvis optimaluri temperaturaa 25-300-is tolia.

 niadagis mier mzis sxivosnuri energiis STanTqmis unars sxivSTanTqma ewodeba. sxivosnuri energia STanTqmis Semdeg siTbur energiaSi gadadis.

niadagis feri sxivSTanTqmis Tvisebaze did gavlenas axdens. Savi feris nadagi ufro Zlieri sxivSTanTqmiT xasiaTdeba vidre Ria an moTeTro feris niadagi. gamokvleulia, rom Savi feris niadagi mzis sxivosnuri energiis 86 % STanTqavs, ruxi 80%, xolo TeTri mxolod 20%-s. siTbos STanTqmaze gavlenas axdens agreTve garemo pirobebi: reliefi, mcenareuli safari, samxreTiT daqanebuli niadagebi STanTqaven met siTbos vidre CrdiloeTiT daxrili. niadagis siTbos balansi didadaa damokidebuli areklil da dacemul sxivosnuri energiis fardobaze-albedoze. albedoze did gavlenas axdens dedamiwis zedapiris forma, ramdenadac zedapiri uaxlovdeba vakes, imdenad albedo didia, da piriqiT uswormasworo zedapiris albedo mcirea.

sxivTfrqveva sxivSTanTqmis sawinaaRmdego movlenaa. niadagis zedapirze moxvedrili mzis sxivuri energiaTbur energiad gardaiqmneba, romlis nawils Tbotevadobis Sedegad is STanTqavs da gadascems qveda fenebs, nawild ki gamoasxivebs da ukan ubrunebs samyaros. am ukanasknel movlenas sxivTfrqveva an Tbogamosxiveba ewodeba. sxivTfrqveva mTeli dRe-Ramis ganmavlobaSi ganuwyvetliv mimdinareobs. Tbogamosxivebis Sedegad niadagi kargavs siTbos, magram es ar igrZnoba, radganac Tbogamosxiveba gadaWarbebiT kompensirdeba mzis radiaciiT.

niadagis sxivTfrqvevaze did gavlenas axdens mcenareuli safari. es ukanaskneli amcirebs sxivTfrqvevas. amitom tyis niadagSi dRe-Ramuri temperaturuli amplituda bevrad mcirea, vidre stepis niadagSi. niadagis sxivfrqvevas amcirebs agreTve Tovlis safari.

Tbotevadoba aris niadagis unari iqonios Tavis masaSi siTbos esa Tu is raodenoba. siTbo izomeba kaloriebSi. Tbotevadoba warmoadgens siTbos im raodenobas romelic saWiroa 1 g niadagis 10-ze gasaTbobad (woniTi Tbotevadoba). sxvadasxva niadags sxvadasxva Tbotevadoba axasiaTebs, rac imas niSnavs, rom maTi Tanabari raodenobis nimuSs erTi da imave xarisxiT (gradusiT) gaTbobisaTvis siTbos gansxvavebuli raodenoba sWirdeba.

niadagis mineraluri nivTierebebis Tbotevadoba wylis TbotevadobasTan (1,0 kal/gC0) SedarebiT 5-jer mcirea (0,2). organuli nivTierebebis Tbotevadoba saSualoT 0,6 udris, silis-0,19, Tixis 0,24, xolo haeris 0,000306. rac ufro teniania niadagi miT meti siTboa saWiro mis gasaTbobad. qviSiani niadagebi Tixaze Tbilia, gazafxulze aseTi niadagebi SeiZleba damuSavdes erTi-ori kviriT adre vidre Tixnari.

Tbogamtaroba ewodeba niadagis unars gaataros siTbo gamTbari fenebidan civisaken. Tbogamtaroba damokidebulia niadagis qimiur da meqanikur Sedgenilobaze. umciresi TbogamtarobiT xasiaTdeba haeri, maRaliT wyali, yvelaze maRaliT- niadagis mineraluri nawili. humusi siTbos cudi gamtaria. amitom rac metia niadagSi humusi da haeri, mT cudad atarebs igi siTbos. e.i. igi didxans ikvebs dagrovil mzis siTbos.

niadagis Tburi reJimis regulirebis meTodebi yoveli niadaguri-klimaturi zonisaTvis sxvadasxvanairia. CrdiloeT da mTian raionebSi agroteqnikuri RonisZiebebi mimarTulia niadagis temperaturis amaRlebisaken, xolo samxreTSi da baris raionebSi misi Semcirebisken.. niadagis tenianobis gadideba morwyviT an sxva saSualebiT amcirebs temperaturas, siTbos daxarjvas, wylis gaTbobasa da aorTqlebas.

niadagis temperaturuli reJimis regulirebisas did rols asrulebs Tovlis dakaveba, gansakuTrebiT saSemodgomo kulturebis naTesebze. mindorsacavi tyis zolebi anelebs qaris siCqares, amcirebs niadagis tenianobas, xels uwyobs Tovlis dagrovebas da amiT gavlenas axdenen niadagis temperaturaze. niadagis zedapiris dafarva sxvadasxva feris masiT-mulCirebiT (namjiT, torfiT, neSompaliT, nacriT) adidebs an amcirebs mis gaTbobas. kvamlis safari amcirebs siTbos gamosxivebas niadagidanda icavs mcenareebs moyinvisagan. amrigad, Tbur reJimze moqmed RonisZiebebs hyofen agroteqnikur, agromelioratorul da agrometeorologiurad.

leqcia 5

niadagis fiziko-qimiuri Tvisebebi. STanTqmisunarianoba. meqanikuri, fizikuri anu molekuluri, fizikur-qimiuri anu polaruli, qimiuri, biologiuri STanTqma. niadagis reaqcia pH, niadagis organuli nawili, niadagis qimiuri Sedgeniloba da kvebis reJi. azoti, fosfori, kaliumi, kalciumi, magniumi, rkina, gogirdi, bori.

niadagis Tvisebas daakavos Tavis masaSi xsnarSi gaxsnili an ativnarebuli nivTierebebi, agreTve baqteriebi da airebi ewodeba niadagis STanTqmisunarianoba.

niadagis es Tviseba kacobriobisaTvis didi xania cnobilia. egviptisa da sxva qveynebis mosaxleoba mas iyenebda mlaSe wylebis gasaneitraleblad. me-18-19 saukuneebSi daiwyo am sakiTxis mecnieruli kvleva, zogierTi mecnieri aRniSnul movlenas niadagSi arsebul mineralebis jgufs-ceolitebs miawerda.

niadagis STanTqmisunarianobis SeswavlaSi didi wvlili miuZRvis gedroics. man STanTqmisunarianobis xuTi saxe gamoyo: 1. meqanikuri, 2. fizikuri anu molekuluri (adsorbcia),, 3.fizikur-qimiuri anu polaruli (gacvliTi) 4. qimiuri da 5 biologiuri.

meqanikuri STanTqmisunarianoba ewodeba, rodesac niadagi Tavis forebSi akavebs wyalSi ativnarebul myar sxeulebs. is damokidebulia niadagis meqanikur Sedgenilobasa da Senebaze. STanTqmis meti unari axasiaTebT mZime meqanikuri Sedgenilobis niadagebs-Tixebs, mZime Tixnarebs da sxv. nadagis meqanikuri STanTqmisunarianobas didi mniSvneloba aqvs is mogvagonebs uzarmazar filtrs, romliTac ifiltreba masSi CaJonili mRvrie wyali.

fizikuri STanTqma--niadagis fizikuri STanTqmis qveS gulisxmoben niadagis mier xsnarSi arsebuli molekulebis Sekavebas, am saxes sxvanairad molekuluri STanTqmasac uwodeben. STanTqmis es saxe wminda fizikur movlenas warmoadgens da gamowveulia niadagis dispersiuli nawilis-koloidebis Tavisufali zedapiruli energiiT. rac metia niadagis wvrili masis dispersiis anu daqucmacebis xarisxi da xvedriTi zedapiri, miT metia Tavisufali zedapiruli energia. romelic xvedriTi zedapiris da Tavisufali zedapiruli daWimulobis namravlis tolia.

koloiduri wilakebis mier fizikurad STanTqmuli molekulebi mis qimiur SedgenilobaSi ar Sedian da zedapiris garSemo koncentrirdebian.

niadagSi arsebuli zogierTi naerTi xels uwyobs zedapiruli daWimulobis Semcirebas( spirti, organuli mJaveebi, alkaloidebi da sxv.) amitom isini koloiduri wilakebis mier miizidebian. am movlebnas dadebiTi adsorbcia ewodeba. magram zogierTi mineraluri nivTierebebi (fuZeebi, araorganuli mJaveebi da sxv) aZliereben zedapirul daWimulobas, ris gamoc niadagis koloidebis mier isini ganizidebian da koncentrirebas ganicdian maTgan moSorebiT-xsnarSi. am movlenas uaryofiTi adsorbcia ewodeba.

niadagis fizikuri STanTqma damokidebulia meqanikur Sedgenilobasa da humusis Semcvelobaze. mZime meqanikuri Sedgenilobis da humusiT mdidari niadagebi ufro maRali fizikuri STanTqmis unarianobiT xasiaTdebian.

fizikuri-qimiuri STanTqma. STanTqmis es saxe mecnierulad yvelaze kargad aris Seswavlili. is mimdinareobs koloiduri kompleqsis zedapirze warmoqmnili Tavisufali zedapiruli energiis gavleniT, ris gamoc es procesi fizikur movlenas miekuTvneba. am dros adgili aqvs koloidebis makompensirebeli ionebsa da niadagur xsnarSi arsebul ionebs Soris Canacvlebis anu gacvla- gamocvlis reaqcias. amitom mas gacvliT STanTqmasac uwodeben. amasTan es gacvla mimdinareobs zustad eqvivaklenturi tolobis mixedviT ris gamoc is atarebs qimiuri reaqciis xasiaTs.

niadagi akavebs rogorc kaTionebs, ise anionebs amis mixedviT asxvaveben kaTionebis da anionebis gacvliT STanTqmas.

kaTionebis STanTqma damaxasiTebelia uaryofiTi muxtis matarebeli koloidebis Semcveli niadagebisaTvis. aseTi niadagi rom davamuSaoT mag. KCL-is xnariT gafiltvris Semdeg filtratSi K-is Semcveloba daiklebs, magram aRmocndeba Ca eqvivalenturi raodenobac, rac miiReba niadagur xsnarSi arsebul ionebsa da niadagis myar nawilTa Soris gacvla gamocvlis Sedegad

niadagebis mier kaTionebis STanTqma damokidebulia koloidebis Semcvelobaze da maT eleqtromuxtze, xsnaris koncentraciaze da kaTionebis STanTqmis energiaze.

 niadagebi da maTi genezisuri horizontebi mkveTrad ganirCevian STanTqmuli kaTionebis mixedviT. niadagis STanTqmisunarianobas gamoxataven STanTqmuli fuZeebis jamis da STanTqmis tevadobis maCveneblebiT. pirveli warmoadgens yvela STanTqmuli kaTionebis jams. gacvliT kaTionebis jams ki uwodeben STanTqmis tevadobas. orive maCvenebels gamoxataven miligrameqvivalentebSi 100 gr niadagSi.

STanTqmis dabali tevadoba axasaiaTebs msubuqi meqanikuri Sedgenilobis koloidebiT Rarib mcire humusian niadagebs.

gedroici STanTqmuli kaTionebis mixedviT niadagebs or did jgufad yofda. fuZeebiT maZRari da fuZeebiT aramaZRari. fuZeebiT aramaZrar niadagebs akuTvnebda mJave reaqciis niadagebs, sadac STanTqmuli kalciumi da magniumi garda monawileobs wyalbadi. iseT niadagebs ki sadac wyalbadi ar monawilebs fuZeebiT maZRari niadagebi ewodeba. Tavis mxriv isini iyofian kalciumiT da magniumiT maZRar da natriumiT maZRar niadagebad. romelsac ekuTvnis bicobebi. natriumis gavleniT es niadagebi mTeli rigi uaryofiTi TvisebebiT xasiaTdebian da saWiroeben specialur melioraciul RonisZiebebs.

anionebis gacvliTi STanTqma axasiaTebs dadebiTi muxtis matarebel koloidebis Semcvel mJave reaqciis niadagebs (wiTelmiwebi, yviTelmiwebi, lateritebi), romelTac niadaguri xsnaridan SeuZliaT STanTqon anionebi

.anionebis STanTqmac damokidebulia niadagebSi kolodebis Semcvelobaze da maT eleqtromuxtze, xsnaris koncentraciaze, STanTqmis energiaze da sxv.

anionebis STanTqmis energias gansazRvravs maTi valentoba amis mixedviT maT samjgufad yofen: pirveli jgufis anionebi fizikur qimiurad ar STainTqmeba, meore jgufis anionebi aramtkiced, mesame jgufis anionebi ki Zlier STainTqmeba.

qimiuri STanTqma. qimiuri STanTqmis qveS gedroici gulisxmobda iseT process, rodesac xsnarSi arsebuli anioni da niadagidan xsnarSi gadasuli kaTioni warmoqmnian Znelad xsnad naerTs, ris gamoc is xsnaridan gamoileqeba da niadagSi kavdeba.

fosformJava kalciumis da fosformJava rkinis marilebi Znelad xsnadobis gamo xsnaridan gamoileqebian da niadagis mier qimiurad STainTqmebian. es procesi gansakuTrebiT damaxasiaTebelia wiTelmiwebisaTvis, romelTa rkinisa da aluminis koloidebi dadebiT muxts atareben. amis Sedegad wiTelmiwa niadagebSi sasuqebad Setanili fosforis nawili gadadis mcenarisaTvis SeuTvisebel an Znelad SesaTvisebel formaSi.

biologiuri STanTqma. am terminis qveS gulisxmoben nivTierebaTa dakavebas cocxali organzmebis qsovilebSi. aqedan gansakuTrebiT aRsaniSnavia qlorofilis matarebeli mcenareebi da niadagSi mobinadre mikroorganizmebi, romlebic nivTierebaTa biologiur mimoqcevaSi mTavar rols asruleben.

biologiur STanTqmisunarianobis Sesaxeb moZRvreba ufro ganaviTara viliamsma, man gaarCia mcenareTa e.w. SerCeviTi STanTqma., romelic mwvane mcenareebis kvebis biologiur kanons warmoadgens. am kanonis mixedviT mcenareebi nadagidan moipoveben mxolod maTTvis aucilebel sakveb elementebs, isini gardaiqmnebian sxvadasxva organul da mineralur nivTierebebad da rCebian mcenaris qsovliebSi misi sicocxlis manZilze. xolo sikvdilis Semdeg organuli narCenebi ganicdian daSlas da odesRac SerCeviTi STanTqmiT miRebuli sakvebi elementebi ubrundebian niadags.

nivTierebaTa aseT brunvas romelic niadagsa da mcenares Soris mimdinareobs viliamsi uwodebda nivTierebaTa mcire biologiur mimoqcevas.

nadagis STanTqmisunarianobas uaRresad didi mniSvneloba aqvs niadagis nayofierebis da sakvebi elementebis dagrovebaSi. STanTqmuli kaTionebis Sedgenilobaze damokidebulia niadagis reaqcia, buferobis Tviseba, struqturianoba, wyalgamtaroba, tentevadoba, da sxva

niadagis xsnaris Tvisebebidan agronomiuli TvalsazrisiT didi mniSvneloba aqvs: 1. osmosur wnevas, 2. reaqcias da 3 daJangva-aRdgenis process.

xsnaris osmosuri wneva. mcenaris kvebis normaluri reJimi damokidebulia fesvTa sistemis ujredTa wvenisa da niadagis xsnaris osmosur wnevaze. niadagis xsnaris osmosur wneva (1,2-2 atmosfero) ramdenimejer mcirea ujredis wvenis osmosur wnevaze (6-10 atmosfero), ris gamoc adgili aqvs niadagis xsnaris fesvis ujredebSi Sesvlas. niadagis xsnaris osmosuri wnevis siWarbis SemTxvevaSi ki adgili aqvs plazmolizis movlenas, ris Sedegadac mcenare iRupeba. maRali osmosuri wneva axasiaTebs mlaSe nidagebis xsnars (30-40 atm. da meti ) amitom mlase niadagebze melioraciis gareSe kulturuli mcenareebi ver xaroben.

niadagis xsnaris raodenobisa da koncentraciis cvlilebebis Sesbamisi dinamika axasiaTebs osmosur wnevas, zafxulSi maRali, gazafxulze ki dabali.

niadagis mJavianoba. niadagis xsnaris Sedgenilobis mixedviT arCeven orgvar mJavianobas: aqtualurs (aqtiurs) da potenciurs (faruls). aqtualuri mJavianoba gapirobebulia niadagis xsnarSi wyalbad ionebis raodenoobiT. niadagis xsnaris reaqcia ganisazRvreba Tavisufali H+ da OH- ionebis koncentraciiT da xasiaTdeba mJavianobis maCveneblis sididiT pH, romelic warmoadgens wyalbadis ionebis koncentraciis uaryofiT logariTms.neitraluri reaqciis niadagagebs aqvs pH 7, mJaves-

<7, tutes- pH>7.

niadagis xsnaris reaqcia sxvadasxva niadagSi meryeobs 3,5-gdan 8-9-mde. yvelaze mJave reaqcia aqvs Waobian niadagebs. niadagis xsnaris MmJave reaqciiT xasiaTdeba eweriani da kordian-eweriani (pH 4-6), Savmiwebis reaqcia neitralurTan axloa. tute reaqcia aqvs bicobebs (pH 8-9 da meti).

rogorc cnobilia, sasoflo-sameurneo kulturebi sxvadasxva moTxovnas uyenebs niadagis ares reaqcias. maT umravlesobisaTvis niadagis xsnaris ukeTesi reaqcia neitraluria. mcenareTa zrdisa da ganviTarebaze uaryofiTad aisaxeba Zlier mJave da Zlier tute reaqcia. mJa­vi­a­no­bis xa­ris­xis si­di­dis mi­xed­viT ga­nas­xva­ve­ben: mJa­ve, ne­it­ra­lu­ri da tu­te re­aq­ci­is ni­a­da­gebs: re­aq­ci­is mi­xed­viT ad­ge­nen mo­ki­ri­a­ne­bis an mo­Ta­ba­Si­re­bis sa­Wi­ro­e­bas da saz­Rvra­ven Ta­ba­Si­ris da ki­ris Se­ta­nis nor­mebs.

potenciuri mJavianoba. misi gamovlineba xdeba niadagis damuSavebis dros sxvadasxva marilis xsnarebiT, romlebic devnian wyalbadisa da aluminis ionebs STanTqmuli mdgomareobidan. arCeven potenciuri mJavianobis or formas: gacvliTs da Hhidrolizurs.

gacvliTi mJavianoba mJRavndeba niadagis damuSavebisas neitraluri marilis xsnariT, magaliTad KCl , am SemTxvevaSi gamoidevneba wyalbadis ioni. gacvliT mJavianobs gamoxataven iseve, rogorc aqtiurs pH simboloTi.

hidrolizuri mJavianoba mJRavndeba niadagis hidrolizurad tute mariliT (1nor. xsnari CH3COONa) damuSavebisas. mocemuli formis mJavianobis sidide axasiaTebs niadagis unarianobas tute marilebis xsnarebidan SeboWos fuZeebi hidrolizurad. mas gamoxataven miligram eqvivalentebSi 100 g niadagSi. ni­a­da­gis Sed­ge­ni­lo­bis ma­xa­si­a­Teb­le­bi­dan erT-erT mniS­vne­lo­van sa­kiTxs war­mo­ad­gens ni­a­da­gis ko­lo­i­du­ri na­wi­lis war­moq­mna da mas­Tan er­Tad ni­a­da­gis mSTan­Tqa­vi kom­pleq­sis si­di­de, ro­mel­sac Se­uZ­lia da­a­mag­ros STan­Tqmis una­riT: kal­ci­u­mis, mag­ni­u­mis, nat­ri­u­mis, ka­li­u­mis, amo­ni­u­mis, alu­mi­nis, rki­nis da wyal­ba­dis ka­Ti­o­ne­bi - STan­Tqmul da araS­Tan­Tqmul mdgo­ma­re­o­ba­Si. STan­Tqmu­li (gac­vli­Ti) ka­Ti­o­ne­bis sa­er­To ra­o­de­no­ba - CaII, MgII, NaI, KI, NH4 uwo­de­ben STan­Tqmu­li fu­Ze­e­bis jams, ma­Ti si­di­de ga­mo­i­xa­te­ba mg-eq. 100 gr ni­a­dag­Si. yve­la gac­vli­Ti ka­Ti­o­ne­bis sa­er­To jams ewo­de­ba STan­Tqmis te­va­do­ba an gac­vli­Ti te­va­do­ba. es maC­ve­ne­be­lic izo­me­ba mg/eqv. 100 gr ni­a­dag­ze. ase­Ti­ve, mag­ram uf­ro mwi­ri ma­xa­si­a­Teb­le­biT xa­si­aT­de­ba ni­a­da­gis STan­Tqmi­Ti ani­o­ne­bi - ClI, NoI3, SoII4, PoIII4, OHI.

STan­Tqmu­li fu­Ze­e­bis ja­mis Se­far­de­bas, STan­Tqmis te­va­do­bis jam­Tan, ro­mel­sac mi­ma­te­bu­li aqvs hid­ro­li­zu­ri mJa­vi­a­no­ba (ga­mo­xa­tu­li %-obiT) ewo­de­ba ni­a­da­gis maZ­Rro­bis xa­ris­xi anu fu­Ze­e­biT maZ­Rro­bis xa­ris­xi: am maC­ve­neb­le­bis ga­mo­ye­ne­biT un­da ga­ni­saz­Rvros ni­a­da­gis moT­xov­ni­le­ba mo­ki­ri­a­ne­ba­ze, mi­ne­ra­lu­ri sa­su­qe­bis for­meb­ze da do­zeb­ze.

ni­a­da­gis mi­ne­ra­lu­ri na­wi­lis da ni­a­dag­Twar­moq­mnis pro­ce­sis Se­de­gad mom­xda­ri gar­daq­mne­bis asax­sne­lad gar­kve­ul dax­ma­re­bas gvi­wevs mTli­a­ni ana­li­zis mo­na­ce­me­bi, ker­Zod S1O2 - si­li­ci­u­mis Jan­gi da R2O3 - er­Tna­xe­va­ri Jan­ge­bi. am kom­po­nen­tebis Sem­cve­lo­bis cva­le­ba­do­bis mi­xed­viT Se­iZ­le­ba vim­sje­loT ni­a­da­gis pro­fi­lis ge­ne­zi­su­ri fe­ne­bis di­fe­ren­ci­a­ci­is xa­ris­xze.

niadagis tutianoba. arCeven aqtiur da potenciur tutianobas. aqtiuri tutianoba gapirobebulia niadagis xsnarSi hidrolizurad tute marilebis Na2CO3, NaHCO3, Ca(HCO3)2 da sxvaTa arsebobiT, romlebic disociaciis dros gansazRvraven hidroqsil ionebis gabatonebul koncentracias da pH sididiT gamoisaxebian.

potenciuri tutianoba axasiaTebs in niadagebs, romlebSic Sedis StanTqmuli natriumi. gamoxataven miligram eqvivalentebSi 100 g niadagSi. niadagis xsaris tutianobas mcenareebi ufro cudad itanen vidre mJavianobas.

niadagis buferoba. niadagis buferoba winaaRmdegobas uwevs gamJavebasa da gatutianebas. igi damokidebulia STanTqmiT tevadobaze. niadagebis koloidebis Semadgenlobaze da niadagis xsnarSi buferuli marilebis arsebobaze. mag. kalciumis bikarbonatebisa. qviSian humusiT Rarib niadagebis buferoba didi ar aris. maTSi advilad ereva xsnaris reaqcia mJave da tute mineraluri sasuqebis Setanisas. fuZeebiT maRali xarisxiT gajerebuli neSompaliT mdidari Tixiani niadagebi meti buferobiTaa aRWurvili, e.i. ares reaqciis cvlilebisadmi sakmao simdgradiT xasiaTdebian.

 koloidebi warmoadgenen niadagis uwvrilesi zomis nawilakTa sistemas. amJamad damtkicebulia, rom yoveli nivTierebidan SeiZleba miviRoT rogorc koloiduri, ise molekuluri xsnarebi. es garemoeba damokidebulia nivTierebaTa gaxsnis pirobebsa da gamxsnelis Tvisebebze (mag. NaCI wyalSi da mraval sxva gamxsnelSi iZleva molekulur xsnars, benzolSi ki \_ koloidurs).

koloidur xsnarebSi nivTirebani ise Zlieraa dispergirebuli, rom calke nawilakebis danaxva mxolod Zalian didi gadidebis mikroskopiT SeiZleba.

niadagis Semadgeneli organuli da mineraluri nivTierebebis daqucmaceba koloiduri Tvisebebis ganviTarebas iwvevs. es Tvisebebi emCneva leqis (<0,001 mm) fraqcias da gansakuTrebiT ki <0,0002 mm fraqcias. amitom am ukanaskneli zomis nawilakebs koloidebs uwodeben.

leqis fraqcia, niadagis koloiduri kompleqsis mniSvnelovan Semadgenel nawils warmoadgens. niadagis koloidur nawils niadagis xsnarTan (wyalTan) erTad dispersiuli sistema ewodeba. koloidebs cru xsnaris (ativnarebul) mdgomareobaSi zoles uwodeben, gamoleqilSi ki \_ gels. niadagis or­ga­nu­li na­wi­li. or­ga­nu­li na­wi­lis Sem­cve­lo­ba da­mo­ki­de­bu­lia ni­a­dag­ze da­sax­le­bul mce­na­re­u­lo­bis flo­ris­tul Sed­ge­ni­lo­ba­ze, ni­a­dag­Si mcxov­reb cxo­ve­lur or­ga­niz­me­bis da mik­ro­or­ga­niz­me­bis aq­ti­vo­ba­ze.

ni­a­dag­Twar­moq­mnis pro­ces­Si xde­ba mce­na­re­u­li da cxo­ve­lu­ri war­mo­So­bis nar­Ce­ne­bis gar­daq­mna, ro­gorc ni­a­dag­Si ise ze­da­pir­ze dag­ro­ve­ba or­ga­nu­li niv­Ti­e­re­be­bis sa­xiT. niv­Ti­e­re­ba­Ta daS­la mim­di­na­re­obs sxva­das­xva pro­ce­se­bis gan­sxva­ve­bu­li in­ten­si­vo­biT es aris mi­ze­zi imi­sa, rom sxva­das­xva pi­ro­beb­Si war­moq­mni­li ni­a­da­ge­bis or­ga­nu­li na­wi­li mkveT­rad gan­sxvav­de­ba er­Tma­ne­Ti­sa­gan.

bunebr fitocenozSi, niadagSi Sesuli organuli nivTiereba mkvdari mcenareulobaa, agrofitocenozebSi ki-sasoflo-sameurneo kulturebis sanawveralo anarCenebi, organuli sasuqebi.

ni­a­dag­Si mox­ved­ri­li mce­na­re­u­li da cxo­ve­lu­ri anar­Ce­ne­bi ga­nic­dis rTul gar­daq­mnebs, na­wi­li bo­lom­de da­iS­le­ba nax­Si­ror­Jan­gis, wylis da mar­ti­vi ma­ri­le­bis do­nem­de, ra­sac mi­ne­ra­li­za­ci­is pro­ce­si ewo­de­ba. me­o­re na­wi­li gar­da­iq­mne­ba, rTul or­ga­nul niv­Ti­e­re­be­bad ni­a­dag­Si da war­moq­mnis hu­muss, ro­mel­sac hu­mi­fi­ka­ci­is pro­cess uwo­de­ben. hu­mu­si anu ne­Som­pa­la, spe­ci­fi­ku­ri da aras­pe­ci­fi­ku­ri or­ga­nu­li niv­Ti­e­re­be­bis er­Tob­li­o­baa, mce­na­re­u­li da cxo­ve­lu­ri war­mo­So­bis nar­Ce­ne­bi, rom­leb­mac ga­ni­ca­des daS­la-gar­daq­mna sxva­das­xva xa­ris­xiT.

humusis warmoqmna niadagSi biologiuri proce­se­bis Sedegia da sami ZiriTadi mJavisagan Sedgeba: 1. hu­minis (aerobul baqteriebis aqtivobas ukavSirdeba) 2. ulminis (anaerobi baqteriebis cxovelmoqmedebis pro­duqtia) da 3) krenis (aerobuli sokovani proce­se­bis aqtiobas ukavSirdeba). maT Soris Sefardeba gan­saz­Rvravs sxva­das­xva ni­a­dag­Si hu­mu­sis xa­ris­xob­riv maC­ve­ne­bels.

hu­muss ni­a­da­gis na­yo­fi­e­re­bi­saT­vis udi­de­si mniS­vne­lo­ba aqvs: war­moq­mnis mce­na­ri­saT­vis saWiro sak­veb niv­Ti­e­re­bebs, ax­lad war­moq­mni­li hu­mu­si or­va­len­ti­an da sam­va­len­ti­an ka­Ti­o­neb­Tan er­Tad qmnis ni­a­da­gis mtki­ce struq­tu­ras, da­de­biT gav­le­nas ax­dens ni­a­da­gis fi­zi­kur da qi­mi­ur Tvi­se­beb­ze, ni­a­da­gis re­aq­ci­a­ze, adi­debs STan­Tqmis te­va­do­bas, ase­ve da­de­bi­Tad moq­me­debs mik­ro­bi­o­lo­gi­ur pro­ce­seb­ze.

hu­muss yve­la­ze mci­re ra­o­de­no­biT Se­i­cavs, ru­xi da ewe­ri ni­a­da­ge­bi (1-2%), xo­lo yve­la­ze me­ti ra­o­de­no­biT - Sav­mi­wa da mTa-mde­los ni­a­da­ge­bi (10-15%). humusis maragi saxnav fenaSi TiToeul heqtarze 60 tonamdea, Rrma SavmiwebSi-230 t/ha.

ZiriTadi mindvris kulturebis mosavlis aRebis Semdeg datovebuli organuli nivTierebebis raodenobis mixedviT sam jgufad iyofian:

mravalwliani parkosani balaxebi, romlebic yvelaze met organul nivTierebas agroveben. amas garda parkosnebi niadags amdidreben biologiuri azotiT, haeridan misi fiqsaciiT. 2. mTlianad moTesili erTwliani marcvlovani da parkosani kulturebi. erTwliani kulturebi niadagSi toveben mniSvnelovnad nakleb organul nivTierebas vidre mravalwliani balaxebi. 3 saToxni kulturebi, romlebic niadagSi toveben yvelaze mcire odenobiT organul nivTierebebs.

niadagSi organuli nivTierebebis anarCenebis gardaqmnis siswrafe damokidebulia maT qimiur da garemo pirobebze: mineraluri elementebis arsebobaze, tenianobaze, temperaturaze, aeraciaze, niadagis biologiur aqtivobaze da fiziko-qimiur Tvisebebze.

niadagis nayofierebis amaRlebaSi organuli nivTierebebi pirdapir funqcias asruleben, isini mineraluris paralelurad mcenareTa kvebis wyaros warmoadgenen. amasTan organuli nivTierebebi arapirdapir funqciasac asruleben, xels uwyoben niadagis struqturis Seqmnasa da gaumjobesebas, gavlenas axdenen niadagis fizikur Tvisebebzec (simtkice, tentevadoba, Tburi reJimi) mniSvnelovanwilad gansazRvraven mis fiziko-qimiur Tvisebebs: gacvliTunarianobas da buferobas.

niadagis qimiuri Sedgeniloba da kvebis reJimi. niadagi fesvTa sistemis saSualebiT mcenareSi Sesuli sakvebi elementebis wyaroa. maTze moTxovnileba damokidebulia mosavlis saxeze, xarisxsa da raodenobaze. sakvebi elementebis saeTo raodenobidan mcenareebi iyeneben mxolod advilad moZrav, misawvdom formebs.

qani azotis garda mcenaris sakveb yvela sxva elements Seicavs. naSal qanSi es nivTierebebi gabneul, arakoncentrirebul mdgomareobaSia. niadagwarmoqmnis procesis saSualebiT am elementTa akumulacia xdeba niadagSi. rogorc ukve aRvniSneT sakvebi nivTierebaTa akumulacia mwvane mcenareis SerCeviTi STanTqmiT xorcieldeba. niadagSi ara mxolod am nivTierebebis akumulacia warmoebs, aramed adgili aqvs xarjvasac da nawilobriv gardaqmnasac. amis gamo niadagSi xdeba sakvebi elementebis gamudmebuli dinamika. dinamikis xasiaTi damokidebulia rogorc niadagwarmoqmnis bunebriv procesze, ise adamianis sawarmoo moqmedebaze.

gamorkveulia, rom mcenare niadagidan iRebs makroelementebs (azotsa da nacris elementebs), K,Ca,Mg,Fe,S,P. mcenaris ganviTareba am nivTierebaTa erTdroul arsebobas moiTxovs niadagSi. kvebis TvalsazrisiT es elementebi Seunacvlebelia, dadasturebulia, rom mcenaris zrda-ganviTarebisaTvis saWiroa agreTve mikroelementebic-mori, marganeci, TuTia, spilenZi, iodi, molibdeni da sxv.

azoti, rogorc yvela cilovani nivTierebis, qlorofilisa da cocxali ujredis aucilebeli Semadgeneli nivTiereba, metad mniSvnelovani organogenia. azoti Sedis organul nivTierebebSi, romelSic imyofeba 90%-mde niadaguri azoti.

azotis ZiriTadi wyaro niadagSi organuli nivTierebebia, meorexarisxovania atmosferuli azotis baqteriuli fiqsacia kidev ufro naklebia Weqa-quxilis dros haerSi warmoqmnili da naleqebis saxiT niadagSi Camotanili amoniakuri azotis roli.

yvelaze meti mniSvneloba mcenarisaTvis misawvdomi azotis Sesavsebad aqvs amonifikaciisa da nitrifikaciis mikrobiologiur procesebs. organuli SenaerTebis gardaqmna SesaTvisebel mineraluri formebad mimdinareobs ramdenime Tanmimdevruli stadiiT. cilebi da huminuri nivTierebebi fermentebis zemoqmedebiT jer aminomJavebad da amidebad gardaiqmnebian, SemdegSi mikroorganizm-aminofiqsatorebs es SenaerTebi gadahyavT amiakad, amiakis marilebad da STanTqmul amoniumad. warmoqmnili amiakis nawils STanTqavs niadagi, magram misi mniSvnelovani nawili nitratebad da nititebad iJangeba. amiakis daJangvis process nitrifikacias uwodebenda xorcieldeba or etapad: amiakis daJangva nitratuli baqteriebiT (Nitrosomnas) nitritebad (NO3), nitritebis daJangva nitratebad nitratuli baqteriebiT (Nitrobacter), mcenareebi azots iTviseben amoniakur (NH4) da nitratul formebSi (NO3).

nitrifikaciis optimaluri done niadagSi damokidebulia temperaturaze (20-300), niadagis haerSi Jangbadis sakmariss maragze, Warbi mJavianobis ararsebobaze, niadagis tenianobaze, sruli mindvruli wyaltevadobis sakmarisobaze 60-70 %. nitrifikaciis xelSemwyob pirobebSi, magaliTad Savmiwa niadagebis saaneulo mindorze nitratuli azoti 30-50 mg/kg niadagze meti grovdeba, rac Seesaameba mis Semcvelobas saxnav fenaSi 90-150 kg-ze meti TiToeul ha-ze.

niadagSi dagrovili azotis nitratuli forma advilad moZravia. didi raodenobis naleqebis mosvlis dros igi SeiZleba gadaadgildes niadagis Rrma fenebSi, Cairecxos gruntis wylebamde, gadavides elementarul azotad da haerSi aorTqldes.

niadagis xarisxovani damuSaveba da fxvier mdgomareobaSi SenarCuneba, organuli sasuqis gamoyeneba, kiris Setana mJave niadagebSi mniSvnelovnad aZlierebs nitrifikacias da adidebs mcenarisaTvis misawvdomi azotis dagrovebas. agroteqnikur moTxovnaTa darRveva da niadagis gazebis gacvla-gamocvlis gauareseba iwvevs sawinaaRmdego process-denitrifikacias,romlis sedegadac xdeba nitratebis aRdgena Tavisufal azotamde da mcenarisaTvis SeuTvisebel formaSi gadasvla.

atmosferodan niadagSi azotis gadasvlis mTavari gza dakavSirebulia mcenarisa da mikroorganizmebis biologiur zemoqmedebasTan.

atmosferos azoti niadagSi nawilobriv naleqebTan erTad xvdeba. Cveulebriv isini Seicaven amiakisa da Jangis (NH4, NO3) mcire raodenibas. wlis ganmavlobasi atmosferuli naleqebiT niadagSi xvdeba 3-17 kg/ha azoti.

niadagis azotis SevsebaSi did rols asruleben mikroorganizmebi. isini ekuTvnian or jgufs: niadagSi Tavisuflad mcxovreb da simbiozur (Tanamcxovrebs), rolebic zogierTi umaRlesi mcenaris fesvbze binadroben, umetesad ki parkosnebze. Tavisuflad mcxovrebi azotobaqteri TviTeul heqtarze agrovebs 25-30 kg. azots. azotis raodenoba, romelsac iTvisebs koJris baqteriebi, damokidebulia mcenaris saxeobaze, agroteqnikaze, niadagis tipsa da gakulturebaze, amindze da sxva. xxelSemwyob pirobebSi samyurasa da ionjis koJris baqteriebi agroveben 150-200 kg/ha azots.niadagSi azotis raodenobasa da organul nivTierebebs Soris pirdapiri damokidebuleba arsebobs. organuli nivTierebebiT mdidari niadagi (Savmiwebi, mTa-mdelos niadagi) azots 0,5-1 % -mde Seicavs. humusiT Raribi niadagebSi ki (ewerebi, ruxi niadagebi) misi Semcveloba 0,10-0,15 %-mdea.

fosfori did rols TamaSobs mcenareuli organizmebis nivTierebaTa cvlaSi. is aucilebeli Semadgeneli nawilia rTuli cilebis-nukleoproteinebis, fitinis, fosfatidebis da sxva organuli naSTebis.

fotosinTezis procesSi, mzis sinaTlis energia da energia gamoyofili sunTqvis procesSi, adre sintezirebuli organuli SenaerTebis daJangvis dros, akumulirdeba mcenareebSi fosfaturi kavSirebis energiis saxiT, romlisganac umTavresia adenozintrifosforis mJava (atf).

atf-i aris fosforuli naerTi, romelic axdens mzis energiisa da bioqimiuri aqtivobs dros warmoqmnili energiis akumulirebas. amdenad atf-i warmoadgens im ZiriTad energetikul wyaros, romelsac mcenare iyenebs SemdegSi yvela sasicocxlo procesebis ganxorcielebisas. fosforis ukmarisobis pirobebSi mcenareSi irRveva energiisa da nivTierebaTa cvla, xangrZlivdeba momwifebis periodi, uaresdeba produqciis xarisxi. mcireba misi raodenoba. mcenareSi fosforis ukmarisobisas foTlebi Rebulobs rux-mwvane, alisfer, mowiTalo-iisfer fers, izrdeba nela.

niadagSi qanis fosforiani naerTebi fosforis pirvelwyaroa. gamofitvis procesSi amoZravebuli fosforiani nivTierebebi mwvane mcenare niadagis zeda fenaSi SerCeviTi STanTqmiT agrovebs. amdenad fosforis raodenoba niadagSi erTi mxriv dedaqanSi fosforis Semcvelobazea damokidebuli, meore mxriv, biologiuri procesebis aqtivobaze.

sxvadasxva niadagSi fosforis Semcveloba gansxvavebulia. Cveulebriv niadagis zeda fenaSi ufro metia, vidre qvedaSi. sxvadasxva niadagi fosfors ESeicavs 0,06-0,21%-mde. niadagSi fosfori organuli da mineraluri naaerTebis saxiT gvxvdeba. fosfris saerTo raodenobis did nawils mineraluri fosforiani naerTebi warmoadgens. mcenare mxolod wyalSi da sust mJavaSi xsnad mineralur fosfatebs iTvisebs. fosformJavas wyalSi uxnadi an Znelad xsnadi mineralebi da organul-fosforiani nivTierebebi mcenarisaTvis miuwvdomelia. Znelad xsnadi fosfatebi, mikroorganizmebis cxovelmyofelobis moqmedebiT SesaTvisebel formaSi gadadis am process fosforis mobilizacia ewodeba. cnobilia,rom rigi baqteriebis moqmedebiT, mineraluri formis fosforiani naerTebis organul-fosforian naerTebSi gadayvanis gamo adgili aqvs fosforis mobilizaciis sawinaarmdego process-fosforis imobilaizacias. fosforis mobilizacia da imobilaizaciis procesebze did gavlenas axdens niadagis reaqcia. mJave reaqciis niadagSi fosforis didi nawili warmodgenilia aluminis da fkinis fosfatis saxiT. amnaerTebis susti xsnadobis gamo niadagis xsnarSi mcenaris SesaTvisebeli PO///4,PO//4,PO/4 ionebi umniSvnelo raodenobiTaa. neitraluri da susti tute reaqciis niadagebSi fosfori ZiriTadad wyalSi uxnadi hidroqsilapatitis Ca5(PO4)3OH organuli naerTebis formiTaa.

kaliumi mniSvnelovan fiziologiur rols asrulebs mcenaris ganviTarebaSi wylis miRebisa da foTlebis saSualebiT haeridan naxSirorJangis SeTvisebis saqmeSi. kaliumi did rols asrulebs mcenareSi naxSirwylebis gadanacvlebis procesSi, xels uwyobs naxSirwylebis dagrovebas. marTalia, igi ar Sedis cilis SedgenilobaSi, magram xels uwyobs mis dagrovebas, iwvevs Reros gamagrebas, amiT adidebs TavTaviani kulturebis gamZleobas Cawolvis mimarT.

niadagi kaliums didi raodenobiT Seicavs kaliumis udidesi nawili nawili niadagSi gvxvdeba mineraluri naerTebis saxiT, SedarebiT mcire nawili ki-organul nivTierebebSia. kaliumis deficitis dros Tesli da nayofi wvrilia, advilad kargavs aRmocenebis unars. kaliumis nakleboba mcenareebis foTlebze iwvevs mura feris laqebs. foTlis xmoba iwyeba napirebidan, xolo SuaSi mwvane feri SenarCunebulia. kaliumze moTxovnilebiT gamoirCevian-kartofili, seli, Tambaqo, Warxali, ionja, samyura da bostneuli kulturebi.

kaliumis ZiriTadi wyaro niadagSi qania. am elementiT mdidaria mcenaris axalgazrda mozardi organoebi (kvirtebi, axalgazrda foTlebi). kaliumis raodenoba niadagSi izrdeba kaliumSemcveli mineralebis arsebobiT. yvela niadagi, garda torfianisa da fxvier qviSianisa xasiaTdeba kaliumis maRali SemcvelobiT (K2O) 1,2-2,5% an saxnav fenaSi-35-75 t/ha-ze. kaliumis umetesi raodenoba dakavSirebulia niadagis Tixian nawilakebTan. rac metia niadagSi wvrildispersiuli nawilakebi, miT metia masSi kaliumi.

kaliumi niadagSi umetesad imyofeba mcenarisaTvis miuwvdomel an naklebad misawvdom formebSi, romlebic qimiuri da biologiuri zemoqmedebiT Zalian nela gadadis niadagis xsnarSi. mcenarisaTvis misawvdomi kaliumis ZiriTad forma-niadagis koloidebis zedapirze adsorbirebuli gacvliTi kaliumia. misi Semcveloba kordian-ewer niadagebSi Seadgens 4-25 mg 100 g niadagze, rux da Savmiwa niadagebSi 50-100 mg 100 gr niadagSi. maRali mosavlis misaRebad niadagebi saWiroeben kaliumis did raodenobas, risTvisac niadagSi azotisa da fosforis sasuqebTan erTad kaliumiani sasuqebic SeaqvT.

kalciumi did rols TamaSobs fotosnTezSi da naxSirwylebis gadaadgilebaSi. is monawileobs mcenaris ujredis formirebaSi. xels uwyobs fesvTa sistemis ganviTarebas. misi naklebobis dros fesvebi wyveten zrdas. kalciumis ukmarisoba iwvevs qlorozs, axalgazrda foTlebze Cndeba wiTeli feris laqebi. niadagSi kalciumis maRali Semcveloba amcirebs rkinis, magniumis, boris, manganums da sxva elementebis SeTvisebas. niadagis xsnarSi kaliumsa da kalciums Soris optimaluri raodenobrivi Tanafardoba kulturebis mixedviT icvleba. marcvlovnebisTvis 6:1, parkosnebisTvis 2:1.

kalciumi niadagSi didi raodenobiT moipoveba. ewer niadagebSic ki, romelic sxva niadagebTan SedarebiT kalciumiT Raribia misi Semcveloba 0,3-0,5% aRwevs. e.i. heqtari farTobis 0-30 sm siRrmis fenaSi misi raodenoba 9-15 tonas udris.

mcenarisaTvis misawvdomi formis kalciumiani naerTebi (sulfatebi, karbonatebi,nitratebi, qloridebi)niadagSi yovelTvis didi raodenobiT moipoveba. amis gamo nadagi am nivTierebis Setanas rogorc sakvebi elementi, naklebad saWiroebs, kalciumis karbonatebi da sulfatebi(CaCO3,CaSO4)

SeaqvT mxolod rogorc arapirdapiri sasuqi (mJave da tute reaqciis niadagebSi) niadagis reaqciis Sesacvlelad.

magniumi qlorofilis aucilebelielementia, monawileobs fosforis gadaadgilebaSi, zemoqmedebas axdens Jangva-aRdgenis procesze. misi ukmarisobis dros foTlebis ZarRvebSorisebSi viTardeba qlorozi da misi mwvave deficiti iwvevs foTlebis siWreles, daxvevas, gayviTlebas. magniumis raodnoba niadagSi saSualod 0,2-3% farglebSi meryeobs. magniumiani naerTebis udidesi nawili mcenarisaTvis advilad misawvdomia.

sxvadasxva mcenare magniums sxvadasxva moTxovnebs uyenebs. am elements didi raodenobiT moiTxovs Saqris da sakvebi Warxali, samyura, ionja da sxva parkosani mcenareebi. marcvlovani mcenareebi magniums SedarebiT naklebad xarjaven. adsorbirebuli magniumis raodenobis zrda uaryofiT gavlenas axdens niadagis fizikur da fizikur-meqanikur Tvisebebze.

 gogirdi sami aminomJavas Semadgeneli nawilia, romlebic Sedian cilebis struqturaSi. is mcenareSi gvxvdeba sulfatebis, sulfogidrolis-SH jgufis da gogirdmJava eTerebis saxiT. gogirdis raodenoba ufro metia mcenari Teslsa da foTlebSi, naklebia Rerosa da fesvebSi gogirdi niadagSi SO3 –ze gadaangariSebiT 0,10-0,15 % farglebSi meryeobs.

rkina niadagSi 3% da meti raodenobiT moipoveba. rkinas gansakuTrebiT didi raodenobiT Seicavs wiTelmiwebi da lateritebi (20-25 % da meti) agreTve yomrali da yavisferi niadagebi. mcnare rkinas umniSvnelo raodenobiT xarjavs, magram misi mniSvneloba mainc metad didia. es iqidanac Cans, rom rkinis naklebobis SemTxvevSi mcenare avaddeba qloroziT.

bori da sxva mikroelementebi. mikroelementebi niadagSi umciresi raodenobiTaa. es elementebi mcenarisaTvis mcire raodenobiTaa saWiro. mikroelementebis roli bioqimiur procesSi metad didia. isini iwveven katalizur moqmedebas fermentebze, amitom mikroelementebiT Rarib niadagze ara marto dabali mosavali modis, aramed xarisxobrivadac mdare.

mikroelementebis raodenobazea damokidebuli Jangva-aRdgenis procesebi. manganumis, TuTiisa da molibdenis saTanado raodenobiT arsebobis SemTxvevaSi es procesi aqtiurad mimdinareobs.

mikroelementebis raodenobazea damokidebuli fotosintezis intensivoba. am mxriv gansakuTrebiT mnSvnelovania bori, manganumi, spilenZi, TuTia molibdeni.

mikroelementebi did gavlenas axdenen mcenaris zrdis nivTierebebze, Teslis Semosvla-damwifebaze. niadagSi mikroelementebis Sedgeniloba-raodenobazea damokidebuli mcenaris avadmyofobisadmi gamZleobis unari. mag. boris naklebobis SemTxvevaSi Saqris Warxals guli ulpeba, yvavilovani kombosto avaddeba wiTeli sidampliT, Tambaqos wveri uxmeba. marganecis simcire iwvevs xorblis, Wvavis,Svriis ruxi laqebiT avadmyofobas. TuTiis simcire simindze wveris waTeTrebas iwvevs, xolo xexils rozetis avadmyofoba uCndeba. araSavmiwaniadagian raionebSi spilenZis nakleboba niadagSi iwvevs cxovelTa anemias, marcvlovnebSi Teslis mosavlis mkveTrad Semcirebas. mikroelementebis Warbi raodenobiT arseboba, aseve uaryofiT gavlenas axdens, rogorc mcenareebze aseve cxovelebze. mag. niadagSi molidenis siWarbe mosaxleobaSi iwvevs iseT davadebas rogoricaa podagra.

leqcia 6.

saqarTvelos niadagebis ZiriTadi tipebi da maTi mniSvneloba miwaTmoqmedebis produqtebis teqnologiaSi. dasavleT saqarTvelos niadagur olqi. Waobiani da eweri niadagebis zona, wiTelmiwebi da yviTelmiwebi. mTa-tyeTa niadagebi. mTa-mdelos niadagebi. aRmosavleT saqarTvelos niadagur olqi.-velebis Savmiwebi, wabla da naxevrad udabnos ruxi-mura niadagebi.

saqarTvelos geografiuli mdebareoba, reliefi da sxva faqtorebi miuxedavad teritoriis simcirisa (69 700 km2) mtkiced gansazRvraven misi bunebrivi da sameurneo pirobebis mravalferovnebas.

qveynis aRmosavleT da dasavleT nawilebis geomorfologiuri Taviseburebebi, klimati mcenareuloba da sxva faqtorebi aucileblad apirobeben geografiuli raionebis calkeul olqebad da zonebad gamoyofas.

saqarTvelos teritoriaze warmodgenilia TiTqmis yvela tipis niadagi sawyebuli naxevrad udabnos ruxi niadagebiT da mlaSobebiT da damTavrebuli alpuri mdeloebis niadagebiT da subtropikuli zonis wiTelmiwebiT.

 geomorfologiuri agebulebis mixedviT saqarTvelos teritorias akad. a. javaxiSvili sam zonad hyofs:

1.kavkaionis mTiani sistemis zona;

2. samxreT mTianeTis ulkanuri zegania da periferiuli ganivi qedebis zona;

3. saqarTvelos mTaTaSoris dablobis zona.

kavkasionis mTian zonas, romelic danawevrebuli zedapiriT xasiaTdeba dasavleT nawilSi warmoadgens gagris, bzifis, svaneTis samegrelos, leCxumisa da raWis qedebi, romlebic ZiriTadad mTavari qedis mimarTulebis Tanxvedrilia, aq arsebul mdinareTa (bzifis, kodoris, enguris, cxeniswylis, rionis da sxv.) kalapotebis mimarTulebis mixedviT.

kavkasionis dasavleT nawilSi gamorCeuli adgili ukavia karstul kirqvian zols, romelic afxazeTis dasavleT sazRvrebidan suramis qedamdea gadaWimuli.

mTavari qedis ganStoeba-suramis qedi, samxreT dasavleTis mimarTulebisa da da dasavleT da aRmosavleT saqarTvelos Soris bunebriv sazRvars warmoadgens.

kavkasionis centraluri nawili warmodgenilia yazbegisa da dasavleT mTiuleTis sistemaSi Semavali qedebiT, romelnic mdinareTa (didi liaxvi, aragvi, iori da sxv.) dinebis mimarTulebis Sesabamisad, samxreTiTaa mimarTuli.

civ-gomboris qediT aris warmodgenili mdinare ioris da alaznis wyalgamyofi. alaznis vake civ-gomboris qeds hyofs kavkasionis aRmosavleT ganapira nawilisagan.

samxreT mTianeTi dasavleTi nawili warmodgenilia aWaris (SavSeTisa da nawilobriv arsianis) da mesxeTis (axalcixe-imereTis) qedebiT, romlebic grZeldebian dasavleTis mimarTulebiT kolxeTis dablobis samxreTidan. mesxeTis qeds mtkvris xeoba hyofs TrialeTis qedisagan, romelic samxreTi mTianeTis CrdiloeT mxares warmoadgens.

saqarTvelos dablobis vakeTa Soris dasavleT nawilSi yvelaze didia kolxTis dablobi, xolo aRmosavleTsi –qarTlisa da kaxeTis vakeebi. Tbilisis samxreT aRmosavleTiT, mdinare mtkvris dinebis gaswvriv gadaWimulia qvemo qarTlis vake. romlis marjvena nawilSi marneulis velia, xolo marcxenaSi gardabnisa.

Tbilisis aRmosavleTiT mdinareebis mtkvris, iorisa da alaznis wyalgamyofze mdebareobs gare kaxeTis zegnad wodebuli teritoria, romelzedac ganlagebulia samgoris, garejis, azamburis,Siraqis, patara Siraqis, taribanis da sxva velebi.

mTlianad saqarTvelo geomorfologiuri niadagur-klimaturi da sxva bunebrivi pirobebiT erTmaneTisagan Zlier gansxvavebulia: dasavleTi, aRmosavleTi da samxreT saqarTvelo iyofa niadagebis cal-calke olqebad.

dasavleT saqarTvelo

 saqarTvelos teritoria suramis qedis dasavleTiT, dasavleT saqarTvelos niadagur olqs ekuTvnis. mas Crdilo-aRmosavleTidan sazRvravs kavkasionis mTavari qedi, dasavleTidan Savi zRva da samxreT-aRmosavleTidan aWara-imereTis qedi.

geomorfologiuri agebulebiT dasavleT saqarTvelos hyofen:1. dablobis, 2. gorakiani mTiswinebis, 3. saSualo mTebisa da maRalmTian zonebad.

klimatis mixedviT dablobsa da mTiswinebis sivrceebs axasiaTebs subtropikuli teniani hava, 1500-2500 mm naleqebis wliuri raodenobiT da 13-140 saSualo wliuri temperaturiT. mTa-tyis zonaSi subtropikul tenian havas cvlis zomierad civi da civi hava.

dablobsa da mTiswinebs axasiaTebs merqniani da balaxa mcenareulobis siuxve. dablobis dasavleT nawilSi Warbobs Waobis tipis tye, mdelosa da xavsiani formaciebi, dablobebis SemaRlebul zolSi da uSualod mTiswinebis zonaSi Warbobs subtropikuli kulturuli mcenareuloba. tyis zonaSi arCeven: 1. Sereul foTlovan tyes (muxa, rcxila, wabli), 800-1200 m-s Soris warmodgenilia foTlovani tye wiflis siWarbiT, 1400-1500 m-dan 2000 m-mde wiwviani tye ZiriTadad naZvisa da soWisgan. maRalmTian zonaSi tyis mcenareulobas cvlis alpuri mdelos mcenareuloba.

aRniSnuli pirobebis gaTvaliswinebiT akad. m. sabaSvils dasavleT saqarTvloSi gamoyofili aqvs niadagebis Semdegi zonebi da qvezonebi:

dablobis Waobiani da eweri niadagebis zona;

gorakiani mTiswinebis wiTelmiwa da yviTelmiwa niadagebis zona;

 mTa-tyeTa niadagebis zona;

mTa-mdeloTa niadagebis zona.

dasavleT saqarTvlos Waobiani da eweri niadagebis zona. kolxeTis dablobis saxeliT cnobili dasavleT saqarTvelos dablobi, Savi zRvis sanapiros gaswvrivi teritoriidan aRmosavleTiT modis q.zestafonamde, galis dablobidan qobuleTis midamoebamde.

sxvadasxva sididis dabloebiT aris warmodgenili afxazeTis, guria-samegrelos da aWaris sanapiro zolis teritoriebi, maTgan yvelaze didia mdinare kodoris dablobi afxazeTSi da kaxaberisa-aWaraSi.

geologiuri agebulebiT aRniSnuli dablobebi warmoadgenen xsenebul mdinareTa akumulaciis arealebs,sadac farTo adgili uWiravs sxvadasxva meqanikuri da qimiuri Sedgenilobis aluviur nafenebs.

aq warmodgenili niadagebis warmoqmnis mniSvnelovani faqtoria niadagisa d niadagqveSa gruntis Warbi tenianoba zonisaTvis damaxasiaTebelQWarb naleqebTan erTad. kerZod ki saqme gvaqvs niadagur da haeris tenianobis siWarbesTan, rac ganapirobebs Waobiani niadagebis farTo gavrcelebas. maTgan umetesad gvxvdeba Waobis torfiani, Waobis lamiani da kordian –lebiani(karbonatul-Waobiani) niadagebi.

Waobian-torfian niadagebi ZiriTadSi gavrcelebulia kolxeTis dablobze. maTi saerTo farTobi Seadgens 0,3 % (190,2kvadratul kilometrs. zRvis siaxloves adgilebi warmoadgens balaxa mcenareulobiT dafarul Waobebs, am niadagebis ZiriTadi diagnostikuri maCvenebelia torfiani horizontis arseboba da mTeli profilis galebeba. torfis fenis sisqe aq ZiriTadad erT metramdea, magram zogan 3-5 metrsac aRwevs.

Waobian –lamiani niadagebi dablobis dasavleT nawilSi moqceuli da torfis mcire fena axasiaTebs. am niadagebis mniSvnelovani nawili gamoyenebulia simindisaTvis.

kordian –lebian niadagebs SedarebiT mcire farTobi ukaviaT, axasiaTebT muqi feris humusiani horizonti damakmayofilebeli struqtura da susti tute reaqcia naxSirmJava kiris SemcvelobT. am niadagis masivebi ZiriTadad daSrobilia da gamoiyeneba simindisa da soias naTesebisTvis.

eweri niadagebi ZiriTadad moqceulia dablobebis SemaRlebul adgilebSi, sadac gruntis Warbi tenianoba naklebi mniSvnelobis faqtoria. aseTi niadagebi gvxvdeba ZiriTadad kodoris terasebze-afxazeTSi, enguris terasebze-zugdidis raionSi, abaSis, samtrediis, md.rionis, cxeniswylis, yvirilis zeda terasebze.

aluviur nafenebze ganviTarebuli es niadagebi Zlier aris Camorecxili, sakvebi nivTierebebiT mniSvnelovnad Raribi da aSkarad gaewerebulia. maT subtropikul eweri niadagebis saxeliT icnoben.

zeda 0-10 sm fenaSi humusis Semcveloba 3-5 %-ia, saeTo azotisa 0,1-0,17%, saerTo fosforisa 0,09-0,11%, STanTqmuli fuZeebis jami 4-25 mgr.eqviv. pH=5,3-5,6. moculobiTi wona 1,4, kuTri wona 2,6. saeTo forianoba 46,5-51,6%-ia, kapilaruli tenteadoba 27-32,6%; gaewerebis sxvadsxva xarisxis gamo gamoyofen Zlier, saSualo da sust ewer niadagebs. dasavleT saqarTvelos eweri niadagebi ZiriTadad gamoyenebulia Caisa da citrusovani kulturebisTvis, naklebad bostneuli da sxva kulturebisTvis.

 aluviuri niadagebi farTod aris gavrcelebuli dablob zolSi. yvelaze metad gvxvdeba mdinare bzifis, kodoris, enguris, rionis, cxeniswylis Woroxis da sxvaTa terasebze. ZiriTadad msubuqi meqanikuri Sedgenilobisaa, humusis Semcveloba zeda fenebSi 1,6-1,8 %-ia . aluviuri niadagebis garkveuli nawili daWaobebulia, yvelaze metad gamoirCeva kolxeTis dablobis dasavleT nawili.

dasavleT saqarTvelos aluviuri niadagebi umetesi nawili gamoyenebulia simindisa da bostneuli kulturebisTvis. aq gavrcelebulia Cai, gerani, Tambaqo, citrusi da sxva mravalwliani xexilovani kulturebi.

gorakiani mTiswinebis wiTelmiwa da yviTelmiwa niadagebis zona. wiTelmiwa da yviTelmiwa niadagebi yvelaze damaxasiaTebeli niadagebis jgufia dasavleT saqarTvelos gorakiani nawilis teritorize.

geologiuri gebulebiT teritoriis es nawili warmodgenilia sxvadasxva saxis mesameuli qanebiT mergelebis, mergelisebri Tixebis, qviSa-qvebis, konglomeratebisa da zebriseburi Tixebis saxiT.

subtropikuli teniani havis pirobebSi dasavleT saqarTvelos gorakiani qanebi ZiriTadad Zlierad aris saxeSecvlili gamofitvis procesebiT. albaT amis gamo, zedapiruli fenebSi warmodgenilia am qanebis didi sisqis wiTelmiwiani da yviTelmiwiani qerqi, romelTa sisqe arc ise iSviaTad 10-15 m aRwevs.

am zonis ZiriTadi nawili dakavebulia subtropikuli kulturuli mcenareebiT.

niadagebis mTavar tips wiTelmiwa da yviTelmiwa niadagebi warmoadgenen. uWiravT dasavleT saqarTvelos gorakebis udidesi nawili awaraSi, guriaSi, da samegrelos dasavleT nawilSi. aq gamoyofen: 1. wiTelmiwebs, 2. yviTelmiwebs, 3. gaewerbul wiTelmiwebs da yviTelmiwebs da 4. sustad ganviTarebul mcire sisqis niadagebs.

wiTelmiwebis Tavisebureba gamowveulia subtropikuli teniani havis pirobebSi qanis daSlisa da Semdgomi procesebis zemoqmedebiT. humusis Semcveloba zeda 0-10 sm fenaSi 5,9 %-ia, saerTo azotisa 0,28-0,32%, saerTo fosforisa 0,10-0,22%, pH=4,4-4,6-s. wiTelmiwebi da maTi gaRaribebuli saxeobebi umTavresad gamoyenebulia Caisa da subtropikuli kulturebisTvis, agreTve sxva kulturebisTvisac.

yviTelmiwebi umetesad gavrcelebulia dasavleT saqarTvelos CrdiloeT da Crdilo-aRmosavleT nawilSi-afxazeTi, samegrelo, quTaisis midamoebi. maT Soris mniSvnelovani nawili aris warmodgenili gaewerebuli saxesxvaobebiT. humusi zeda 0-10 sm fenaSi 2,0-3,5%-ia, saerTo azotisa 0,20-0,25%, saerTo fosforisa 0,10-0,20%, pH=5,3-5,5-s.

neSompala –karbonatuli niadagebi gavrclebulia afxazeTis Crdilo regionebSi, zugdidis, xobis, senakis, Cxorowyus, martvilisa da tyibulis raionebSi, agreTve quTaisis zonaSi.

neSompala –karbonatuli niadagebi umTavresad gamoyenebulia vazis, dafnis, Tambaqos da sxva kulturebisTvis.

dasavleT saqarTvelos mTa-tyeTa niadagebis zona

dasavleT saqarTveloSi farTo zolad aris warmodgenili mTa-tyeTa niadagebis zona 500-2000 m simaRleze mTiswinebis wiTelmiwa da yviTelmiwa niadagebis zonasa da maRalmTiani niadagebis zonas Soris.

am zonisaTvis damaxasiaTebelia mkveTrad gamoxatuli mTiani reliefi, romelzec Camodis md. bzifis, kodoris, enguris, rionis, cxeniswylis da maTi Senakadebis xeobebi.

mTa-tyeTa niadagebis gamoyeneba miwaTmoqmedebaSi mkveTrad aris SezRuduli. umetesad gamoyenebulia misi foTlovani tyis qveda nawili, sadac Tbili klimatia, ganviTaebulia mevenaxeoba da meTambaqoeoba.

aRniSnuli neSonpala –karbonatuli niadagebi garda kavkasionis samxreTi ferdobis mTa-tyeTa zonaSi gamoyofilia: 1 svaneTis, leCxumis da raWis qedis tyis yomrali da mTis eweri niadagebis raionSi da 2. suramis qedis (kristaluri masivis) imave niadagebis raioni.

am zonaSi gamoyofen yomral-gakordebul da yviTel-yomral niadagebs. isini ZiriTadad gvxvdeba zemo imereTis, raWa-leCxumis gorak-serebis zolSi am niadagebis niadagwarmomqmnel qanebs ukarbonato Tixa-fiqalebi warmoadgenen. niadagis profili genezisuri horizontebis mixedviT kargad ar aris diferencirebuli. yviTel- yomral niadagebs vxvdebiT aWaraSi-qeda,Suaxevi, zemoimereTSi-vani, xaragauli, baRdadi, saCxere, tyibuli, samegreloSi- walebjixa,Cxorowyu da ufro mcire farTobebia raWa-leCxumis da afxazeTis mTispira raionebSi.

am niadagebis zolis ZiriTad edifikators bunebrivi mcenareulobidan wabli warmoadgens, romlis nacveni R2O3kerZod Fe2O3sakmaod didi raodenobiT Seicavs, rac ganapirobebs yviTel-yomrali niadagebis warmoqmnis Taviseburebas.

dasavleT saqarTvelos mTa-mdeloTa niadagebis zona

kavkasionis maRalmTian nawilSi dasavleT saqarTvelos farglebSi mTa-mdeloTa niadagebis zonas uWiravs vrceli teritoria-afxazeTis, samegrelos, svaneTisa da imereTis regionebi. es teritoria saSualod 2000-3000 m simaRleze imyofeba zRvis donidan. mTa-mdeloTa zonas samxreT mTianeTSi cota ufro dabali adgili ukavia (2700-2800 m).

maRalmTiani mxaris civi haviT gamowveulia niadagwarmoqmnis procesebis susti ganviTareba da mTa-mdeloTa niadagebis Taviseburi tipi. humusi Semcveloba zeda 0-10 sm fenaSi 10,0-25,5%-ia, saerTo azotisa 0,40-0,55%, saerTo fosforisa 0,11-0,23%, pH=7,2-7,5.

mTa-mdelos zonaSi gamoiyofa sxvadasxva Sedgenilobis subalpuri da alpuri mdeloebis ramodenime formacia, ZiriTadad nairbalaxovani da sxva mcenareuloba.

mTa-mdelos zonas didi sameurneo mniSvneloba aqvs, rogorc bunebriv sakveb bazas mesaqonleobisaTvs.

amrigad, kavkaionis qedis farglebSi dasavleT saqarTvelos maRalmTian zonaSi gamoyofilia niadaguri raionebi:1. afxazeT-svaneTis mTa-mdelos niadagebi da 2. qluxoris mTa-mdelos niadagebi.

leqcia 7

 aRmosavleT saqarTvelos niadagur olqi.-velebis Savmiwebi, wabla da naxevrad udabnos ruxi-mura niadagebi. vakeTa da mTiswinebis gardamavali saxis tye-velisa da tyis niadagebi, mTa-tyeTa niadagebis zona; mTa-mdelos niadagebis zona. damlaSebuli niadagebi. aluviuri niadagebi.

aRmosavleT saqarTvelos niadaguri safari warmodgenilia baris, mTiswinebisa da mTiani zonisteritoriebiT, suramis qedidan aRmosavleTiT. marTalia igi sakmaod mravalferovania, maTSi gamoyofen oTx mTavar zonas: 1. velebis Savmiwa, wabla da naxevrad udabnos ruxi- mura niadagebis zona, 2. vakebisa da mTiswinebis gardamavali tye-velisa da tyis niadagebis zona, 3. mTa-tyeTa niadagebis zona, 4. mTa- mdelos niadagebis zona.

aRmosavleT saqarTvelos velebis Savmiwa, wabla da naxevrad udabnos ruxi-mura niadagebi ZiriTadad ganlagebulia zRvis donidan 550-750 m simaRlis farglebSi. administraciulad igi moqceulia dedofliswyaros, siRnaRis, gurjaanis, nawilibriv gardabnis, gorisa da sxva raionebis farglebSi. maT uWiravT aRmosavleT saqarTvelos vakeebi, mTiswinebi, umTavresad mtkvrisa da alaznis wyalgamyof zeganze.

geologiuri agebulebiT es geografiuli teritoria umTavresad warmoadgens mesameulis Semdgom da Tanamedrove nafenebs.

zonis klimati kontinenturia. naleqebis wliuri raodenoba meryeobs 350-550 mm-is, saSualo temperatura ki 11-14 0-is farglebSi.

mcenareuloba ZiriTadad warmodgenilia velis abzindian-uroiani mcenareulobiT. calkeul adgilebSi aris Soraqan-veZiani mcenareuloba. niadagebis mTavar tips warmoadgens wabla niadagebi da Savmiwebi. yvelaze dabal zolSi mdebareobs ruxi-mura, Semdeg wabla da bolos Savmiwebi.

ruxi-mura niadagebi- am tipis niadagebi ZiriTadad gvxvdeba aRmosavleT saqarTvelos samxreT-aRmosavleT nawilSi-eldaris velze. gare kaxeTis zegnis samxreT aRmosavleT nawilSi, mdinare ivris orive napirze. am teritorize Zalian cota naleqebi modis (saS. 300 mm) da maRalia haeris saSualo wliuri temperatura (13-140), mcenareuloba Zlier naklebi vegetatiuri masiT gamoirCeva, amitom niadags axasiaTebs susti ganviTareba da msubuqi meqanikuri Sedgeniloba. humusis Semcveloba zeda fenebSi 1,6-2,3%-ia, saerTo azotisa-0,14-0,16 %, STanTqmuli fuZeebis jami 18,5-24,5 mgr ekv. tute reaqcia, zogan vxvdebiT TabaSirisa da naxSirmJava kiris Semcvelobas. agreTve xsnad marilebsac. aq sakmaod mniSvnelovnadaa gavrcelebuli damuSavebuli niadagebi.

ruxi niadagebi humusis SemcvelobiT mdidari ar aris –ZiriTadad 2%-is fargalSia am niadagebis gavrcelebis zonaSi normaluri mosavlis misaRebad mTavari pirobaa morwyva.

wabla niadagebi-aRmosavleT saqarTvelos vakeebsa da dablobebze sakmaodaa gavrcelebuli. aq naleqebis wliuri raodenoba 450-600 mm-mdea. amasTan SemaRlebul mTian adgilebSi naleqebi meti modis, xolo saxnavi miwebis niadagebis zonaSi-naklebi (400-450 mm), haeris saSualo wliuri temratura 13,50-mdea.

wabla niadagebis mniSvnelovani farTobebi warmodgenilia qvemo qarTlis vakeze-marneulisa da gardabnis velebze. aris bicobi wabla niadagebic. wabla niadgebi gvxvdeba agreTve Tbilisis midamoebSi, samgoris velisa da gare kaxeTis zegnis samxreT nawilSi.

wabla niadagebSi humusis raodenoba zeda fenaSizeda fenaSi 2-4%-s aRwevs. meqanikuri Sedgeniloba ki saSualo Tixnaria. humusis Semcveloba zeda 0-10 sm –ian fenaSi 2,5-3,0%, saerTo azotisa-0,14-0,18 %,. saerTo fosfori 0,12-14 %, reaqcia tutea, pH=7,8-8,1. STanTqmuli fuZeebis jami 36,5-38,6 mg.eqv.. am regionSi wabla niadagebi ZiriTadad gamoyenebulia saSemodgomo TavTaviani pureuli kulturebisTvis, naklebad venaxebisa da bostneulisTvis. zonaSi naTesebis morwyva normaluri mosavlis miRebis erT-erTi umTavresi pirobaa.

Savmiwa niadagebi. mtkvrisa da alaznis xeobebs Soris wyalgamyofi zeganis teritoriis niadagis safari umetesad SavmiwebiT aris warmodgenili. SeiZleba iTqvas, rom respublikis saukeTeso niadagebis umTavresi nawili aq aris moqceuli. misi didi maragi gvxvdeba samgoris, garejis, azamburis, taribanisa da Siraqis velebze. am velebs axasiaTebT talRiseburi zedapiri rbili konturiebiT. aris 600-700 m simaRlis iSviaTad ki 900 m simaRlis maRlobebi da maT Soris arsebuli dablobebiT.. maTgan yvelaze didi farTobi uWiravs Siraqis vels.

Savmiwa niadagebi SedarebiT maRla mdebareobs, vidre wabla niadagebi, da ganviTarebulia ufro meti naleqebis mosvlis pirobebSi (500-550 mm), haeris saSualo temperatura aq 11,5-12,50 tolia da warmodgenilia velebisaTvis damaxasiaTebeli mdidari nairbalaxa –uroiani mcenareulobiT. amis gamo, aRmosavleT saqarTvelos yvela sxva niadagTan SedarebiT Savmiwebs axasiaTebs humusis yvelaze meti Semcveloba (5-10 %), maRali nayofiereba. saerTo azotisa-0,21-0,34 %,. saerTo fosfori 0,10-14 %, reaqcia tutea, pH=7,3-7,6 STanTqmuli fuZeebis jami 41,5-48,6 mg.eqv.

 Savmiwa niadagebs gavrcelebis zonaSi Savmiwebis warmomqmneli qani umetesad liosisebri TixebiT da TixnarebiT aris warmodgenili.

Savmiwebs Soris gamoirCeva mcire da saSualo humusiani Savmiwebi, saSualo Savmiwebs didi xvedriTi wili ukaviaT Siraqis velis masivze.Savmiwa niadagebs Soris damlaSebul farTobebs iSviaTad vxvdebiT, magram miwebi bicobianobis niSnebiT sakmaod moipoveba. Savmiwa da wabla niadagebis Soris sakmao gavrcelebiT xasiaTdebian e.w.”gajiani” niadagebi, romlebic TabaSiris didi SemcvelobiT gamoirCevian. mcire sisqis gajiani niadagebi didi gavrcelebiT xasiaTdebian samgoris velze.

aRmosavleT saqarTvelos Savmiwa niadagebi umTavresad gamoyenebulia marcvleuli kulturebis sawarmoeblad.

damlaSebuli niadagebi. wabla da mura niadaebis gavrcelebis zonaSi mniSvnelovani odenobiT aris gavrcelebuli damlaSebuli niadagebi. aseTi niadagebi yvelaze metad aris warmodgenili alaznis velis samxreT-aRmosavleT nawilze, eldaris velze, gare kaxeTis, gardabnis velze, marneulis dablobze da Tbilisis midamoebSi.

es niadagebi gamoirCeva sxvadasxva saxis damlaSebis da bicobianobis xarixiT. damlaSeba upiratesad gapirobebulia mineralizebuli gruntis wylebiT. STanTqmuli fuZeebis jami saSualod 53,8-58,1 mg.ekv. tolia, kuTri wona 2,7-2,8, moculobiTi wona-1,2-1,5.

damlaSebuli niadagebi mlaSobebis gamoklebiT umTavresad gamoyenebulia marcvleuli kulturebis da sakvebi balaxebisTvis.

aluviuri niadagebi. aRmosavleT saqarTvelos mdinareTa (mtkvari, iori, alazani, aragvi, xrami) auzebSi farTO gavrceleba aqvs aluviur niadagebsac.

rogroc cnobilia aluviur niadagebisaTvis damaxasiaTebelia mtvrian-qviSiani Sedgeniloba da naxSirmJava kiris didi Semcveloba zedapiridanve. humusis Semcveloba zedapirul fenebSi 1,8-2,2%, saerTo azoti0,15-0,22%, saerTo fofori 0,10-0,16%, , pH=5,4-6,6.aluviuri niadagebi ZiriTadad gamoiyeneba marcvlovani da bostneuli kulturebisTvis, qarTlis raionebSi- Saqris Warxlisa da xexilisaTvis.

aRmosavleT saqarTvelos vakebisa da mTiswinebis gardamavali tye-velisa da tyis niadagebis zona. am zonas miekuTvneba aRmosavleT saqarTvelos vakeebisa da mTiswinebis didi nawili-Sua qarTlis bari, mosazRvre kavkasiis mTiswinebi, TrialeTisa da somxeTis mTebis mTiswinebi,alaznis vake.

aRniSnul zonas gardamavali adgili ukavia velis zonasa da mTa-tyeTa zonas Soris. agrosamrewvelo TvalsazrisiT zona miRebulia, rogorc aRmosavleT saqarTvelos mevenaxeoba-mexileobis ZiriTadi mwarmoebeli. naleqebis raodenoba meryeobs 500-700 mm-Si. sakmaod maRali haeris saSualo temperaturis gamo wylis balansi umetes SemTxvevaSi uaryofiTia.

vakeebis farglebSi aq Warbobs, aluviuri karbonatuli da ruxi yavisferi niadagebi. mTiswinebSi ki ufro meti xvedriTi wiliT aris warmodgenili Savmiwisebri da tyis yavisferi niadagebi. alaznis velis marcxena nawilisaTvis damaxasiaTebeliaa tyis aluviuri ukarbonato niadagebi.

xsenebuli vakeebis niadagur safarSi umTavresia Zveli aluviuri niadagebi, ufro maRal Zveli terasebis adgilze vxvdebiT -gardamavali saxiT rux-yavisfer, zogan ki Savmiwa niadagebs. Zvel aluviur niadagebs farTo gamoyeneba aqvs marcvlovani kulturebis warmoebaSi.

aluviuri karbonatuli niadagebiT xasiaTdeba gare kaxeTis zeganis dablobebic (saarejo, manavi, kakabeTi) sof. manavTan mcire raodenobiT daWaobebuli niadagebiT.

alaznis vakis qveda nawilSi umetesad gavrcelebulia aluviuri karbonatuli Tixnari niadagebi, Sua nawilSi-Zveli aluviuri-karbonatuli mdelos yavisferi niadagebi. samxreT-aRmosavleT nawilSi niadagebi mZime meqanikuri Sedgenilobisaa da TiTqmis Camoyalibebuli velis niadagis sxasiaTs atarebs. aq didi farTobi uWiravs sxvadasxva xarisxiT mlSob da bicobian niadagebs (siRnaRis raionis farglebSi).

gansxvavebuli pirobebiT xasiaTdeba alaznis vakis gaRma (marcxena mxare) sadac niadagebis umTavresi saxe tyis aluviuri ukarbonato niadagebia.

alaznis velis orive nawili agrosamrewvelo TvalsazrisiT cnobilia rogorc marcvleulis, vazis, Tambaqos da sxva kulturebis gavrcelebiT.

aRmosavleT saqarTvelos mTa-tyeTa niadagebis zona. aRmosavleT saqartvelos mTiani zonis mniSvnelovani nawili ukavia mTa-tyeTa zonas, 700-2000 m simaRlemde zRvis donidan.

yvelaze didi xvedriTi wiliT es zona warmodgenilia qarTlis, TianeTis, KkaxeTisa da kavkasionis sxva qedebze.

mTa-tyeTa zonis qveda nawilSi sxvadasxvaniria klimaturi pirobebis mixedviTac. qveda nawilSi-tye-velis zonaSi hava Tbilia, ufro zeviT ki teniani.naleqebis wliuri saSualo raodenoba600-800 mm-is farglebSia. haeris saSualo wliuri temperatura 7-100 udris.

mTa-tyeTa zonis sazRvarze klimati zomierad civia, naleqebis wliuri raodenoba 1000-2000 mm-ia, xolo saSualo wliuri temperatura 5-60-s utoldeba. tyisa da tye-velian zonebSi umTavresad gavrcelebulia tyis yavisferi niadagebi. esenia: Sida qarTli, Tbilisis midamoebi, gare da Siga kaxeTi, TeTriwyaro, bolnisi, dmanisi da sxva raionebi.

aRniSnul niadagebs didi sisqe da kalciumis karbonatebis Semcveloba axasiaTebs qveda fenebSi. isini umTavresad gamoyenebulia marcvleuli kulturebis, xexilisa da venaxebisTvis. gardamaval zolSi yvelaze mniSvnelovan adgili uWiravs muqi da Ria feris tyis yomral niadagebs.

aRmosavleT saqarTvelos mTa- mdelos niadagebis zona. aRmosavleT saqrTveloSi didi farTobi uWiravs mTa- mdelos niadagebis zonas. Siga qarTlis, duSeTis, yazbegis, TianeTis, Telavis raionebSi. agreTve kaxeTis kavkasionis maRalmTian zonaSi,

zRvis donidan 2000 metris zviT alpur zonas aq mcire xvedriTi wili miekuTvneba.

mTa-mdeloTa niadagebs aRmosavleT saqarTveloSic didi sxvadasxvaoba axasiaTebs. subalpuri mdeloebis sartyelSi yvelaze mniSvnelovani adgili uWiravs kordian da kordian-torfian mTa-mdelos niadagebs. ufro qvemoT meti sisqis alag gaewerebul mTa-mdelos niadagebs. sakmao raodenobiT aris warmodgenili torfiani mTa-mdelos niadagebi.

alpuri mdeloebis zomaSi meti gavrceleba aqvs mcire sisqis kordian, torfian da sustad ganviTarebul mTa-mdelos niadagebs.

samxreT saqarTvelo.

samxreT saqarTvelos javaxeTis da walkis zeganis teritoriebis calke niadagur olqad gamoyofis aucileblobas apirobebs niadagebis da maTi warmomqmneli faqtorebis Tavisebureba.

regioni geologiuri agebulebis mxriv warmoadgens vulkanuri qanebis mxares, romelTa Soris yvelaze didi adgili ukavia andezitebsa da bazaltebs.

regionis hava kontinenturia. naleqebis wliuri raodenoba 500-700 mm-s utoldeba. haeris saSualo wliuri temperatura ki 5-60-s. zamTari, rogorc wesi uxvTovliani da mkacria.

zeganis mcenareuli safari warmodgenilia mTiani velebis da subalpuri da alpuri mdeloebis formaciebiT.

akad. m. sabaSvilis monacemebiT samxreT saqarTvelos niadagur olqSi Sedis javaxeTis zeganis CrdiloeTi nawilis tyiani zona da axalcixis qvabuli, misTvis damaxasiaTebeli tye-velis da tyis niSnebiT.

aRniSnul olqs axasiaTebs niadagis mniSvnelovani sxvadasxvaobani da niadagis garkveuli zonaluri gavrceleba. kerZod igi moicavs Semdeg zonebs:

samxreT saqarTvelos (axalcixis qvabuli) vakeTa da mTiswinebis gardamavali saxis (ruxi yavisferi) da tyis yavisferi niadagebis zona;

mTa–tyeTa niadagebis zona;

samxreT saqarTvelos vulkanuri zegnebis, mTis Savmiwebisa da mdeloTa niadagebis zona;

mTa-mdelos niadagebis zona.

samxreT saqarTvelos gardamavali (ruxi yavisferi) da tyis yavisferi niadagebis zona;

am zonaSi igulisxmeba axalcixis qvabulis fskeri da mesxeTisa da eruSeTis MmTebis mTiswina zoli. igi gamoirCeva mesameuli qviSa-qvebisa da Tixa-fiqalebis gavrcelebiT.

zonis niadagur Tvisebebs ganapirobebs agreTve SedarebiT mSrali havac,roca gansazRvrulia qserofituli mcenareulobis siWarbe, sadac tyis zona 1200-1300 m-is zeviT iwyeba.

aRniSnuli pirobebis Sesabamisad zonis niadagur safars gardamavali tye-velis saxe aqvs. qvabulis mTiswinebSi da vakeebze umetesi gavrceleba aqvs gardamavali saxis ruxi yavisfersa da tyis yavisferi niadagebs.

zonis farglebSi tyis yavisfer niadagebs yvelaze meti adgili uWiravs eroziuli procesebis aqtiurobis gamo, niadagebs ganuviTrebloba da Camorecxva axasiaTebT. mniSvnelovania maTSi karbonatebis (CaCO3) Semcveloba.

maRali tyis zonaSi tyis yavisfer niadagebs cvlis yomrali da mTa-mdelos niadagebi.

qvabulis fkerze da vakeebze vxvdebiT agreTve aluviur-karbonatul Tixnar niadagebs.

zona sakmaod intensiuri miwaTmoqmedebis regionia pureulis, xexilis, kartofilis da bostneuli kulturebis gavrcelebiT.

samxreT saqarTvelos mTa–tyeTa niadagebis zona. am zonaSi tyian nawils uWiravs mesxeTis qedis samxreTis, agreTve eruSeTisa da cixijvris qedebis ferdobebi.

am teritoriis agebulebaSi xvedriTi wili aqvT qviSaqvebs, mergelebs, vulkanur qanebs –andezitebisa da bazaltebis sxiT. tyis Sedgeniloba ZiriTadad warmodgenilia wiwviani jiSebiT-naZvi, fiWvi,soWi.

aRniSnuli regionis mTa–tyeTa niadagebSi yvlaze mniSvnelovani adgili ukavia tyis yomral niadagebs, romlebic ferdobebis didi daqanebisa d eroziuli procesebis agresiuli aqtiurobis gamo, sustad aris ganviTarebuli da naklebi sisqiTaa warmodgenili.

mTa-tyeTa zonis qveda zolSi mniSvnelovani masStabiT gvxvdeba tyis yavisferi niadagebi.

samxreT saqarTvelos vulkanuri zegnebis, mTis Savmiwebisa da mdeloTa niadagebis zona. samxreT saqarTvelos zegnebis vakeebi ZiriTadad Savmiwebs ukaviaT. zRvis donidan 1500-2200 m simaRleze. isini ganviTarebulia maRalmTiani mcenareulobis cxovelmyofelobis Sedegad, ZiriTadad bazaltis gamfitvis produqtebze da liosisebr Tixebze.

sxvadasxva simaRlisa da naleqebis sxvadasxva raodenobiT mosvlis gamo Savmiwebs warmoqmnis procesi sxvadasxvnairad aris aris warmarTuli. aqarCeven: karbonatul, saSualo da gamotutul Savmiwebs. ufro meti gavrceleba aqvs saSualo da gamotutul Savmiwebs.

karbonatuli Savmiwebi 40-60 sm sisqisaa da humusis raodenoba 5-6%aRwevs. 70-80 sm siRrmeze didia kiris Semcveloba-30%-mde. meqanikuri SedgenilbiT es niadagebi umTavresad Tixiani da mZime Tixnarebia.

zRvis donidan 2100-2200 m simaRleze ZiriTadad mTis mdeloebis sazRvarze ganviTarebulia gamotutuli Savmiwebi, romlebic kirs saerTod ar Seicaven, aqvT Tixiani meqanikuri Sedgeniloba da ufro meti humusi.

regionis Crdilo-dasavleT nawilSi Savmiwa niadagebi ZiriTadad gamoyenebulia marcvlovani kulturebisa da sakvebi balaxebisTvis. samxreTisken gamotutuli Savmiwebis zonaSi ufro metad gavrcelebulia sakvebi balaxebis naTesebi da kartofilis nargaoba.

Savmiwebis gavrcelebs zemoT, javaxeTis da walkis zegnebis qedebis ferdobebze adgils iWers mTa-mdeloTa Savmiwisebri niadagebi, zegnis CrdiloeT nawilSi ki tyis niadagebi.

samxreT saqarTvelos mTa-mdelos niadagebis zona. vulkanuri zegnis agebuleba grZeldeba samxreT saqarTvelos mTa-mdeloebis zonaSic. am regionSi naleqebis SedarebiT mcire raodenoba (800mm-mde) da mkacri zamTaria. mTa-mdeloTa niadagebi mniSvnelovani odenobiTaa gavrcelebuli. isini 2100-2200 m simaRleze zRvis donidan cvlian mTis Savmiwebs da ZiriTadad vulkanur qanebze vxvdebiT. walkis zeganze mTa-mdeloTa niadagebis ganviTarebis sazRvari ufro dabla -1700-1800 m simaRleze iwevs.

am niadagebs aqvT saSualo sisqe, mZime Tixnari meqanikuri Sedgeniloba, kargad gamoxatuli struqtura da humusis SedarebiT didi Semcveloba (4-11 %).

ufro zeviT, zRvis donidan 2300-2400 m simarleze Savmiwa niadagebi icvleba mTa-mdelos kordiani niadagebiT.

javaxeTis da walkis zeganze, maRalmTian zonaSi agreTve sustad ganviTarebuli da Zlier qviani niadagebia farTod gavrcelebuli, sadac mcenareuli safari da niadagebic Zlier sustad aris ganviTarebuli, es ukanaskneli mcire sisqisaa, ZiriTadad gamoyenebulia saTib-saZovrebad.

niadagis bonitireba. saqarTvelos respublikis miwis resursebi udidesi saxalxo simdidrea. maTi swori gamoyeneba SeuZlebelia raodenobrivi da xarisxobrivi mecnieruli aRricxvis gareSe. am amocanas emsaxureba miwis kadastris Sedgena da SemoReba (cadastre franguli sityvaa niSnavs-registracia). miwis kadastri aris sarwmuno da aucilebeli cnobebis erToblioba miwebis bunebriv, sameurneo da samarTlebriv mdgomareobaze. misi Semadgeneli nawilia niadagis bonitireba da ekonomikuri Sefaseba.

niadagis bonitireba (vargisianoba,xarixianoba)- aris nadagis xarisxis SedarebiTi Sefaseba, gamoxatuli raodenobriv maCveneblebSi (balebSi) damyarebulia niadagis Tvisebebze da mosavlianobis doneze.

niadagis bonitireba aris niadagis agronomiuli inventarizacia balebSi, romelic dgindeba niadagis Tvisebebisa da umTavresi sasoflo-sameurneo kulturebis mravalwliani saSualo mosavlianobis mixedviT, saxnavi miwebisatvis an sakvebi savargulebisaTvis bunebrivi mcenareulobis produqtiulobis miexedviT. sxvanairad bonitireba aris specializirebuli genetikur-sawarmoo klasifikacia, romelTa nayofiereba gamoxatulia balebSi.

miwis kadastri saSualebas iZleva mecnierul doneze gadawydes sasoflo-sameurneo warmoebis dagegmvis amocanebi. ufro obieqrturad Sefasdes niadagebis xarisxi meurneobis sawarmoo saqmianobis gaTvaliswinebiT, miwebis sdarebiTi Rirsebis koeficienti didad exmareba mosavlianobasa da sasoflo-sameurneo warmoebis sxva sakiTxebis perspeqtiul dagegmvaSi.

niadagebis ruka da misi praqtikuli gamoyeneba. qveyanaSi arsebuli niadagebis gansxvavebuloba sasoflo-sameurneo kulturebis movla –moyvanis procesSi moiTxovs maTi mkacri sizustiT aRricxvas. nayofierebis racionaluri gamoyeneba Seuzlebeliz niadagebis rukis gareSe. es rukebi aris wvrilmasStabiani (1:300 000 naklebi masStabiT)- qveynisaTvis, olqebisaTvis, mxareebisaTvis da msxvilmasStabiani (1:50 000, 1:10 000) meurneobaTa niadagebis daxasiaTebisaTvis da agreTve detaluri (1:5000,1:2000) sacdeli dawesebulebisTvis

praqtikul saqmianobaSi didi mniSvneloba aqvs msxvilmasStabian rukebs, romlebic damuSavebulia meurneobaTa miwebis mindvruli gamokvlevebis, qimiuri da da sxva analizebis safuZvelze. niadagebis rukebis damatebiT adgenen agreTve specialuri kartogramebs, romelzedac aRniSnaven moTxovnilebas kirze, sasuqebze, maTi damlaSebulobis, daWaobebis, xixatianobis xarisxs, nakveTebs romlebic ganicdian wylismier da qarismier erozias. rukas aucileblad unda axldes Tan ganmartebiTi baraTi an niadaguri narkvevi, sadac mocemulia am teritoriis niadagebis farTo agrosawarmoo daxasiaTeba da rekomendaciebi maTi gamoyenebisaTvis.

niadagebis ruka agronom-meurnis, meqanizatoris yoveldRiuri saxelmZRvaneloa, ramdenadac niadagebis Tavisebureba mxedvelobaSia misaRebi Teslbrunvis mindvrebis gamoyofis dros kulturaTa ganlagebis dawyebamde, nakveTebis gaTvaliswinebisas sameurneo nagebobebisatvis da a.S. is aucilebelia sazafxulo mindvris samuSaoebis Tanmimdevrobis vadebisa da traqtorebis datvirTvis gansazRvrisas, radgan niadagis meqanikuri Sedgenilobis mixedviT traqtorebis gawevis Zala erTidaimave saxis samuSaos Sesrulebisas erTnairi ar aris.

niadagebis ruka saWiroa meurneobis organizaciuli mowyobis, melioraciul samuSaoTA dagegmvis, eroziis sawinaaRmdego RonisZiebaTa dasaxvis, niadagebis bonitirebisas da sxv.

leqcia 8

miwebis melioracia. wylis reJimi da mcenareTa produqtiuloba, wylis monawileoba mcenaris zrda-ganviTarebis procesSi. wylis odenoba da mdgomareoba mcenareSi. transpiracia da misi mniSvneloba mcenarisaTvis. mcenaris tenmoyvaruloba da gvalvagamZleoba. mcenareTa mier wylis xarjvis kritikuli periodebi. niadagis wylis formebi. morwyvis pirobebi. niadagis wyali da wylieri Tvisebebi. mcenareTa mier wylis xarjva. kapilaruli wyali. orTqliseburi wyali. wyalxarjvis koeficienti. rwyvis reJimi, sarwyavi norma.

miwebis melioracia. organizaciul-sameurneo da teqnikur RonisZiebaTa kompleqss, mimarTuls miwebis Zireuli gaumjobesebisaken, maRali da myari mosavlis miRebis mizniT miwebis melioracia ewodeba. igi sasoflo-sameurneo warmoebis erT-erTi umniSvnelovanesi faqtoria udabnosa da DdaWaobebuli miwebis normaluri funqcionirebisaTvis. melioracia iyofa: hidroteqnikurad (teritoriis wylis reJimis regulireba), qimiurad da kultteqnikurad.

hidroteqnikuri melioracia kompleqsSi Sedis daSroba, miwebis morwyva xelSemwyobi wylis reJimis Sesaqmnelad, wylismier da qarismier eroziasTan brZola.

qimiuri melioracia gulisxmobs mJave niadagebis mokirianebas da damlaSebuli niadagebis moTabaSirebas, mcenarisTvis normaluri, cxovelmyofeli pirobebis Seqmnas.

 kultteqnikuri melioracia aris niadagis moyvana saxnavad vargis mdgomareobaSi da misi gakultureba.

wylis reJimi da mcenareTa produqtiuloba, wylis monawileoba mcenaris zrda-ganviTarebis procesSi. wyali umniSvnelovanesi elementia yoveli cocxalisa, yvelaze gavrcelebuli nivTierebaa bunebaSi da mcenaris saarsebo faqtorTa erT-erTi warmomadgenelia. mtknari wylis saerTo moculoba hidrosferos saerTo moculobis daaxlebiT 3%-ia. wyali mcenarisaTvis aucilebeli sasicocxlo faqtoria, amave dros misi optimaluri raodenobis pirobebSi ig xels uwyobs sxva sasicocxlo faqtorTa ukeT mobilizacia. wyali axdens pirdapir da arapirdapir zemoqmedebas yvela proceszebze, romlebic mcenareSi mimdinareobs.

niadagidan wyalTan erTad mcenareSi Sedis masSi gaxsnili sakvebi nivTierebebi, romlebic gadaadgildeba foTlebsa da sxva organoebSi wylis saSualebiT xdeba foTolSi Seqmnili nivTierebaTa gadaadgileba mozard organoebSi axali ujredebis Sesaqmnelad. wyali aucilebelia ujredebis turgoris SesanarCuneblad. mcenaris wyliT gaJRenTvis xarisxzea damokidebuli masSi mimdinare gardaqmnebis siCqare da mimarTuleba. mcenareSi wylis saSualebiT xdeba fotosinTezi, romlis wyalobiT dedamiwaze balansdeba da ivseba gaxarjuli Jangbadi da organuli nivTierebaTa maragi.

wylis aorTqlebiT mcenare Tavs icavs gadaxurebisagan. igi aucilebebia fermentebis cxovelmoqmedebisTvis, romlebic warmarTaven nivTierebaTa metabolizms, maT gardaqmnasa, gadaadgilebas. mcenaris zrdaze wyali axdens uSualo gavlenas. niadagis teniT zomierad momaragebis dros umjobesdeba mcenaris fesvTa sistemis zrda, diddeba misi masa, matulobs foTolTa zoma da raodenoba. wyali saWiroa, agreTve, niadagSi mcxovrebi sasargeblo cocxali organizmebisaTvis; igi gavlenas axdens sakveb nivTierebaTa fizikur-qimiur gardaqmnebze, mikrobiologiur procesebze, haerisa da siTbos reJimze. wylis Semcveloba apirobebs niadagis teqnologiur Tvisebebs, mis “simwifes”, winaRobis sidides, mindvris samuSaoTa xarisxs.

wylis odenoba da mdgomareoba mcenareSi. mcenaris Sedgenilobis naxevarze meti wyalia. a.maqsimovis monacemebiT foTlebi Seicavs 80-90% wyals, fesvebi 70-80%-s mcenaris mwvane masis mimarT. mcenareSi wylis fraqciebi, moZraobis xarisxis mxriv imyofebian sxvadasxva mdgomareobaSi da amve dros, mtkice urTierTobaSi. wyliT da masSi gaxsnili qimiuri nivTierebebiTaa amovsebuli mcenaris WurWlebis sistema-ujredis vakuolebi moZraobiT kavSirSi Sedian cilebTan da ujredis sxva nawilebTan.

citoplazma, rogorc Tavis erT-erT komponents Seicavs wyals (75-85%). is rogorc ujredis sxva organoebi, awesrigebs wylis molekulebis mdgomareobas da zRudavs mis gadaadgilebas.

mcenareSi arCeven wylis Semdeg formebs:1. konstituciuri, anu qimiurad dakavSirebuli, 2. hidrataciuli, romelic gars ertymis gaxsnili organuli nivTierebebis ionebs, makromolekulebs. es wyali SeWrilia citoplazmis ultrastruqturasa daujredis kedlebs Soris; 3. sarezervo, romelic avsebs wyalSemkreb Rruebsa da vakuolebs; 4. intenstilaciuli, romelic asrulebs transportis funqcias ujredSorisebSi, gamtar gzebSi-WurWlebSi da sacrisnair milebSi, 5. nawili wylisa, orTqldeba ra mcenaruli ujredebis zedapiridan gadadis orTqlisebur mdgomareobaSi.

wylis aRniSnuli fraqciebi met-naklebad mWidrod arian dakavSirebuli mcenaris ujredebTan da organoebTan, agreTve fiziologiur procesebTan-transpiraciaTan, fotosinTezTan, sunTqvasTan da sxv. mcenares, mis ujredebs aqvs wylis dakavebis unari- rasac mcenaris wyaldamkaveblobas uwodeben. rac ufro mcirea wylis raodenoba mcenareSi, miT meti wylis daWeris unari aqvs mas.

transpiracia da misi mniSvneloba mcenarisaTvis. mcenaris mier fesvebis saSualebiT Sewovili wylis mxolod mcire nawili-0,2% ixarjeba organuli nivTierebebis Seqmnaze. wylis danarCeni raodenobas mcenare aorTqlebs foTlebis zedapiridan miwiszeda sxva nawilebidan. am process transpiracia ewodeba. wylis im raodenobas, romelsac mcenare aorTqlebs mSrali nivTierebis woniTi erTeulis Sesaqmnelad transpiraciis koeficienti ewodeba.

 transpiraciis koeficienti gamoxatavs mcenaris moTxovnilebas wyalze.

transpiracia uzrunvelyofs: wylis Sewovis uwyvet nakads; Sewovil wyalTan erTad mcenareSi Sedis sakvebi nivTierebebi; transpiraciis Sedegad mcenaris temperatura 3-60 dabalia garemosTan SedarebiT. transpiraciis sidideze moqmedebs: mcenaris saxeoba, jiSi, asaki, xolo garemopirobebidan-haeris fadobiTi tenianoba, qari, niadagis tenianoba, niadagis xsnaris osmosuri wneva struqtura, sakveb nivTierebaTa Semcveloba.

 sxvadasxva mcenaris moTxovnileba wyalze da misi naklebobis uaryofiTi gavlena zrda-ganviTarebaze, bevradaa damokidebuli mcenaris morfologiaze, amaorTqlebeli zedapiris farTobze, bageebis sididesa da sixSireze. fesvTa sistemis saerTo siZlieresa da niadagis siRrmeSi gavrcelebaze. masze gavlenas axdens savegetacio periodis xangrZlivoba, ujredis wvenis koncentracia da sxv.

mcenaris tenmoyvaruloba da gvalvagamZleoba. mcenareTa mier wylis xarjvis kritikuli periodebi. sxvadasxva kulturas sxvadasxvaniri damokidebuleba aqvs wylisadmi. savegetacio periodSi, mcenareTa moTxovnileba wyalzee icvleba-minimaluria Teslis gaRivebis dros, Semdeg matulobs da maqsimums aRwevs yvavilobis wina fazaSi, bolos isev mcirdeba. zrda-ganviTarebis im fazas, rodesac mcenares wylis maqsimaluri raodenoba esaWiroeba da gansakuTrebiT mgrZnobiarea wylis danaklisis mimarT, kritikuli periodi ewodeba. igi sxvadasxva mcenares met-naklebi siZlieriT aqvs gamosaxuli. xorblisaTvis periodi aRerebis fazaSia, simindisaTvis-qoCoCis gamotanis, fetvisa da RomisaTvis-sagvelas ganviTareba yvavilobis dros, mzesumziras Tavis kalaTis gakeTeba-yvavilobisas da a.S. Saqris Warxali, Tambaqo maTTan SedarebiT mTeli aqtiuri vegetaciis manZilze TiTqmis erTnairad ganicdis wylis danaklisis uaryofiT gavlenas.

Uumetes mcenareebs wylis moTxovnilebis maqsimumi reproduqciuli organoebis warmoSobis periodSi aqvT. Tumca es ar niSnavs, rom mcenares mxolod kritikul periodSi unda iyos wyliT uzrunvelyofili, stabiluri mosavlis misaRebad aucilebelia mcenaris ganviTarebis yvela fazaSi wylis saWiro wylis raodenoba hqondes.

Mmcenaris gvalvaamtanobas gansazRvravs mcenaris Zlieri fesvTa sistema. Ggvalvaamtan mcenareebs miekuTvnebian: fetvi, sorgo, sudanis balaxi, simindi, mzesumzira; saSualo gvalvaamtanebia: xorbali, Saqris Warxali, ionja, soia, barda, kartofili pamidori; tenismoyvaruli mcenareebia: brinji, bostneuli kulturebi, mdelos balaxeuloba. Magram arian mcenareebi, romlebic gvalvaamtanebia, amave dros tenmoyvarulebic. mag. simindi. tenianobis cvalebadobas ganicdian mikroorganizmebic. Cveulebriv mkrobiologiuri procesebi ufro intensiuria mindvruli tentevadobis Sesatyvisi tenianobis dros. Aaerobuli mikroorganizmebisaTvis, rogoricaa: amonifikatorebi, nitrifikatorebi, azotobaqterini, Warbtenianoba mavnebelia vidre, misi nakleboba. saerTod ki sasargeblo mikrobiologiuri procesebis optimaluri tenianobis farglebSi iseTivea, rogorc mcenarisaTvis.

wylis Sesvla mcenareSi erTis mxriv damokidebulia niadagis tenis unarze-gadaadgildes mcenaris fesvebis bususebisaken, meores mxriv ki fesvTa sistemis unarze-imoZraos tenis axali da axali wyaroebisaken.

Mmcenaris mier wylis SeTviseba. erT-erTi mTavari piroba is aris, rom bususis ujredis wvenis koncentracia meti unda iyos, vidre niadagis xsnarisa, mxolod im SemTxvevaSi Seiwovs mcenare wyals, winaaRmdeg SemTxvevaSi moxdeba piriqiT, wylisa da sakvebi nivTierebebis sesvla mcenareSi rTuli biologiuri procesia, rac ganisazRvreba ujredis Sewovis ZaliT, fesvebis bususebis da osmosuri wneviT.

Mmceanris fesvebi niadagSsi sxvadasxva siRrmeze Cadian.magaliTad Warxlisa da ionjis 3-5 metramde., simindis da xorblisa -2-mde, fetvisa da bardis 1 m-mde, SedarebiT zereled inviTarebs fesvebs kombosto, xaxvi. Magram mcenareTa fesvTa sistemis Ziritadi masa ganlagebulia niadagis mniSvnelovnad zeda fenebSi. Nniadagis fenas , romelic SedarebiT mdidaria sakvebi nivTierebebiT da sasargeblo mikroorganizmebiT, sadac moTavsebulia uwvrilesi fesvebis da Semwovi bususebis 90%, niadagis aqtiuri fena ewodeba.

wylisa da sakvebi nivTierebeTa mcenareSi Sesvla, misi intensivoba damokidebulia sxva mraval faqtorze. kerZod, fesvebis mier wyali ufro intensiurad Seiwoveba niadagis optimaluri tenianobis dros. Digi damokidebulia mcenaris asakze, daberebasTan erTad wylis Sewova mcirdeba. mcenareSi wylis Sesvla sunTqvis gaZlierebasTan erTad matulobs, e.i. damokidebulia Jangbadis raodenobaze mcenareSi.

niadagis wylis formebi. kapilaruli wyali. orTqliseburi wyali. Nniadaguri tenis mTavari wyaro atmosferuli naleqebia. Garkveul rols am mxriv miwisqveSa wyalic asrulebs.

wylis es wyaroebi dedamiwaze araerTgvarovnad aris ganawilebuli geografiuli, topografiuli, hifsometruli da sxva pirobebis gamo. Aamitom maTi roli yvelgan erTnairi ar aris. Aatmosfeuli naleqebis raodenobas, intensivobas da weliwadis droze ganawilebas metad didi mniSvneloba aqs niadaguri tenisaTvis.

Tanamerove klasifikaciis mixedviT (a. rode-1965 w) niadgSi gamoyofen agronomiulad mniSvnelovani niadagur wylis Semdeg formebs:

Mmyari faza-yinuli. niadagis myari fazis wyali aris yinuli. romelic sezonur xasiaTs atarebs, warmoadgens Txieri masis potenciur wyaros.

Tavisufali wyali romelSic Sedis:1. Tavisufal-gravitaciuli (moZraobs mxolod simZimis ZaliT;) 2. Ddabjenili gravitaciuli- kapilaruli (romelsac akavebs kapilaruli Zalebi); 3. Ddakidebul-kapilaruli ; 4. Ggruntis wylebi (monawileobs niadagwarmoqmnis procesSi da mcenareTa zrda- ganviTarebaSi). Aam wylebis gavlena mcenareze ufro uaryofiTia vidre dadebiTi. Ggruntis wylebis siWarbe iwvevs niadagis daWaobebas da damlaSebas.

 mWidrod dakavSirebuli wylebi (sorbciuli wyali); 1. higroskopuli, 2. maqsimaluri higroskopuli wyali ( niadagis nawilakis zedapirze qmnis ori-sami wylis molekulis sisqis sifrifana apks).

orTqliseburi wyali imyofeba niadagis haerSi, wylis orTqlis saxiT gadaadgildeba SedarebiT naklebi drekdobisaken da SeuZlia gadasvla Txier mdgomareobaSi.

faSarad dakavSirebuli wyali niadagis nawilakebs ekvris zemodan, apkis saxiT, romlis sisqem SeiZleba miaRwios aTeulamde wylis molekulas sisqes. aqvs Cveulebrivi wylis simkvrive.

Tavisufali-gravitaciuli wyali . es wyali yvelaze moZravia da iolad SesaTvisebeli mcenarisaTvis. magram amave dros is Tavisi simZimis ZaliT is swrafad Caedineba niadagis qveda fenaSi tovebs fesvTa sistemis ganlagebis fenas da uerTdeba gruntis wylebs. mcenare mxolod nawilobriv aswrebs mis gamoyenebas.

kapilaruli wyali ki ufro didxans rCeba fesvTa sistemis ganlagebis areSi. is aris mcenaris wyliT momaragebis ZiriTadi wyaro. kapilaruli wyali SeiZleba imyofebodes dakidebul da dabjenil mdgomareobaSi. pirvelis mkvebavs Tavisufali-gravitaciuli wyali warmoadgens, xolo meorisas-gruntis wyali. niadagis forebi, romlis sidide 60 mkm-mdea kapilaruli Zalebis meoxebiT akavebs wyals, niadagi akavebs mas gruntis wylebis ganlagebis siRrmis miuxedavad e.i. dabjenis gareSe, dakiduli kapilaruli wyali ewodeba. xolo forebi, romelTa sidide 60 mkm-ze metia, sustad avlenen wylis amowevisa da Sekavebis unars. am SemTxvevaSi wyali Tavisi simZimis ZaliT moqmedebiT Caedineba qvemoT sanam miaRwevs gruntis wylis sarkis zedapirs, miebjibneba da SeaCerebs mis svlas. niadagis msxvilforebSi myof aseT mdgomareobaSi myof wyals dabjenili kapilaruli wyali ewodeba.

niadags aqvs unari daakavSiros niadagis Txieri da orTqliseburi wyali. niadagis Tvisebas- STanTqos da daakavSiros orTqliseburi wylis nawilakebi, higroskopuli wyali ewodeba..

yvelaze meti raodenobis orTqliseburi wylis SanTqmas, romlis STanTqmis unaric niadags aqvs, Seesabameba maqsimalur higroskopulobas.

higroskopulad dakavSirebuli wyali es mkvdari wylis maragia, romlis drosac mcenareebi iRupebian. am mdgomareobamde Tu miva tenianoba, maSin mcenares veRarc rwyva uSvelis.

orTqliseburi wyali uSualod ar gamoiyeneba mcenaris mier, magram am wyalsT niadagis forebis amovseba aucilebeli pirobaa fesvta sistemis normaluri cxovelmyofelobisTvis. aseTi piroba iqmneba maSin, rodesac tenianoba sWrbobs produqtiuli tentevadobis qveda zRvars.

gansazRvrul pirobebSi orTqliseburi wyali ganicdis kondensacias da gadadis Txier mdgomareobaSi.

wyalxarjvis koeficienti.. niadagidan tenis xarjva transpiraciiT da niadagis zedairis mier aorTqlebis gziT, SejamebiTi (jamuri ) wyalxarjvaa. amas metad didi mniSvneloba aqvs soflis meurneobis warmoebisTvis, radgan is gamoxatavs namdvil garemos, sadac mJRavndeba niadagis da mcenaris wylis reJims. wylis xarjvis wyaroebia: niadagis bunebrivi teni, naleqebi, sarwyavi da gruntis wyali.

ama Tu im kulturis vegetaciis perioSi SejamebiTi wyalxarjvis sidide m3 1 heqtarze gavyofT miRebuli mosavlis raodenobaze (c/ha), miviRebT wyalxarjvis koeficients. wyalxarjvis koeficienti cvalebadi da icvleba metad farTo farglebSi, agroteqnikisa da meteorologiuri pirobebis Sesabamisad.

 rwyvis reJimi, sarwyavi norma. sarwyavi wylis efeqti damokidebulia imaze, rom rwyva Catardes gansazRvrul vadaSi, romelic unda Seesabamebodes mcenaris biologiur Taviseburebas da zrda-ganviTarebis garemo pirobebs. TviTeuli rwyvis dros saWiroa dadgindes rwyvis norma (1 ha-ze wylis saWiro raodenoba) da SeirCes rwyvis ufro efeqturi wesi.

ama Tu im kulturis maRali mosavlis miRebisaTvis, Catarebuli rwyvebi mTeli periodis ganmavlobaSi gansakuTrebuli gegmiT tardeba, romelsac morwyvis an sarwyav reJims uwodeben. sarwyav reJimi TiToeuli kulturisTvis gamoixateba gansazRvruli sqemiT, masSi CamoTvlilia yovelgvari rwyva Catarebis vadebiT, rwyvis normis, rwyvis wesisa da sarwyavi wylis normis CvenebiT.

sarwyavi reJimis ukeT dasadgenad saWiroa TiToeuli kulturisaTvis dadgindes niadagis rwyviswina tenianoba, romelic Seadgens niadagis dasaSvebi tenianobis Semcirebis qveda zRvars mcenaris ganviTarebis mniSvnelovan periodebSi.

Cveulebriv, mcenaris zrda-ganviTarebis periods, vegetaciis vadebs sam periodad yofen:1. dasawyisi, kritikul periodamde, 2. kritikuli 3. zrda-ganviTarebis dasasruli.

TiToeuli mcenaris moTxovnileba wylisadmi am periodebSi sxvadasxvaa da morwyvis raodenoba da normebic sxvadasxva iqneba. es ki dgindeba savegetacio cdis CatarebiT da misi Sedegebis SemowmebiT mindvris pirobebSi.

rwyviswina tenianobis done damokidebulia mcenaris biologiur Tvisebebze da niadagisa da amindis pirobebze. Warbteniani da grili klimatis pirobebSi, rogorc wesi, rwyviswina tenianoba ufro dabali maCveneblebiT xasiaTdeba, vidre mkacr mSral-gvalvian pirobebSi.

rwyvis normis dasadgenad garda rwyviswina tenianobisa, didi mniSvneloba aqvs niadagis dasatenianebeli fenis siRrmis codnas, rogorc viciT, rwyviT atenianeben niadagis aqtiur fenas, sadac gavrcelebulia kulturis fesvTa sistemis Semwovi fesvebis umetesi nawili. sxvadsaxva kulturisaTvis am fenis siRrme cvalebadobs 0,4-1 metramde.

rwyviswina tenianobisa da aqtiuri fenis dadgenis Semdeg rwyvis normas angariSoben formulT:

Mn=100.Ha(A-µ)

Mn -aris rwyvis norma m3 1 heqtarze

Ha(-aqtiuri fenis siRrme metrobiT;

A -aqtiuri fens niadagis moculobiTi wona;

µ -zRvruli mindvruli tentevadoba %-obiT; am niadagis tentevadobis zea zRvari

-niadagis rwyviswina tenianoba

wlis is raodenoba romliTac mcenare dakmayofilebulia mTeli vegetaciis periodSi sarwyavi norma ewodeba. aqedan cxadia, rom is aris mTeli vegetaciis ganmavlobaSi Catarebuli rwyvis dros 1 heqtarze daxarjuli wylis jami mm-obiT.

gamoangariSebul rwyvis normas unda daematos 10-15 % sarwyavi wylis danakargisa, gamowveuli rwyvis dros aorTqlebiT, filtraciiT da sxv.

leqcia 9

 rwyvis specializacia sameurneo daniSnulebis mixedviT, rwyvis wesebi, maTi agroteqnikuri Sefaseba, samarago xvniswina, gamorecxviTi anu niadag gamwmendi, Tesviswina an dargviswina, damatebiTi Tesvis an dargvis Semdeg. damatebiT savegetacio an sxva rwyva. morigi savegetacio rwyvis vadebis gansazRvris meTodebi.

sarwyav sistemad iwodeba teritoria, romelic uzrunvelyofilia arxebiT, nagebobebiT da sxvadasxvanairi mowyobilobebiT, romlebic uzrunvelyofen mindvrebisaTvis sarwyavi wylis Tavis droze misawodeblad. sarwyavi sistemis elementebia: wyaro (mdinare, tba, wyalsacavi, miwisqveSa wylebi), romlebic uzrunvelyofen ganuwyvetel wyalmomaragebas saWiro dros saWiro raodenobiT. mTavari anu wylis damagrovebeli nageboba, sagubari, satumbavi sadguri, magistraluri an mTavari sarwyavi arxi, gamanawilebeli gamtari arxebi, Sidasameurneo, romelic emsaxureba erT meurneobas, romelsac mihyavs wyali nakveTaamde, Teslbrunvis nakveTamde.

sarwyavi sistema anu rwyvis reJimi, calkeuli kulturebis Sesabamisad iTvaliswinebs sxvadasxva sameurneo daniSnulebis anu sxvadasxva specializaciis rwyvas. sameurneo daniSnulebis mixedviT rwyva SeiZleba iyos: 1. samarago, 2. xvniswina, 3. gamorecxviTi anu niadaggamwmendi, 4. Tesvis an dargvis wina 5. damatebiTi Tesvis an dargvis Semdeg damatebiT, 6 savegetacio, 7. damatebiTi gamokvebis gamagrilebeli, 9 saprovokacio da sxv.

samarago anu niadagis tenmomaragebis rwyva warmoebs sasoflo-sameurneo kulturebis Tesvamde an mravalwlovani kulturebis aqtiuri vegetaciis Sewyvetis Semdeg, samarago rwyvis daniSnulebaa gaadidos tenis maragi niadagis fesvTa sistemis gavrcelebis fenaSi mcenareTa savegetacio periodisaTvis. qveda fenebSi wyali kargad inaxeba ramdenime Tvis ganmavlobaSi da Semdeg vegetaciis periodSi mcenare iyenebs mas. samarago rwyvis dros niadagi teniandeba 1-2 metramde.

samarago rwyva mizanSewonilia Catardes iq sadac Semodgoma -zamTris periodSi arasakmao naleqebi modis. am dros niadagi unda dateniandes zRvrul mindvrul tentevadobamde.

samarago rwyva Zalian mniSvnelovania sagazafxulo adreuli kulturebisaTvis romelTa fesvTa sistema Rrmad Cadis niadagSi, simindi, pamidori, Warxali, ionja, xexili vazi da sxv.

samarago rwyva ar aris saWiro im niadagebisaTvis sadac gruntis wyali zedapirTan axlosaa an aqvT didi CaJonvis unari.

xvniswina rwyvas zogjer mimarTaven maSin rodesac xvnamde gamomSralia niadgis saxnavi fena. misi mizania daatenianos niadagi da Seqmnas xelsayreli pirobebi xarisxovani xvnisaTvis, Tu saWiroeba moiTxovs xvniswina rwyvis norma SeiZleba gadides, raTa man Seasrulos samarago rwyvis funqciac.

 Tesvis an dargviswina rwyvis amocanaa daatenianos niadagis saxnavi da qvesaxnavi fena da miRebuli iqnes Tanabari aRmonaceni. Tesviswina rwyvis norma didi ar aris. am dros niadagi teniandeba 0,6 metramde.Tesviswina rwyvis norma didi ar aris da is unda SevusabamoT mcenaris biologiur Tvisebebs.

Tesviswina rwyvas sagazafxulo kulturebisaTvis iSviaTad gegmaven, vinaidan niadagi moxnulia mzralad da niadagSi sakmarisi raodenobis tenis maragia Teslis gasaRiveblad.

damatebiTi rwyva tardeba esvis an dargvis Semdeg 20-30 sm siRrmeze drouli da Tanabari aRmonacenis misaRebad, am dros rwyvis norma didi ar unda iyod, rom niadagma qerqi ar gaikeTos, rwyvis dros sworad unda davicvaT agroteqnikis wesebi. damatebiTi rwyva SeiZleba Catardes dawvimebiTac.

gamorecxvis an niadaggasufTavebis rwyvas iyeneben niadagSi xsnadi mavne marilebis gamosarecxad. amas sadrenaJo rwyvasac uwodeben

savegetacio rwyvas atareben mcenaris zrda-ganviTarebis periodSi, rom uzrunvelyofili iqnes mcenare saWiro wylis moTxovnilebiT aRmocenebidan nayofis miRebamde.

damatebiTi gamokvebis rwyvas iyeneben naTes-nargavebis vegetaciis periodSi. damatebiTi gamokvebisas sasuqebi jer moibneva nakveTebSi Semdeg ki atareben rwyvas.

gamagrilebeli rwyvatardeba dawvimebiT, romlis mtaari amocanaa masSi gafantuli wylis Sxefebis saSualebiT win aRudges haeris gavlenas. es rwyva adidebs haeris absolutur tenianobas da amcirebs haeris temperaturas.

saprovokacio rwyva tardeba xvnis win. morwyvis Sedegad teniandeba is fena sadac didi raodenobiT aris sarevelebis teslebi. es rwyva xels uwyobs sarevelebis amotyuebas romelsac spoben niadagis momdevno damuSavebiT.

morigi savegetacio rwyvis vadebis gansazRvris meTodebi. rwyvis vadis dadgenis standarts niadagis tenianobis gansazRvra warmoadgens. es meTodi rom gamoviyenoT, saWiroa cdebis saSualebiT winaswar ganvsazRvroT tenianobis Semcirebis zRvari, romelic mosavlis mniSvnelovan zarals ar iwvevs. optimaluri tenianobis es qveda zRvari saWiroa mirigi rwyvis dawyebisaTvis.

rwyviswina tenianobas adgenen aqtiuri fenisTvis da radgan misi siRrme icvleba mcenaris zrda-ganviTarebis fazebis mixedviT, misi tenianoba vegetaciis periodSi moiTxovs rwyvis sxvadasxva normas. am meTodiT sakmaod srulyofilad xdeba mcenaris wyalmomaragebis gansazRvra, magram misi gamoyeneba moiTxovs sistematur Tvalyurs niadagis tenianobaze. amastan rwyviswina tenianobas gamoxataven sxvadasxva maCvenebliT, procentobiT mSrali niadagis wonidan misi mindvruli tentevadobidan, niadagis moculobiTi tenianobis mixedviT da sxv.

niadagis rwyviswina tenianobis dadgenasTan erTad muSavdeba niadagis tenianobis gansazRvris daCqarebiTi meTodebi-eleqtrometruli, radiaqtiuri gamosxivebis meTodi da sxv.

warmoebis pirobebisatvis tenianobis gansazRvris sakmaod damakmayofilebeli Sedegs iZleva niadagis 30-40 sm fenidan aRebul nimuSSi tenianobis raodenobis gansazRvra. es aqtiuri Sua nawilia da misi maveneblebi tenianobis mxriv arsebiTad Seesabameba aqtiuri fenis tenianobas. am meTodiT sargeblobs samecniero-kvleviTi dawesebulebebis umetesi nawili.

rwyviswina tenianobis gansazRvrisaTvis arsebobs specialuri stacionaruli meTodi, romlebic ganuwyvtliv aRricxaven niadagis tenianobas. Semcirebis SemTxvevaSi avtomaturad CairTveba dawvimebis mowyobiloba, xolo rodesac tenianoba miaRwevs sasurvel zRvars, manqana avtomaturad gamoirTveba.

farTod aris gavrcelebuli rwyvis vadebis dadgena mcenaris zrda-ganviTarebis fazebis mixedviT, romlis drosac icvleba moTxovnileba wyalze. es meTodi Tavisi xelsayrelobis gamo farTod gamoiyeneba TiTqmis yvela sarwyav meurneobaSi. rwyvis normebs adgenen mindvris cdebis Catarebis Sedegad. am meTodiT rwyvis dawyebis vadis gansazRvrisaTvis winaswar adgenen morwyvis sistemis kalendarul vadebs, romlebic Seesabameba mcenaris satanado fazebis dawyebas. magram rogorc kargad ar unda iyos dagegmili rwyvis dawyebis vadebi, konkretul pirobebSi mainc saWiro xdeba koreqtivebis Setana.

savegetacio rwyvis dawyebis vadis gansazRvisaTvis maRal Sefasebas iZleva rwyvis diagnostikis biologiuri meTodi. es iTvaliswinebs mcenaris arsebul mdgomareobas wyliT uzrunvelyofis mxriv. amisaTvis iyeneben mcenaris garegnul Sexedulebas (foTlebis feris Secvla, foTlis turgoris darRveva) da mcenaris fiziologiur mdgomareobas (folebis Sewovis Zala, foTlis bageebis gaxsna da sxv.) magram zogjer mcenaris morfologiuri maCveneblebi nakleb sizustes iZleva morigi rwyvis diagnostikis dadgenaSi. miuxedavad aRniSnuli naklisa warmoeba farTod iyenebs am meTods,mcenaris wyliT uzrunvelyofis gansazRvrisaTvis, radgan garegnuli niSnebi, romelic Seesabameba ama Tu im kulturis biologiur Taviseburebebs, signals iZlevarwyvis Catarebis saWiroebaze.

rwyvis dawyebis saWiroebis ukeTes Sedegs iZleva mcenaris fiziologiuri maCveneblebi, vidre meurneobaSi rwyvis saWiroebis vadebis dadgena saamisod Sedgenili gegmiT.

fiziologiuri maCveneblebi ufro metad sizustes iZleva morigi rwyvis vadis gansazRvraSi, vidre niadagis tenianoba, radgan niadagis erTnairi tenianobisas mSral da tenian wlebSi mcenaris mdgomareoba sxvadasxvaa, kerZod gvalvian wels foTlis ujredis wvenis koncentracia ufro gadidebulia, vidre tenian weliwads.

mcenare erTnairad iqneba dakmayofilebuli wyliT im SemTxvevaSi Tu morwyva Catardeba teniani wlis maCvneblebiT.

foTlis ujredis wvenis dabali koncentracia da Sewovis Zalis Semcireba iZleva morigi rwyvis diagnostikas. igi iTvaliswinebs sarwyavi wylis swor ganawilebas TeslbrunvaSi Semaval kulturebs Soris. maTi zrda-ganviTarebis mTel etapze, amave dros sazRvravs meurneobaSi teqnikisa da muSaxelis gegmazomier gamoyenebas rwyvisaTvis.

zafxulis cxel da gvalvian TveebSi xSirad saqme gvaqvs sarwyavi wylis deficitTan da TeslbrunvaSi yvela kultura mTlianad ver aris uzrunvelyofili sarwyavi wyliT. am SemTxvevaSi morwyva pirvel rigSi unda Catardes im kulturebis romelTac saxelmwifoebrivi da meurneobrivi mniSvneloba aqvT da meurneobaSi rwyva met ekonomikur efeqts iZleva.

Teslbrunvis mindorze sarwyavi wylis ganawilebis dros saWiroa vuCvenoT TiToeuli kulturis morwyvis vadebi mcenareTa biologiur TaviseburebaTa da garemo pirobebis mixedviT. magram gvalvian periodSi bevri kulturis xSiri morwyvis vadebi erTmaneTs emTxveva da amdenad ver xerxdeba Teslbrunvis yvela mindoris vadebSi morwyva. aseT SemTxvevaSi unda gadaisinjos morwyvis grafiki da unda Seikvecos an Semcirdes rwyvis norma kulturaTa biologiuri TaviseburebaTa gaTvaliswinebiT.

axali grafikis Sedgenisas mxedvelobaSi unda iqnes mirebuli Tu romel mindorze iyo Catarebuli samarago rwyva, amas gansakuTrebiT didi mniSvneloba aqvs mSrali velebis pirobebSi. samarago rwyvis dros mTlianad teniandeba fesvta sistemis gavrcelebis zona da SemdgomSi mcirdeba rwyvebis Catarebis saWiroeba da sasoflo-sameurneo kulturebi naklebad ziandeba vegetaciis periodSi.

samarago rwyvisaTvidmi mgrZnobiarobis mixedviT SeiZleba gamoiyos kulturaTa jgufebi:

saSemodgomo TavTaviani kulturebi(xorbali, qeri)romelTaTvisac didi mniSvneloba aqvs samarago rwyvas.

sagazafxulo TavTaviani marcvlovnebi(simindi, ispanaxi,barda) romelTaTvisac didi mniSvneloba aqvs samarago rwyvas im wlebSi, rodesac mcirea gazafxulis teni.

sakvebi Warxali,sudanura balaxi da sxv. romlebic kargad iyeneben samarago rwyvas da niadagis Rrma fenebSi arsebul tens.

kartofili, pomidori, kitri, yabayi, maTTvisac gadamwyveti mniSvneloba aqvs samarago rwyvebs.

morwyvis dros meurneobis d saSualo uzrunvelyofa wyliT SeiZleba gamoangariSebuli iqnes hidromoduliT, rac niSnavs wylis saSualo raodenobas, mowodebuls 1 wamSi litrobiT 1 ha farTobze. aq CaiTvleba morwyva Ramis drosac da saerTod sarwyavi wylis racionaluri gamoyenebisaTvis rwyvis Catareba unda warmoebdes dRisa da Ramis droSi.

Tanamedrove sarwyav miwaTmoqmedebaSi gamoiyeneba ZiriTadad rwyvis sami wesi: zedapiruli, dawvimebiTi da niadagSida. meti efeqtis misaRebad morwyvam unda uzrunvelyos fesvebis gavrcelebis fenis Tanabari datenianeba, niadagis wvrilkoStovani struqturis SenarCuneba, niadagis zedapiris dacva wyliT zedmeti gatkepniagan da qerqis warmoSobisagan. sarwyavi wylis gamoyeneba unda xdebodes umciresi danakargebiT. amas xels uwyobs morwyvis Catareba saWiro vadebSi da sasoflo-sameurneo manqanebisa da iaraRebis mwarmoebluri gamoyeneba, morwyva meqanizaciiT da avtomatizaciiT.

leqcia 10

zedapiruli, dawvimebiTi da niadagqveSa rwyva. sasoflo-sameurneo kulturebis movla-moyvana limanuri rwyvis pirobebSi. sasoflo-sameurneo kulturebis Tesva moyvana Camonadeni wylebiT rwyvis pirobebSi. daSrobiTi melioracia, niadagis qimiuri melioracia sasuqebi da maTi gamoyeneba. mineraluri sasuqebi organuli sasuqebi.

sarwyavi miwaTmoqmeebis praqtikaSi yvelaze ufro gavrcelebulia zedapiruli rwyvis wesi. zedapiruli rwyva martivad sruldeba da araviTar specialur mowyobilobas ar saWiroebs. wesis arsi isaa, rom wyali nawildeba mindvris zedapirze kvlebSi, zolebSi an mTeli nakveTebis datborviT. marcvleul kulturebs, balaxebsa da mTlianad mosaTes kulturebs rwyaven zolebSi miSvebiT. brinjs datborviT, saToxn kulturebs (bamba,simindi, Saqris Warxali) kvlebSi miSvebiT. datborviT rwyvis dros SesamCnevia niadagis struqturis daSla, morwyvis uTanabroba mindvris mikroreliefTan dakavSirebiT, nadagis cudi haeracia, niadagis saxnavi fenis damlaSebis saSiSroeba. ufro efeqturia kvlebSi miSvebiT rwyva, Tumca am wesis dros dabalia Sromis nayofiereba.

dawvimebiT rwyvis dros niadagi mdidrdeba wyliTa da JangbadiT, romelic ierTebs wylis wveTebs haeridan, wyali gadarecxavs mtvers, mavneblebsa da maT matlebs, wyalSi SeiZleba davumatoT sasuqebi da pesticidebi. sarwyavi normebi mcirdeba 25-30%. SeiZleba moirwyas rTulreliefiani nakveTebi. xSirad morwyva tardeba mcire dozebiT, magram dawvimebiT rwyvis drosac SeimCneva niadagis struqturis daSla, zedapiruli araproduqtiuli aorTqleba, rac mTavaria maRalia saeqsploatacio xarjebi, romlebic gamowveulia arasrulyofili dasawvimebeli danadgarebiT. sarwyavi wyali specialuri maSxefebiT iqcevaxelovnur wvimad, rac atenianebs niadags, mcenares, haeris zedapirul fenas. sarwyavi danadgarebi muSaobis xasiaTis mixedviT SeiZleba iyos poziciuri da gadasaadgilebeli, xolo nakadis gadawvdenis mixedviT moklenakadiani, saSualonakadiani da grZelnakadiani.

dadgenilia, rom mosavlianobis mateba morwyviT saWiro normebis dacvis da maRali agroteqnikis pirobebSi Seadgens: bostneuli kulturebisa 8-10 t/ha. maT Soris kombostosi 12-16t/ha. kartofilisa 5-7 t/ha. morwyvis efeqturoba izrdeba niadagis gakulturebis zrdasTan, sasuqebis gamoyenebasa da saxnavi fenis gazrdasTan erTad.

niadagSida rwyva gamoricxavs zedapiruli rwyvis yvela mavne Semdgom moqmedebas, magram miwisqveSa sistems mSenebloba Zalian Zviri jdeba. niadagSida morwyvis dros wyali mcenareebTan miiyvaneba dablidan, forovani milebiT, romelTagan is iJoneba, Cadis niadagSi.

Zalian bevr ganviTarebul qveyanaSi didi warmatebiT gamoiyeneba wveTobrivi rwyvis wesi. misi arsi imaSi mdgomareobs, rom specialuri polieTilenis milebiT wyali mihyavT TviTeul mcenaremde, mTeli procesi aris meqanizebuli da avtomatizebuli. wveTobrivi rwyva ZiriTadad gamoiyeneba mravalwliani nargavebis, baR-venaxebis, agreTve erTwliani kulturebis mosarwyavad. igi farTod gamoiyeneba israelSi, aSS, avstraliaSi da sxv. misi mtavari upiratesoba morwyvis sxva wesebTan SedarebiT is aris ,rom am dros maqsimalurad ekonomiurad SeiZleba gamoviyenoT wylis maragi da amasTan erTdroulad wyalTan erTad SegviZlia mivawodoT mcenares sasuqi.

sasoflo-sameurneo kulturebis movla-moyvana limanuri rwyvis pirobebSi. limanuri rwyva datborviTi rwyvis yvelaze martivi saxea. dasatboreblad iyeneben gazafxulze Tovlis dnobis, wvimebisa da adgilobrivi mindvrebis wylebs (wyaldidobis dros). mcire drois manZilze Sromis mcire danaxarjebiT SesaZlebelia moirwyas didi farTobebi da amitom es rwyva metad iafi RonisZiebaa.

limanuri rwyva mxolod gazafxulze tardeba erTxel da isic rogorc samarago rwyva, igi araxangrZlivia. mTeli vegetaciis periodSi savegetcio rwyvas ar iyeneben. amitom datborvit morwyva wlebis mixedviT aramyaria da limanebze yvela kulturis morwyva ar xerxdeba. mSral velebze limanuri rwyvis Sedegad xelsayreli pirobebi iqmneba bunebrivi saTib-saZovrebis produqtiulobis gadidebisaTvis. damdnari Tovlis wylis Sekavebisa da dasatbori farTobis gadidebis mizniT, buldozerebiT oTxive mxridanakeTeben miwayrilebs. aseT limanebze niadagi teniandeba 50-60 sm siRrmeze, balaxnari umjobesdeba da saTib-saZovari aRidgens produqtiulobas. reliefuri pirobebis mixedviT zogjer gvxvdeba bunebrivad Cadablebuli adgilebi, romelTa datborva xdeba gazafxulze wyaldidobis dros damSrali mdinareebisa da xevebis wyliT gadavsbisa da napiridan gadmosvlis Sedegad.

gamoyenebis xasiaTis mixedviT limani or tipad iyofa: mdelosa da mindvris limanad. mindvris limani warmoadgens saxnav farTobs, xolo pirveli bunebriv saTib-saZovars.

saqarTveloSi limanur rwyvas masobrivi gamoyeneba ara aqvs, is SiZleba gavrceldes mcire raodenobiT da isic konkretul pirobebSi.

 mindvris limani ar SeiZleba gamoyenebuli iqnes yvela kulturis Tesva-moyvanisaTvis, radgan Tesvis periodSi Warbad aris niadagis zeda fena datenianebuli. amdenad saWiro xdeba biologiuri Taviseburebebis mixedviT SerCeul iqnes Sesaferisi kulturebi.. Cveulebriv limanebze Tesaven sakveb balaxebs, qers, xorbals, fetvs, sasilose siminds, parkosnebs da sxv.

limanebze niadagis Rrm fenebis gayinvis Tavidan asacileblad saWiroa Tovlis Sekaveba da mindorsacavi tyis zolebis gaSeneba, rac xels uwyobs niadagSi wylis droulad SeJonvas da gazafxulze daubrkolebriv Tesviswina samuSaoebis Catarebas.

limanebze Tesvs norma gacilebiT maRalia, vidre urwyavebze TavTaviani kulturebis Tesvis normas adideben 20-30 %-iT. limanebze agroteqnikis mniSvnelovan RonisZiebas warmoadgens Tesvis Semdeg niadagis motkepna. limanebze sasoflo-sameurneo kulturebis mosavlis gadidebaSi did efeqts iZleva sasuqebis gamoyeneba. mzralad xvnis dros ZiriTad sasuqSi SeaqvT superfosfati, nakeli, mwvane sasuqi.

advilad xsnadi mineraluri sasuqi SeaqvT gazafxulze niadagis Tesviswina damuSavebis dros, radgan Semodgomaze Setanili sasuqi Cairecxeba limanuri datborvis dros.

Cveulebriv niadagis 1- 1,5 m sisqis fena teniandeba 3-5 dRes. mZime niadagebSi, gansakuTrebiT bicobebSi wylis CaJonvis xangrZlioba grZeldeba 10 dRemde.

gvalvian velebis pirobebSi sadac sarwyavi sistema ar arsebobs da reliefuri piorbebi xelsayrelia xexilis baRebisaTvis iyeneben limanur rwyvas. aseT piorbebSi axlad dargul baRebSi matulobs xexilis gaxarebis procenti, Zlierdeba maTi zrda, Cqardeba fesvTa sistemis formireba da Rrma fenebSi CaRweva, Zlierdeba maTi zamTargamZleoba da mosavlianoba.

limanuri rwyva gamoiyeneba agreTve mindorsacavi tyis zolebis datenianebisaTvis, niadagis Rrma fenebSi wylis maragis gadideba xels uwyobs tyis nargavebis gaZlierebas, aRar xdeba nargavebis gameCxereba. tyis zolebis swrafi zrdis meSveobiT 3-4 wlis nargavebi ukve kargad icavs mondors Tovlis gadaxvetisgan, qarismieri eroziisagan da zafxulis qarsicxeebisagan.

 sasoflo-sameurneo kulturebis Tesva moyvana Camonadeni wylebiT rwyvis pirobebSi. sasoflo-sameurneo kulturebis Camonadeni wyliT rwyva cnobili germaniaSi,inglisSi,safrangeTSi indoeTSi israelSi da sxva qveynebSi.

Cveni qveynis did qalaqebsa da samrewvelo centrebSi rogorc wesi mrewvelobis anarCenebi da kanalizaciis Camonadeni wylebi Caedineba yovelgvari gawmendisa da gasufTavebis gareSe axlos mdebare mdinareebSi saidanac xdeba naTesebis morwyva.

dadgenilia, rom rusTavis metalurgiuli qarxnis anarCeni wyali, romelic mtkvarSi Caedineba iwvevs Tevzebis daRupvas. asevea madneulis sabados gadamuSavebis Sedegad narCenebi Caedineba mdinare maSaveraSi rac iwvevs mis dabinZurebas gansakuTrebiT mZime metalebiT,

miuxedavad amisa Camonadeni wylebi Seicaven mcenarisatvis saWiro sakveb elementebis did raodenobas-azots, fosfors, kaliums. sasoflo-sameurneo kulturebis am wyliT morwyva mcenarisatvis erTdroulad wyliTa da sakvebiT uzrunvelyofaa-morwyva da ganoyiereba. am wesiT morwyvis safuZvelia , rom niadags aqvvs Tviseba Seakavos Tavis masaSi is WuWyi, rac wyalSia, maT Soris mavne nivTierebanic da iamve dros diddeba misi nayofierebac.

Camonadeni wyliT morwyvis Tavisebureba imaSi mdgomareobs, rom rwyva xdeba mTeli wlis ganmavlobaSi qalaqis axlo gareubnebSi specialurad gamoyenebul nakveTebze. romlebsac “samiwaTmoqmedo sarwyav mindvrebs” uwodeben, Camonadeni wyali, romelic modis qalaqis sakanalizacio qselidan, winaswar iwmindeba-sufTavdeba meqanikurad badeebis, qviSaSemkaveblebis saSualebiT wvrili damsxvili minarevebisagan, Wiis kvercxebisagan da sxv. gasufTavebis Semdeg wyali bunebrivi dawoliT an satumbi sadguris saSualebiT daxuruli milebiT miewodeba mosarwyav mindors. saleqavidan amoRebul danaleqs ki Semdgomi damuSavebis Semdeg iyeneben nakelTan an torfTan SereviT kompostebis dasamzadeblad.

amJamad muSavdeba Camonadeni wylis biologiuri da qimiuri gawmendis meTodebi.

higienis specialuri debulebis Tanaxmad nebadarTulia savegetacio periodSi Camonadeni wyliT ganoyierebul mindorze yvela sasoflo-sameurneo kulturis moyvana, garda marwyvisa,Zirxvenebis da tuberiani kulturebisa, kitrisa, romelic unda moirwyas mtknari wyliT.

miuxedavad imisa, rom Camonadeni wyali Seicavs mcenarisaTvis saWirosakveb elementebs, sarwyav mindorze mizanSewonilia gamoyenebuli iqnes rogorc mineraluri ise organuli sasuqebi.

 daSrobiTi melioracia. kulturul mcenareTa normaluri cxovelmyofelobisTvis aucilebelia, rom niadagSi fesvebis gavrcelebis areSi haeri da wyali iyvnen gansazRvruli urTierTSefardebiT. roca wyals forebis umetesi nawili ukaviaT da haeris Semcveloba moculobis mimarT 20%-ze naklebia, maSin niadagSi iqmneba anaerobuli pirobebi, romelic amcirebs mis nayofierebas.

Warbi tenianobis niadagebze aSeneben mudmivad moqmed damSrob sistemebs, e..i. nagebobebisa da mowyobilobebis kompleqss, romlebic uzrunvelyofen Warbi wylis mocilebas da niadagis xelSemwyob wylier-haerovan Tvisebebis SenarCunebas. damSrob sistemebs, wylis mocilebis wesebze damokidebulebiT hyofen sam saxed: TviTdineba, manqanuri da Sereuli. TviTdinebis dros mogrovili wyali gaedineba wyalmimRebSi romlis done yovelTvis dabalia damSrobi arxis doneze, manqanuri damSrob sistemebs aqvs specialuri tumboebi arxebidan wylis gadasaqaCad wyalmimRebebSi.

damSrobi sistemis SemadgenlobaSi Sedian: dasaSrobi teritoria, maregulirebeli arxebi, gamtari arxebi, wyalmimRebi, sagzao qseli saeqsploatacio mowyobiloba-nagebobebi.

 melioraciuli sistemebis TviTeuli nawili Sedgeba Ria da daxuruli daSrobis wesebis elementebisagan. maregulirebeli arxebi Sedgeba Ria Semkebebis da daxuruli drenaJebisgan, romlebmac unda uzrunvelyon Warbi wylis mocileba tenis siwarbis periodebSi da wylis miwodeba teritoriaze gvalvian periodSi.

daxuruli drenaJiT daSrobisas miiRweva niadagis wylis reJimis ufro Tanabari da srulyofili regulireba, iqmneba pirobebi manqanebisa da meqanizmebis muSaobis srulyofilad Casatareblad.

Ria arxebis mSeneblobis dros farTobis kargva Seadgens 13% mcirdeba sasoflo-sameurneo manqanebis mwarmoebloba da maSasadame izrdeba produqciis TviTRirebuleba. Ria sistemebis rentabeloba maRali ar aris, daxuruli sadrenaJo qselis gamZleoba 50-60 wels utoldeba, Ria qselisa ki12-15 wels.

Ria maregulirebeli qseli warmoadgens mudmiv da droebiT arxebs. daxuruli maregulirebeli qseli warmoadgens miwisqveSa Cawyobil milebs, romelsac gamohyavT Warbi wyali. isini SeiZleba iyos Tixis, plastmasis. Waobebis dasaSrobad upiratesoba eniWeba ficris drenaJs.

didi mniSvneloba aqvs damSrobi sistemis gadayvanas damSrob-damatenianeblad. igi gaTvaliswinebuli Warbi wylis mosacileblad da am wylis misawodeblad niadagis arasakmarisi tenianobisas. aseTi sistema ori nawilisgan Sedgeba, romelic Seicavs maregulirebel, gadamRob da gamtar qselebs, wyalmimRebs, wylis wyaros, hidroteqnikur nagebobas, saeqsploatacio qsels da sxv.

maregulirebeli qseli emsaxureba zedapiruli da gruntis wylebis Segrovebas da mocilebas Warbi tenianobisas da wylis ganawilebasa da miwodebas fesvebis gavrcelebis areSi, gvalvian periodSi.

niadagis qimiuri melioracia. miwaTmoqmedebaSi niadagis nayofiereba damokidebulia wylis da sakvebi nivTierebebis SesaTvisebeli formebis reJimze. damlaSebul da daWaobebul niadagebze maTi gaumjobesebis winaswari RonisZiebebis gareSe SeuZlebelia miviRoT sasoflo-sameurneo kulturebis maRali mosavali.

 aRmosavleT saqarTvelos raionebSi sakmaod didi farTobebia damlaSebuli, kerZod: kaspis raioni (aSuriani) mcired damlaSebuli, diRmis mindori, samgoris veli, gardabnis veli alaznis da eldaris velebi da sxv.

saqarTveloSi damlaSebuli niadagebis didi masivebia mdinare alaznis marjvena napiris centralur nawilSi, es niadagebi damlaSebis kuTxiT kargad aris Seswavlili qarTveli da rusi mecnierebis mier. amJamad aq mimdinareobs didi samelioracio samuSaoebi marilebis gamorecxvisa da ganmlaSebuli niadagebis aTviseba-damuSavebaSi.

damlaSebuli niadagebis fizikur-qimiuri Tvisebebis gasaumjobeseblad gamoiyeneba moTabaSireba. damlaSebul niadagebs aqvT cudi fizikuri Tvisebebi: tenianoba-iwebeba, mSrali-ibelteba, warmoqmnis qerqs. maT aqvT tute reaqcia, romelic araxelSemwyobia yvela sasoflo-sameurneo kulturebisTvis. am niadagebze TabaSiris Setana, gansakuTrebiT Rrma xvnasTan da nakelis SetanasTan SeTanawyobiT, cvlis ra tute reaqcias neitralurad, maRal efeqts iZleva. cdebiT dadgenilia, rom heqtarze 4-6 tona normiT Setanili TabaSiri damlaSebul niadagebze gavlenas axdenda mindvris TeslbrunvaSi monawile yvela kulturaze, amaRlebda saSemodgomo xorblis, Warxlis da qeris mosavals 1,5-2,0 –jer.

 iyeneben fosforTabaSiris (mineraluri sasuqebis warmoebis anarCens 75% TabaSirisa da 2-3% fosforis SemcvelobiT), TixaTabaSirs, romelic bunebriv sabadoebSi moipoveba da Seicavs 60-90 % TabaSirs. TabaSiri da sxva masalebi SeaqvT niadagis xvnisa da kultivaciis win

zogierT SemTxvevaSi niadagis damlaSebuli fenis qveS moTavsebulia kalciumissulfatiT mdidari fena. am SemTxvevaSi Rrma xvniT erTmaneTSi ereva damlaSebuli da karbonatuli horizontebi da miiRweva damlaSebuli miwebis e.w. TviTmoTabaSireba.

qimiuri melioraciis qveS igulisxmeba mJave niadagebis mokirianeba. mJave niadagebis Zireuli gaumjobesebis RonisZiebaa, niadagis mSTanTqav kompleqsis kalciumiT gamdidreba. am saSualebiT mokirianebas saWiroeben saZovrebi, saTibebi da saxnavebi.

niadagis mokirianebas gansazRvraven pH-is marilmJavas gamonawuris gacvliTi mJavianobis maCvenebliT. kiris Setanis norma heqtarze iangariSeba hidrolizuri mJavianobiT(hm) CaCO3=hm.1,5. am formulis gamoyeneba marTebulia Tu niadagis fenas 1 ha farTobze miviRebT 3000 tonad. aseTi masa aqvT niadagebs, romelTa saxnavi fena 20-22 sm-ia.

ufro meti masis saxnavi fenis mqone niadagebisaTvis, sadac masa Seadgens 3500-4200 tonas, formula mcireodeniT icvleba CaCO3=hm.2.0.

umravles TeslbrunvebSi kiris norma iangariSeba 1,0-1,5 hm ganeitralebisTvis. kiris moqmedebis xangrZlivoba damokidebulia misi Setanis normaze, niadagis kalciumis gamorecxvaze, sxva sasuqebis saxeebze da Setanis vadebze da normebze.msubuqi meqanikuri Sedgenilobis niadagis mokirianeba saorientacio perioduloba Seadgens 3-4 weliwads, saSualosi 6-7 wels xolo mZime niadagebisa 8-10 wels. mokirianebisaTvis Seizleba gamoyenebuli iyos Camqrali kiri, dafqvili kirqva, mergeli, kiriani tufi, agreTve samrewvelo anarCenebi, romlebic Seicaven kalciums.

kiri, rogorc wesi SeaqvT Semodgomaze, mosavlis aRebis Semdeg, xvnis win, gazafxulze kulturebis Tesvis win, zafxulSi saaneulo mindorze da zamTarSic ki Tu Tovlis safari ar aRemateba 25-30 sm.

sasuqebi da maTi gamoyeneba.

mcenares Tavs zrda-ganviTarebissaTvis esaWiroeba garemos xuTi faqtori: sinaTle, siTbo, haeri, wyali da sakvebi elementebi wyalsa da sakveb elementebs igi ZiriTadad iRebs niadagidan. imisaTvis rom miviRoT maRali mosavali niadagSi arsebuli wyali da sakvebi nivTierebebi unda gadavides mcenarisaTvis SesaTvisebel mdgomareobaSi, raTa gauadvildes mcenares misi SeTviseba. am mizniT iyeneben agroteqnikur RonisZiebaTa kompleqss, romelic uzrunvelyofs niadagSi wylisa da sakvebis SesaTvisebeli maragis Seqmnas.

agroteqnikur RoniZiebebSi garkveuli mniSvnelovani adgili ukaviaT sasuqebis gamoyenebis sistemas. rogorc samamulo ise sazRvargareTis gamocdileba mowmobs, mosavlianobis matebis aranakleb naxevari sasuqebis gamoyenebiT aris gapirobebuli.

sasuqebi ewodeba organul da mineralur nivTierebebs, romelTa qimiur SedgenilobaSi Sedis kulturuli mcenareebisaTvis aucilebeli kvebis elementebi. maT hyofen organulad da mineralurad.

sasoflo-sameurneo kulturebis intensiuri teqnologiiT moyvana efeqturia mxolod mcenareTa normaluri kvebisa da niadagis nayofierebis ganuxreli zrdis pirobebSi. gasagebia, rom sakvebi elementebis maragi niadagSi amouwuravi ar aris. amitom mcenareebis mier gamotanili nivTierebebis dabruneba sasoflo-sameurneo kulturebis produqtiulobis stabilurobis aucilebeli pirobaa.

kvebis elementebis balansi Sedgeba xarjviTa (gamotana mosavliT, danakargebi eroziiT, gamotutviT da aqroladobiT) da SemosavliT (sasuqebis SetaniT). kvebis elementebis balanss adgenen konkretuli pirobebis da mindvris gaTvaliswinebiT. es saSualebas iZleva dasabuTdes da daigegmos rogorc mosavlianoba, ise sasuqebis saerTo odenoba da saxeebi.

 mineraluri sasuqebi. mineraluri warmoSobis sasuqebi swrfad momqmedi nivTierebebia, romlebic SedarebiT swrafad SeiTviseba mcenaris mier. Sedgenilobis mixedviT mineraluri sasuqebi aris martivi da kompleqsuri(Seicavs kvebis 2-3 elements).

fizikuri mdgomareobis mixedvT mineraluri sasuqebi mrewvelobidan gamodis Txier da myar mdgomareobaSi, es ukanaskneli ki SeiZleba iyos kristaluri,fxvnilisebri da granulirebuli.

mineraluri sasuqebia: azotiani, kaliumiani, fosforiani, kalciumiani da mikroelementebis Semcveli sasuqebi.

azotiani sasuqebi iwarmoeba samrewvelo wesiT, amiakisa da azotmJavasgan. es sasuqebi warmoadgenen TeTr, iSviaTad moyviTalo feris, wyalSi kargad xsnad kristalur fxvnils. isini iyofian: amiakur-nitratul, amiakur, nitratul da amiduri saxeebad.

amiakur-nitratul sasuqebidan yvelaze gavrcelebuli azotiani sasuqebia- amoniumis gvarjila (azoti-32-35%), gamodis 1-3 mm granulebis saxiT. igi SeaqvT rogorc ZiriTadi sasuqi. mcenare swrafad iTvisebs fuZeebs, vidre mJaveebs, amitom gvarjilis nitratuli nawili sistematuri Setanisas amJavianebs niadags.

amiakuri sasuqebi Seicaven ramodenime saxes: amoniumis sulfati (azoti 20-21%), qlorovani amoniumi (azoti 24-25%). es sasuqebi fiziologiurad mJavea, kargad STainTqmeba niadagis mier.

nitratul sasuqebi warmodgenilia sxvadasxva gvarjilebis saxiT. azotis Semcveloba masSi Seadgens15-16%, kargad ixsneba wyalSi igi fiziologiurad tute sasuqia, ukeTesia Setanili iqnes mJave niadagebSi.

amiduri sasuqebidan yvelaze metad gavrcelebulia Sardovana (karbamidi). azotis Semcveloba masSi aris 46% mas iyeneben rogorc ZiriTad sasuqs, gamokvebis saxiT. sasuqi fiziologiurad mJavea da yvelaze koncentrireblia. amitom mis Tanabar ganawilebas niadagis zedapirze gansakuTrebuli mniSvneloba aqvs.

Txieri azotian sasuqebs miekuTvneba: Txedadi amiaki(82% azoti) ufero aqroladi siTxe, niSaduris spirtisaTvis damaxasiaTebeli suniT. Ria WurWelSi Senaxvisas swrafad orTqldeba. inaxeba da gadaaqvT maRali wnevis gamZle foladis avzebiT an cisternebiT.

amiakuri wyali ufero moyviTalo siTxea, mzaddeba ori saxis 20,5% azotis SemcvelobiT da meore 18%-iani amiakis mZafri suniT, gadaaqvT foladis avzebiT. igi gamoiyeneba rogorc ZiriTadi sasuqi da gamokvebis saxiT simindis, kartofilis,Zirxvenebis gasanoyiereblad.

fosforiani sasuqebi. fosforiani sasuqebis miRebis wyaroa bunebrivi fosforSemcveli agromadnebi-fosforitebi da apatitebi, agreTve fosforiT mdidari metalurgiuli mrewvelobis anarCenebi-Tomasis wida, martenis wida.

fosforiani sasuqebi xsnadobis mixedviT iyofa sam jgufad: wyalxsadi fosforis Semcveli sasuqebi (superfosfati, martivi da ormagi), xsnadebi mxolod sust mJavebSi (fosforitis fqvili, Zvlis fqvili), uxsnadi sasuqebi, romlebSic fosfori uxnad formaSia, magram kargad xsnadia sust mJavebSi (precipitati, Tomasis wida).

superfosfati martivi Seicavs 14% P2O5, mzaddeba fxvnilis an 1-2 mm zomis granulebis saxiT, aqvs kargi fizikuri Tvisebebi, ar qvavdeba, iSleba niadagis zedapirze. ormagsuperfosfatSi fosforis Semcveloba 37-54%. igi koncentrirebuli fosforiani sasuqia, misi dozebi martivTan SedarebiT ganaxevrebulia, riTac mcirdeba danaxarjebi mis transportirebaze, Senaxvasada Setanaze.

precipitati TeTri da rux—TeTri fxvnilisebri sasuqia. fosforis raodenoba masSi 27-46%-ia. am sasuqis Setana mizanSewonilia mJave, qviSian da qviSnar niadagebze, radganac igi naklebad ukavSirdeba niadags qimiurad da naklebad gamoirecxeba. igi gamoiyeneba rogorc ZiriTadi sasuqi.

kaliumiani sasuqebi. mrewvelobis mier iwarmoeba mariebisa da maRalkoncentitebuli kaliumovani sasuqebis wyalSi xsnadi formebiT. kaliumis nawili gamodis agreTve kompleqsuri sasuqis saxiT.

kaliumian sasuqebs miekuTvneba: qlorovani kaliumi (kaliumi 54-62,5%),wvrilkristaluri fxvnilia, TeTri an vardisferi Seferilobis, Senaxvisas Zalian qvavdeba da specialur dafSvnas moiTxovs. amitom iyeneben granulacia, romelic aumjobesebs mis fizikur Tvisebebs.

40%-iani kaliumis marili warmoadgens qlorovani kaliumisa da wvrilad dafquli silvinitis an kainitis meqanikur narevs. igi Seitaneba ZiriTadi ganoyierebis saxiT Rrma CakeTebiT, guTniT, umjobesia Semodgomaze. kaliumiani sasuqebidan aRsaniSnavia: gogirdmJava kaliumi, kalimagnezia, kainiti, cementis mtveri, xis nacari.

xis nacari warmoadgens kaliumian, fosforian da kirian sasuqs, romelSic kaliumi naxSirmJava kaliumis saxiTaa. misi Semcveloba damokidebulia sawvavis saxeze. misiT yvelaze metad mdidaria foTlovani jiSebis, wiwiburas namjis, mzesumziras Reroebis nacari. nacari nawilobriv aneitralebs niadagis mJavianobas. Setanis norma 2-3 c farglebSia.

kompleqsuria is sasuqebi romlebic Seicaven 2-an 3 ZiriTad sakveb elements. maT miekuTneba Sereuli sasuqebi, kombinirebuli da rTuli.

Sereuli sasuqebi aris martivi sasuqebis narevi. amzadeben qarxanaSi an meurneobaSi sasuqSerevi danadgarebis gamoyenebiT uSualod Setanis win. yvelaze metad gavrcelebulia amoniumis gvarjilis Sereva superfosfatTan, Sardovanasi sulfatamoniumTan.

kombinirebuli sasuqia: nitrofoska, nitrofosi, nitroamofoska, Sardovana.

rTuli sasuqebia: amofosi, kaliumis gvarjila da sxv. amofosi 10-11% azots da 47% fosfors Seicavs, mzaddeba granulebis saxiT rekomendebulia azotiT mdidar da fosforiT Rarib niadagebSi Sesatanad. gamoiyeneba marcvleuli kulturebis bambis gasanoyiereblad. misi efeqturoba superfosfatTan SedarebiT maRalia azotis Semcvelobis gamo.

mikrosasuqebad iwodebian mineraluri nivTierebebi, romelTa SedgenilobaSi Sedian mikroelementebi. am elementebis deficitis dros iyeneben boris, molibdenis, manganumis, spilenZis da TuTiis sasuqebs. maTi Setanis normaa heqtarze 200-600 grami.

 organuli sasuqebi. organul sasuqebs miekuTvneba: nakeli, nakelis wunwuxi, frinvelis nakeli, torfi, sxvadasxva mcenareuli kompostebi, qalaqis meurneobis organuli anarCenebi, mwvane sasuqebi.

nakeli ZiriTadad maRalefeqturi organuli sasuqia. igi warmoadgens sasoflo-sameurneo cxovelebis myar da Txier gamonayofs. masSi Sedis mcenarisaTvis aucilebeli kvebis yvela elementi, risTvisac mas srul sasuqsac uwodeben.

nakeli sakveb nivTierebad mcenareebis mier gamoiyeneba TandaTanobiT, maTi organuli SenaerTebisagan gaTavisuflebis paralelurad. msubuq niadagze nakeli 4-5 wlis ganmavlobaSi mZime niadagze 7-10 wlis ganmavlobaSi axdens ganoyierebas. gadaumwvari nakelis Caxvnas axdenen ufro Rrmad vidre gadamwvarisas. Setanis norma saSualod aris 50-60 t/ha-ze.

nakeli SeaqvT Semodgomaze mzralad xvnis win, gazafxulze-moxvnis win, zafxulSi saaneulo mindorze. nakelis xarisxi damokidebulia mis Senaxvis pirobebze, nakels inaxaven mindorSi mowyobil moednebze mecxoveleobis fermebTan axlos, agreTve sanakeleSi. nakelis optimaluri masa mindorSi zamTarSi Sesanaxad sasurvelia iyos 200-300 tona.

wunwuxi swrafad moqmedi azot-kaliumiani sasuqia, romelic warmoadgens gadidebul Txieri gamonayofisa da wylis narevs. mas iyeneben rogorc ZiriTadi sasuqi 20-30 t/ha marcvlovanTa, sakvebi da teqnikuri kulturebis gasanoyiereblad.

frinvelis nakeli sruli, swrafad moqmedi sasuqia, iyeneben yvela kulturis gasanoyiereblad, rogorc ZiriTad sasuqis saxiT 2-4t/ha, aseve gamokvebisTvis 0,8-1,0 t/ha.

torfi. saSualo maCveneblebiT torfSi Sedis azoti-1,8-3,0 %, fosfori-0,2-0,5% kaliumi0,1-0,3% torfis sufTa saxiT gamoyeneba efeqturi ar aris, amis gamo torfs akompostireben nakelTan, fekalebTan, umateben organul da mineraluri sasuqebs.

mwvane sasuqebi anu sideratebi aris specialurad moyvanili da niadagSi Caxnuli mcenareebi. aseTi mizniT yvelaze ufro vargisia parkosani mcenareebi, romelTac aqvT didi vegetatiuri masa da arsebiTad amdidreben niadags azotiT. aseT mcenareebs miekuTvneba xanWkola, mdogvi, wiwibura, saSemodgomo da sagazafxulo rafsi da sxv.

baqteriuli sasuqebi. preparatebi, romlebic Seicaven mcenarisaTvis sasargeblo baqteriebis garkveul rasas, baqteriul sasuqebad iwodebian. maT aqvT unari gaaumjobeson sasoflos-sameurneo kulturebis kveba. aseT sasuqebs miekuTvneba: nitragini, azotbaqterini.

mcenareTa zrdis regulatorebi. sasoflo-sameurneo warmoebaSi ukanasknel wlebSi farTod gamoiyeneba sxvadsxva qimiuri nivTierebebi, romlebic miekuTvnebian zrdis regulatorebs da gavlenas axdenen mosavalze da mis xarisxze, maT iyeneben mraval kulturaTa naTesebSi, es nivTierebebia: natriumis gumaTi, kampozani, fospinali, turi (qlorqlorinqloridi) farTod gamoiyeneba marcvlovani kulturebis naTesebSi gansakuTrebiT saSemodgomoebSi, rogorc maRalmosavliani naTesebis Cawolis sawinaaRmdego saSualeba.

gamoyenebuli sasuqebidan yvelaze meti efeqti miiReba maSin, roca sworad aris gansazRvruli maTi niadagSi Setanis vadebi da wesebi. Cveulebrivad sasuqebis Setanis ori umTavresi wesi arsebobs: mTliani (zedapiruli) da lokaluri (budnaSi, mwkrivSi da a.S.) ganoyierebas ki hyofen ZiriTad (Tesvamde), TesvasTan erTad da Tesvis Semdgom (gamokveba).

kvebis elementebis maqsimaluri gamoyenebis miRwevis mizniT sasuqebis Setana aucilebelia agroteqnikis moTxovnaTA sruli dacviT. amasTan mkacrad unda iyos daculi usafrTxoebis zomebi sasuqebTan muSaobis dros da rac mTavaria mkacrad unda gakontroldes garemos dacviTi RoniZiebebi.

leqcia 11

saqarTveloSi sarevela mcenareebis gavrcelebis mdgomareoba da maTi biologiuri Tavisebureba. sarevelebi da maT mier gamowveuli ziani. sarevela mcenareebis klasifikacia. sarevelebis winaaRmdeg brZolis biologiuri RonisZiebebi. gamafrTxilebeli da mospobiT brZolis RonisZiebebi. sarevela mcenareebis winaaRmdeg brZolis qimiuri RonisZiebebi.

yoveli ucxo mcenares, romelic aRmocenebulia da gazrdilia kulturuli mcenareebis naTesebsa da nargavebSi sarevela ewodeba.

 sarevela mcenareebis raodenoba ramdenime aTass aWarbebs, magram calkeuli niadagur-klimaturi zonebisaTvis ziani moaqvs ramdenime aseuls.

arCeven sakuTrad sarevelebs-velurad mozard mcenareebs, Sereuls naTesebSi da daumuSavebel ferdobebze da damsarevlianeblebs, mag. Wvavs xorbalSi, qers-WvavSi, mzesumziras-simindSi da sxv. damoukideblad mozard sarevelebtan erTad arCeven agreTve parazitul (abreSuma, kelaptara) da naxevrad parazit (sanTela, kordiskbila, fiTri da sxv.) sarevelebs.

sarevelebi asarevlianeben mindvrebs, baRebs, kenkrovnebs, sakveb savargulebs. zogierTi maTgani ise Seegua kulturul mcenareebTan Tanacxovrebas, rom calke naTesebis gareSe aRarc gvxvdeba. aseT arevelas ekuTvnis TavTaviani kulturebis damsarevlianebeli Wiota.

sarevelebis sxva saxeobebs gamomuSavebuli aqvs kulturul mcenareTa msgavsi morfologiuri da biologiuri niSnebi, iseTi rogoric aris Teslis forma da zomebi, zrda-ganviTarebis da momwifebis vadebi, isini asarevelianeben monaTesave kulturebs da iwodebian specializebul sarevelebad. maT miekuTvneba-xanduri-bardis naTesebSi, Svriuka-Svriis naTesebSi, abreSuma-samyurasa da ionjas naTesebSi da sxv. sarevela mcenareebi kulturul mcenareebTan SedarebiT meti gvalvagamZleobiT da zamargamZleobiT xasiaTdebian.

sarevelebs axasiaTebs maRali nayofiereba. isini gamoimuSaveben asjer da aTasjer ufro meti raodenobis Tesls vidre kulturuli mcenareebi. bolokas erTi mcenare iviTarebs 12 aTasamde Tesls, mindvris nari -19 aTasamde, jijlaya-500 aTasamde. sarevelebis maRali saTesle produqtiuloba iwvevs usazRvro dasarevelianebas. amasTan sarevelebis aRmoucenebeli Teslebi cxovelunarianobas didi xnis ganmavlobaSi inarCuneben. mag mindvris mdogvi-10 wlis ganmavlobaSi, abreSuma-15 weli, nacarqaTama -38, xvarTqla-50 da sxv.

aRmocenebis uTanabroba Zler aZnelebs sarevelebTan brZolas, radgan maTi gaRiveba-aRmoceneba xangrZliv periods moiTxovs. Teslis aRmocenebis uTanabroba gapirobebulia mravali mizeziT, mosvenebis periodis sxvadasxva xangrZlivoba momwifebis Semdeg, araerTnairi moTxovnileba niadagis tenianobis, temperaturis sinaTlis da CaTesvis siRrmisadmi.

sarevelebis winaaRmdeg brZolas aZnelebs Tviseba-momwifdes kulturul mcenareze adre, ris gamoc isini aswreben niadagSi Cacvenas kulturul mosvlis aRebamde da asarevelianeben niadags. es garemoeba gamoricxavs SesaZleblobas moscildes isini mindvris mosavlis aRebasTan erTad da ganadgurdes Teslis wmendis dros.

sarevelebis TeslTa gamravlebis kerebia gzebis napirebi gauTibavi nawilebi, mindvrebis daumuSavebeli sazRvrebi da sxv.

sarevelebi ZiriTadad vrceldebian TesliT, iSviaTad vegetatiurad,. momwifebuli Teslebi ifanteba qaris saSualebiT, Tibvisas, momwifebuli nayofis skdomisas da misi gadaadgilebi dros, afrebiani da frTebiani Teslebi advilad gadaaqvs qars. sarevelebis advilad misakrobeli Teslebi fexsacmelis, tansacmelis cxovelebis, transprotis saSualebiT Sor manZilze vrceldebian.

vegetatiuri gamravleba bevr mravalwlian sarevelas swrafad gamravlebis saSualebas aZlevs, maTi miwisqveSa organoebi iZleva amonayaris did masas mravalricxovani mZinare kvirtebiT, saidanac SeiZleba ganviTardes axali amoanyari da damoukidebeli mcenare.

Teslebis umetesoba srulad aRmocendeba 2-5 sm siRrmidan. siRrmis TandaTan gadidebiT gaRivebul da aRmocenebul mcenareta raodenoba mcirdeba, 15-20 sm da ufro meti siRrmidanzogierTi sarevelas Tesli saerTod ver aRmocendeba..

sarevelebi da maT mier gamowveuli ziani. sarevelebi iTviseben ra kvebis elementebis udides raodenobas, niadagSi mniSvnelovnad amcireben kulturul mcenarisaTvis SesaTvisebel sakveb nivTierebebs, amcireben mis nayofierebas. saSualod dasarevlianebuli mindvrebidan sarevelebs gamoaqvT (kg/ha): azoti 60-120, fosfori 20-30, kaliumi 100-140. kvlevebiT dadgenilia, rom sarevelebi sasoflo-sameurneo kulturebis mosavals 45-60 %-iT amcirebs.

mravali sarevelas fesvi kulturul mcenareze ufro swrafad izrdeba da Rrmad Cadis niadagSi. maTgan niadagis intensiurad gamoSrobisa da fesvis gamoayofiT Teslis mindvruli aRmoceneba mcirdeba da zogjer arsebiTadac.

sarevelebi seriozulad aZneleben sasoflo-sameurneo samuSaoebis Serulebas. am mxriv aucilebelia agrokompleqsSi iseTi RoniZiebebis CarTva, romelic uzrunvelyofs sarevelebisgan nakveTebis gawmendas.

iseTi abezari sarevelebi, rogoricaa naris sxvadasxva saxeoba, xvarTqla, glerta da sxva iviTareben ra mravalricxovan fesvs, fesvis amonayars da fesuras, arTulebs niadagis ZiriTad da Tesviswina damuSavebas, naTesebis movlas. niadagdamamuSavebeli manqanebis weviTi winaRoba Zlier dasarevelianebul farTobebze 30-35%-mde izrdeba, vidre sarevelebisgan sufTa mindvrebze.

sarevelebi swrafad izrdebian da viTardebian kulturul mcenareebTan SedarebiT, Crdilaven naTesebs, amcireben fotosinTezis process da niadagis mikrobiologiur aqtivobas. simindis naTesis mindvris nariT dasarevelianobis dros kulturis mosavali saSualod mcirdeba 35-40%-iT. abreSumaTi dasarevelianebuli ionjis naTesis Tivis mosavali SeiZleba Semcirdes 20-30%-iT.

 dasarevelianeba zogjer axangrZlivebs mosavlis aRebas, ris gamoc seriozulad izrdeba danakargebi. sarevelebis Teslebi, ReroTa nawili da sxva anarCenebi mosavlis aRebis droisaTvis inarCuneben ra garkveul simwvanes (sinedles) mniSvnelovnad zrdian marcvlis masis sinotives, xels uwyoben TviTCaxurebasa da daobebas, produqciis gaufasurebas.

bevri sarevela xels uwyobs sasoflo-sameurneo kulturebis mwer-mavneblebis gavrcelebas, sokovan davadebaTa gamowvevas. isini anagvianeben matyls, auareseben sasoflo-sameurneo manqanebis muSaobas. arsebiTad aqveiTeben sakvebis xarisxs.

mravali sarevelas Tesli xvdeba, ra galewvis dros marcvalSi, xolo Semdeg fqvilSi auaresebs mis xarisxs, xolo maTi mniSvnelovani odenobiT Serevisas saerTod gamouyenebels xdis fqvils xmarebisaTvis, adamianis da cxovelTa organizmebisaTvis mavne organuli nivTierebebis Semcvelobis gamo. aseT sarevelebs ekuTvnis Wiota, mwara, RvarZli da sxv.

 mineraluri sasuqebis gamoyenebasTan erTad sarwyavi miwebis gafarToebasTan, agreTve niadagdamcavi da niadagis minimaluri damuSavebis danergvasTan dakavSirebiT, miwaTmoqedebis zogierT Zvel raionSi saxnavi miwebis dasarevlianeba diddeba. energodamzogavi, niadagdamcavi da sasoflo-sameurneo kulturebis movla-moyvanis Tanamedrove intensiuri teqnologiebi maRalefeqturiania mxolod sarevelebisagan sufTa mindvrebze. amitom sarevelebis winaaRmdeg brZolas gansakuTrebuli mniSvneloba aqvs sasoflo-sameurneo kulturebis mosavlis misaRebad

sarevela mcenareebis klasifikacia.sarevela mcenareebis biologiurma Taviseburebam, maTma simravlem warmoSves maTi klasifikaciis saWiroeba umniSvnelovanesi biologiuri niSnebis mixedviT: kvebis wesis, sicocxlis xangrZlivobisa da gamravlebis Taviseburebebis mixedviT.

moklexnovani sarevela mcenareebi, rogorc wesi mravldebin mxolod TesliT.sasicocxlo cikli grZeldeba araumetes ori wels. sicocxle mTavrdeba mxolod Teslis momwifebis Semdeg. maT OSoris gamoyofen ramdenime jgufs:

efemerebi (xanmokle), romlebic teniT sakmarisad uzrunvelyofil pirobebSi swrafad amTavreben vegetacias. es sarevelebi gvxvdeba yvelgan –Teslbrunvis mindorze, saZovrebze, bostnebSi, baRebSi. am jgufs ekuTvnis JunJruko.

sagazafxulo. am sarevelebis zrda da ganviTareba sagazafxulo kulturul mcenareTa msgavsia. mravldebian TesliT, aRmocendebian gazafxulze, mcenareebi Tesls zafxulSi an Semodgomaze iZlevian da imave wels kvdebian. Tesli Rivdeba sxvadasxva temperaturaze, amitom maT yofen: adreul da sagvianoebad.

adreuli sagazafxulo sarevelebi yvelaze mravalricxovani jgufia, isini saSiSni arian adre dasaTesi kulturebisTvis, maTi Tesli Rivdeba adre gazafxulze 2-40 temperaturis pirobebSi. sarevelebis Teslebi asarevelianeben niadags da kulturul mcenareta mosavals. am jgufSi Sedian matitela, mindvris mdogvi, TaTruli wiwibura, nacarqaTama, Svriukebi, RvarZli, yanis Wleqi, biloka da sxv.

sagviano sagazafxuloebi Rivdebian 10-140 temperaturaze.aRmonaceni Cndeba gazafxulis dasasruls-zafxulis dasawyisSi. ZiriTadad asarevelianeben gvian vadaSi dasaTes kulturebs da mwifdebian maTTan erTad. maT ekuTvnis jijlaya, Zurwa, ZaRlyurZena, danduri da sxv.

mozamTre sarevelebi vegetacias adre aRmocenebisas amTavreben imave wels, xolo gvian aRmocenebisas izamTreben zrda-ganviTarebis nebismier fazaSi. asarevelianeben rogorc sagazafxulo ise saSemodgomo kulturebs. am jgufSi Sedian: luRji RiRilo, quTquTa, xovera gvirila sosana da sxv.

saSemodgomo sarevelebi zrdisa da ganviTarebisaTvis saWiroeben Semcirebul temperaturas. Cveulebriv gvxvdeba saSemodgomo kulturebis da mravalwliani balaxebis naTesebSi. maTi Tesli mwifdeba saSemodgomo kulturebis Teslis momwifebasTan erTad, mosavlis aRebis dros asarevelianeben mosavals da niadags. sarevelebis am jgufs miekuTvneba: maxobeli, Svriuka, cercvelebi, Wiota, wiwmataseli da sxv.

orwliani sarevelebi viTardebian ori savegetacio periodis ganmavlobaSi. gazafxulze aRmocnebisas sicocxlis pirvel wels warmoqmnian foTlebis rozets. iviTarebs mZlavr fesvTa sistemas da izamTrebs mindorSi. gazafxulze swrafad iwyebs zrdas, yvaviloben, nayofs iZlevian da amTavreben sicocxles. am jgufis sarevelebs ekuTvnis: lencofa, ZiZo, narSavi, daTvis soko, kobrCxila, RiRilo, da sxv.

mravalwliani sarevela mcenareebi yvelaze abezari da Znelad mosacilebelia. Teslis momwifebis Semdeg miwiszeda nawili kvdeba, magram niadagSi rCeba sarevelebis fesvebis cocxali nawilebi, romlebic vegetatiurad gamravlebis saSualebas warmoadgenen da romlebisganac yovelwliurad swrafad viTardebian Reroebi, yvavilebi da Teslebi.

gamravlebis Taviseburebebis mixedviT mravalwliani sarevelebi iyofa Semdeg biologiur jgufebad:

fesuriani sarevelebi umetesad mravldebian vegetatiurad, miwiszeda ReroebiT (fesurebiT), fesura miwiszeda saxeSecvlili Reroa, romelzedac warmoiqmneba muxlebi, kiliseburi foTolakebisa da fesvebis CanasaxebiT. foTolakebis ubeebSi isaxeba kvirtebi. fesuraSi sakvebi elementebis didi maragi grovdeba. muxliani fesuris Zalian mcire monaWeric ki axal wamonazards iZleva. sarevelebi Zlierad izrdebian, warmoqmnian kords da axSoben mosayvan kulturas. fesurian sarevelebs miekuTvneba: Wanga, glerta, Salafa, qasra, leli, mamula, gvimra da sxv.

fesvnayari sarevelebi ZiriTadad mravldebian fesvebiT, romlebic iZlevian amonayars. vertikalurad ganviTarebuli fesvebi did siRrmeze Cadian, maTgan gamodian horizontaluri fesvebi, romelTa kvirtebidan viTardebian fesvis amonayrebi. axali wamonazardi viTardeba mTeli savegetacio periodis ganmavlobaSi.amonayari Tavis amonayarsac iZleva, amrigad sarevela iWers sul axal da axal sivrceebs. am jgufs ekuTvnis: mindvris nari, RiWa, xvarTqla, mwara, Roris qada da sxv.

bolqviani da tuberiani sarevelebi ZiriTadad mravldebian vegetatiurad, bolqvebiT da tuberebiT, asarevelianeben marcvlovanebs, saToxn kulturebs, saaneulo mindvrebs, mravalwlian balaxebs. aseT sarevelebs miekuTvneba: yanis niori, Tero, WinWara, CitisTava da sxv.

mxoxavi sarevelebi umetesad mravldebian Reros muxlebidan gamotanili fesvebiT. asarevelianeben marcvleul da teqnikuri kulturebs, erTwlian da mravalwlian balaxebs. yvelaze metad gavrcelebulia mxoxavi baia, xaxvTesla, marwyvis balaxa da sxva.

paraziti sarevelebi Cveulebriv iyofa or jgufad: naxevrad parazitebi da sruli parazitebi.

sruli parazitebi Tavis mxriv iyofa Rerosa d fesvis parazitebad. Reros parazitebi miekuTvnebian abezar sakarantino sarevelaTa jgufs (abreSuma). maT ar gaaCniaT fesvebi da foTlebi, ar Seicaven qlorofils, mravldebian TeslebiT. Tesli Rivdeba niadagSi, Semdeg axalgazrda mcenareebi exvevian kulturul mcenareebs, emagrebian maT sawovrebiT da iwyeben parazitul cxovrebas.

fesvis parazitebi vTardebian mwvane patron-mcenaris fesvebze (kelaptara-mzesumziraze), mcenareebi mcire sididis arian, mwvane Seferilobis gareSe, isini parazitoben kulturuli mcenareebis fesvebze da ikvebebian iqidan, amave dros did zians ayeneben maT-mkveTrad amcireben mosavals, zogjer mcenareebis srul daRupvasac iwveven.

naxevrad paraziti sarevelebi sruli parazitebisagan gansxvavebiT iviTareben foTlebs da fotosinTezis unari aqvT. pirvel periodSi viTardebian ra Teslidan cxovroben damoukideblad, xolo Semdeg nawilobriv parazitoben mcenareebze, ekvrebian ra maT fesvebs. gavrcelebulni arian yvelgan da asarevelianeben mdeloebs, naTesebs, yamirs da arsebiTi zarali moaqvT soflis meurneobisaTvis.

naxevrad parazitebi gvxvdeba rogorc Rerosi (fiTri) ise fesvebisa (kordiskbila, sanTela)isini auareseben Tivis xarisxs mdeloebze da marcvleulisas naTesebSi. marcvals aZleven mware gemos.

sarevelebis winaaRmdeg brZolis biologiuri RonisZiebebi. sarevelebis winaaRmdeg brZolis biologiur RonisZiebad iTvleba naTesebSi iseTi organizmebis gamoyeneba, romlebic aavadeben sarevela mcenareebs da kulturuli mcenare ki uvnebeli rCeba an amravleben mavne mwerebs, romlebic azianeben sarevelebs, maT yvavils an nayofs da ar aZleven Teslis momwifebis saSualebas. aseTi sarevelebia kelaptara, vardkaWaWa, RiWa, gvirila da sxv. romlebic eqvemdebarebian mavne mwerebis moqmedebas.

unda aRiniSnos, rom aRniSnul RonisZiebebs sarevelebis winaaRmdeg brZolaSi jerjerobiT warmoebaSi praqtikuli mniSvneloba ara aqvs. amitom am sakiTxis Seswavla samecniero-kvleviTi dawesebulebebis erT-erTi mniSvnelovan amocanaa.

sarevelebTan brZolis biologiuri RoniZiebebidan warmoebisaTvis ufro meti praqtikuli mniSvneloba aqvs Teslbrunvebs, Tesvis wesebs, vadebs, normebs da sxva agroteqnikur RoniZiebebs, ris drosac swrafad xdeba kulturuli mcenareebis zrda, aswrebs simaRleSi sarevelebs da axSobs maT. ganakuTrebiT SesamCnevia es moklexnovani sareelebis SemTxvevaSi, rodesac sagazafxuli xorblis viwro mwkrivebSi Tesvis dros dasareve-lianeba Semcirebulia 21%, saSemodgomo xorblis 67%, qeris 30%.

gamafrTxilebeli da mospobiT brZolis RonisZiebebi. sarevela mcenareebTan brZolaSi wamyvani roli agroteqnikur RonisZiebebs ekuTvnis. agroteqnikuri RoniZiebebi iyofa gamafrTxilebel da mospobiT RonisZiebebad. gamafrTxilebeli mimarTulia iqiTken, rom daixSos mindvrad sarevela mcenareeTa Teslis Setanis gzebi, mospobiTi RonisZiebebiT ki unda movspoT niadagSi sarevela mcenareTa Tesli, mravalwlianebis fesvTa sistemis maragi da ukve aRmocenebuli mcenareebi.

gamafrTxilebeli zomebi winaaRmdegobas uweven sarevelebis Semotanasa da gamravlebas mindorze, maT miekuTvneba:

TeslbrunvaSi kulturaTa swori morigeoba. es procesi amaRlebs Teslbrunvis produqtiulobas, amcirebs niadagis dasarevelianebas TeslebiTa da vegetatiuri nawilebiT. kargad ganviTarebuli kulturuli mcenareebi Zlier Trgunaven sarevelebs.

saTesle masalis guldasmiT gawmenda. standartis mixedviT sarevelebis Teslebis Semcveloba 1 kg pirveli xarisxis xorblis, Svriis, brinjis, wiwiburas TeslSi ar unda aRematebodes 5 cals, meore klasis TeslSi-20–s.

Tesvis optimaluri vadebis, normebisa da wesebis dacva. Tesvis normis Semcirea, mcenareTa meCxerad dgoma, xels uwyobs mindvrebis dasarevelianebas. gameCxerebis Tavidan asacileblad Tesvis normas adideben 10-15 %-iT.

daraionebuli jiSebisa da hibridebis gamoyeneba. mocemul konkretul niadagur-klimatur pirobebSi isini kargi zrda -ganviTarebiT xasiaTdebian da yvelaze maRal mosavals iZlevian, rac seriozul winaaRmdegobas uweven niadagis dasarevelianebas.

sarevelebis drouli ganadgureba. sarevelebis mospoba maT yvavilobamde naTesebSi, gzebze, nakveTebis sazRvrebze, mindorsacavi tyis zolebSi Tavidan gvacilebs maT gamravlebas.

cxovelTa kveba marcvlis anarCenebiT. mindvris dasarevelianebis Tavidan acilebis mizniT cxovelebis kveba unda xdebodes mxolod dafquli an daorTqlili marcvlis anarCenebiT, im varaudiT, rom sarevelebis Teslebma dakargon aRmocenebis unari.

nakelis momzadeba. kategoriulad unda aikrZalos axali nakelis mindorSi gatana da Caxvna, romelic niadagSi sarevelebis Teslebis Semdgomi gadidebis wyaros warmoadgens. mxolod nakelis TviTCaxurebis Sedegad bevri sarevela hkargavs aRmocenebis unars. amitom mindorSi unda SevitanoT mxolod is nakeli, romelic ara nakleb erTi weli moTavsebuli iyo sanakeleSi.

sarevelebis sawinaaRmdego karantinis dacva. arCeven gare da Siga karantins. gare karantini axorcielebs sxva qveynebidan abezari sarevelebis SemoWris winaaRmdeg brZolas. es gaTvaliswinebulia sagareo vaWrobis wesebiT. Siga karantini gzas uRobavs Znelad mosaspobi sarevelebis gavrcelebas erTi raionidan meoreSi. aseT Znelad mosaspob sarevelebs ekuTvnis ambrozia, mwara, abreSumas yvela saxeoba, ZaRlyurZena da sxv.

sarevelebis mospobiTi RonisZiebebi mimarTulia uSualod sarevelebis, maTi Teslebis da vegetatiuri nawilebis meqanikuri, biologiuri da qimiuri saSualebebiT mospobisaken.

agroteqnikur-meqanikuri wesiT sarevelebi ispoba niadagdammuavebeli manqanebis da iaraRebis samuSao organoebiT. gaRivebis unaris mqone sarevelaTa TeslebisaTvis metad gavrcelebulia provokaciuli wesi, kulturul mcenareTagan Tavisufal periodSi sarevela balaxebis gaRivebisaTvis maqsimalurad xelSemwyobi pirobebis Seqmna. gaRivebuli da aRmocenebuli sarevelebi sxvadasxva iaraRiT ispoba. es wesi gamoiyeneba Savi aneulis damuSavebisas Semodgomaze. sarevela balaxebiT niadagis gawmendis meore xerxia Rrmad Caxvna niadagSi, saidanac sarevela veRar aswrebs amosvlas niadagis zedapirze.

agroteqnikur RonisZiebas miekuTvneba fesurebis amoxuTva, gaxmoba, fesvurebis gamoyinva.

sarevelebTan meqanikur brZolas atareben Tesvis Semdeg da vegetaciis ganmavlobaSi, farcxvebiTa da mwkrivTaSorisebis damuSavebiT. farcxaven rogorc aRmonacenis gamoCenamde, ise mis Semdeg. naTesebs farcxaven roca sarevelebi imyofebian “TeTri Zafis” mdgomareobaSi. am dros isini kargad ispoba (daaxlebiT 90%) es periodi dgeba daTesvidan ara uadres 3-4 dRisa.

sarevelebTan brZolaSi gansakuTrebul rols asrulebs kartofilis aRmocenebamde aranakleb orjer dafarcxva. saToxni kulturebis moyvanis dros efeqturi RoniZiebaa mwkrivTaSorisebis gafxviereba.

naTesebis movlis sistemaSi Tanamedrove etapze, mniSvnelovani adgili ukavia sarevela mcenareebTan brZolis qimiur meTods.

 qimiuri wesiT sarevelebTn brZola gulisxmobs maT mospobas qimiuri nivTierebebiT-herbicidebiT.

warmobaSi gamoyenebuli herbicidebi iyofa: organulad da araorganulad. mcenaris sxeulSi SeWris xasiaTis mixedviT: fesvebis gziT, foTlebis gziT. mcenareebze moqmedebis mixedviT kontaqturi da sistemuri, mgrZnobelobis mixedviT: mTliani moqmedebis, SerCeviTi moqmedebis.

araorganuli anu mineraluri herbicidebi gvxvdeba mJaveebisa da marilebis saxiT, rogoricaa gogirdmJava, fosformJava, marilmJava, amoniumis sulfamati, kalciumis cianamidi da sxv.

organuli herbicidebi warmoadgenen sxvadasxva organuli SenaerTebis, gansakuTrebiT ki organuli mJavebis, rogoricaa: triqlorZmarJava, karbaminmJava, qlorfenoqsierbomJava marilebs, eTerebs da sxva formebs.

fesvebis gziT moqmedi niadagSi Sesatani herbicidebia: eptami, simazini, atrazini, evadeqsi, diusoni da sxv. foTlebis gziT moqmed herbicidebs miekuTvneba 2,4-d, 2,4,5,-t.

 kontaqturi moqmedebis herbicidebi sarevelebs spoben mcenareze Sesxurebis saSualebiT, xolo sistemuri mcenares azianebs maTi sxeulSi SeWris Semdeg.

mTliani moqmedebis herbicidebi yvela mcenaris daRupvas iwveven. maT Sesabamisi dozebiT iyeneben sarevelebis winaaRmdeg gzebisa da arxebis napirebze da im nakveTebze, romlebic Tavisufali unda iyos sarevela mcenareulobisagan.

SerCeviTi moqmedebis herbicidebi Trgunaven an spoben sarevelebs ise, rom ar azianebs kulturul mcenareebs. maT miekuTvneba atrazini, simazini, piramini da sxv.

yvela herbicidi moqmedebis xangrZlivobis mixedviT iyofa or jgufad:xangrZlivi moqmedebis –erT welze meti xnis moqmedebiT da mokle xnovani.

naTesebis herbicidebiT damuSaveba SeiZleba iyos mTliani, mwkrivuli (saToxni kulturebisTvis), lentiseburi.

herbicidebi, rogorc wesi, unda inaxebodes specialur sawyobebSi, sawyobebi sacxovrebeli saxlebidan, femebidan da wylis wyaroebidan daSorebuli unda iyos ara nakleb 200 metriT. sawyobSi usaTuod unda iyos ventilacia, betonis an asfaltis iataki, specialuri samuSao tansacmeli, afTiaqi, aerwinaRebi da xanZarsawinaaRmdego inventaris adgili.

sawyobSi Senaxul herbicidebs periodulad unda gaukeTdes qimiuri analizi. herbicidebTan muSaobisas daiSvebian mxolod is pirebi, romelTac gavlii aqvT instruqtaJi. xsnarebis momzadebisa da Sesxurebis dros dauSvebelia saWmlis miReba, wylis daleva, papirosis moweva. herbicidebis damuSavebul nakveTebze Sesvla ar SeiZleba 5 dRe-Rameze adre. mindvrebze sadac gamoyenebuli iyo herbicidi ar SeiZleba Ria kabiniani traqtoriT muSaoba.

atmosferosa da hidrosferoSi haerisa da wylis moZraobisa, agreTve sxva fiziko-qimiuri procesebis gamo, herbicidebis gamoyenebis yvela wesis zustad dacvis pirobebSic ki qimikatebi vrceldeba damuSavebuli farTobebis gareTac. herbicidebi moqmedebs gareul cxovelTa nerviul sistemaze, iwvevs maTi qcevis darRvevas. herbicidebi dnoki, karbini,piramini,tilami,eptami da sxva swrafad kargaven aqtiurobas niadagSi da kulturul mcenareebze ar axdenen Semdgom zemoqmedebas. herbicidebi, Tu isini SeaqvT mcire dozebiT da sxva toqsikurobis swrafad mkargav preparatebTan erTad xels uwyobs garemos dacvas dabinZurebisagan.

leqcia 12

niadagis damuSavebis sistema. niadagis damuSavebis xerxebi da amocanebi. xvnis simwife, xvnis siRrme, xvnis wesi, xvna da masze wayenebuli ZiriTadi agroteqnikuri moTxovnebi. niadagis zedapiruli damuSavebis wesebi da iaraRebi. niadagis damuSavebis sistemebi. nawveralis damuSavebis sistema. saToxni kulturebisagan gaTavisuflebuli nakveTis mzral damuSavebis sistema. kordis damuSavebis sistema. yamiri da nasveni miwebis damuSavebis sistema. niadagis aneulad damuSavebis sistema, kulisebiani aneuli, moTesili aneulebi, sideraluri aneulebi, niadagis Tesviswina da TesvisSemdgomi damuSavebis sistema.

miwaTmoqmedebaSi adreve gairkva, rom kulturuli mcenare niadagis damuSavebis gareSe araviTar mosavals ar iZleva. Tanamedrove miwaTmoqmedebaSic sasoflo-sameurneo kulturul mcenareTa moyvanisa da mosavlanobis gadidebis saqmeSi niadagis swor damuSavebas gadamwyveti mniSvneloba aqvs. miwaTmoqmedeba warmoudgenelia niadagis swori damuSavebis gareSe.

niadagis damuSavebis mTavari amocanaa-saxnavi Sre moyvanili iyos fxvier, koStovan mdgomareobaSi, gaiwmindos mindvrebi sarevelebisagan, niadagSi Setanili iqnes organuli da mineraluri sasuqebi, niadagi momzaddes Teslis ukeTesad CasaTesad da sxv.

niadagis damuSavebis amocanebi arsebiTad icvleba niadagur-klimaturi pirobebisa da mosayvani kulturebis biologiuri Taviseburebebis mixedviT. imisaTvis rom niadagis damuSavebis ama Tu im wesma Tavis mizans miaRwios, damuSaveba unda moxdes drisyvelaze saWiro monakveTSi, xarisxis mudmivi kontroliT.

damuSavebis xarisxi Tavis mxriv damokidebulia dasamusavebeli niadagis fiziko-qimiur Tvisebebze, maT miekuTvneba plastikuroba, mwebaoba, bmuloba da fizikuri simwife.

niadagis dammuSavebeli iaraRebis zemoqmedebis ZiriTadi teqnologiuri procesebi mdgomareobs: dafxvnaSi, gafxvierebaSi, urTierTSerevaSi, gadabrunebaSi, mosworebaSi mikroreliefis SeqmnaSi.

dafxvnis Sedegad icvleba niadagis struqturuli erTeulebis sidideebi, icvleba niadagis koStebisa da nawilakebis urTierTmdebareoba, romlebic calkevdebian erTmaneTisagan, diddeba forianoba da aeracia. miwaTmoqmedebaSi gamoyenebuli damuSavebis bevri iaraRi (guTnebi frTis sxvadasxva formiT, frezebi, brtylad mWrelebi kultivatorebi da sxv.) qmnis sifxvieris sxvadasxva dones.

gafxvierebis meoxebiT icvleba erTeulebis urTierTganlageba da diddeba niadagis moculoba, iqmneba fxvieri saxnavi da zogierT SemTxveva saxnavis qeda fena.datkepnil niadagSi brkoldeba fesvebis zrda, Zirxvenebisa da bolqvebis ganviTareba. gafxviereba aumjobesebs niadagis wyal da haergamtarobas, aCqarebs mcenareuli narCenebis gaxrwnas, intensiurad grovdeba mineraluri kvebis elementebi.

Serevis Sedegad icvleba niadagis erTeulebis erTmaneTisadmi ganlageba, rac uzrunvlyofs niadagis dasamuSavebeli fenis erTgvarovnebas.

niadagis Sereva saWiro xdeba saxnav fenaSi organuli da mineraluri sasuqebis, kiris, TabaSiris Tanabari ganawilebisaTvis. is aucilebelia agreTve naklebnayofieri saxnavi qveda fenis moxvnis drosac. am RonisZiebis Cataeba dauSvebelia eroziulad saSiS da gvalvian raionebSi. niadagis Sereva xorcieldeba uwinmxvnelo guTnebiT, frezebiT da sxva gamafxvierebeli iaraRebiT.

gadabrunebis dros niadagis zeda da qveda fenebi urTierTSeerevian vertikaluri mimarTulebiT. am dros saxnav fenaSi CakeTebas ganicdis mcnareTa sanawveralo anarCeni, kordi, organuli da mineraluri sasuqebi, kiri, TabaSiri, sarevelaTa dacvenili Teslebi.

niadagis mosworebis Sedegad mcirdeba zedapiris uswormasworoba, gvalvian zonebSi RonisZieba xels uwyobs aorTqlebis Semcirebas da wylis SenarCunebas niadagSi.gasworebul niadagSi Tesli ufro Tanabrad iTeseba, xelsayrelia naTesebis movlisa da mosavlis asaRebad. mosasworeblad iyeneben farcxebs, mosasworeblebs, greiderebs, saTrevela farcxebs da sxv.

niadagis damuSavebis wesebi. agronomiaSi arCeven niadagis ZiriTad, zedapirul da specialur damuSavebis wesebs.

niadagis ZiriTadi damuSavebis cnebaSi igulisxmeba niadagis yvelaze Rrmad damuSaveba TeslbrunvaSi monawile kulturebisTvis. ZiriTad damuSavebas ekuTvnis xvna da Rrma gafxviereba.

zedapiruli damuSaveba aris niadagis damuSaveba sxvadasxva iaraRiT araumetes 12-14 sm siRrmeze. aseTebia: aoSva, kultivacia,farcxva, datkepna, mosworeba, moSandakeba da sxv.

specialuri damuSaveba gamoiyeneba specifikuripirobebis dros, garkvuli konkretuli mizniT-wylis dasakaveblad an asacileblad, Tovlis dasakaveblad da sxv. specialuri damuSavebis wesebs miekuTvneba frezireba, dabudneba, danapraleba, daRrueba, dabazoeba.

 niadagis ZiriTadi damuSavebis wesebi. xvna ewodeba niadagis guTniT damuSavebas, romelic uzrunvelyofs dafSvnas, gafxvierebas da dasamuSavebeli fenis gadabrunebas aranakleb 1350-isa. xvnis dros CakeTebas ganicdis sasuqebi da sanawveralo anarCenebi. yvelaze srulad gadanawildeba niadagis fenebi, Tanabrdeba gansxvaveba maT nayofierebaSi, iWreba sarevelebi. xvnis Catarebis drois mixedviT arCeven saSemodgomo (mzralad) da sagazafxulo xvnas.

umetes sasoflo-sameurneo raionebSi xvnas atareben winmxvneliani guTniT. guTani Sedgeba korpusis dgarisagan, romelzedac mimagrebulia saxnisi, frTa da mindvris dafa, saxnisi horizontalurad Wris belts qvevidan. mis zemoT dayenebulia frTa, romelic fxvnis da abrunebs moWril belts. mindvris dafa gamoyenebulia rogorc sayrdeni.

guTnis umniSvnelovanesi nawilia winmxveli, romelic Sedgeba dgaris, saxnisis da frTisgan. misi modebis gani75%-ia Ziritadi korpusis modebis ganisa. winmxvnelis saxnisis cxviri dgeba 250-300 mm-iT win ZiriTadi korpusis saxnisis cxviridan. savegetacio periodSi niadagis zeda fena Sreba da xmeba, mkvrivdeba ikvreba mcenareTa fesvebiT. winmxvneli Wris mas 10-12 sm siRrmeze da aTavsebs kvlis fskerze. gakordebuli fenamocilebuli qveda fena advilad ifSvneba guTnis ZiriTadi korpusis frTaze da zevidan eyreba kvlis fskerze Cayril zeda fenas. winmxvnelian guTniT xvnas agronomiaSi kulturul xvnas uwodeben.

winmxvneliani guTniT xvna SesaZlebelia da dasaSvebia mxolod im farTobebisa, romelTa saxnavi fenis siRrme 20 sm naklebi ar aris. es saWiroa, ramdenadac niadagis moWrili zeda fena (10-12 sm) aucilebelia daifaros qveda gafxvierebuli feniT. 20 sm mcire sisqis niadagebi, agreTve torfiani niadagebi ixvneba uwinmxvnelo guTniT.

mosaxnavad gaTvaliswinebul nakveTs Cveulebriv yofen saqcevebad. saqcevebis TavSi da boloSi tveben agregatebis mosabrunebel zols, romelic ixvneba saqcevebis xvnis damTavrebis Semdeg, xvnis perpendikularuli mimarTulebiT.

saqcevebSi xvnas awarmoeben nazurgad da naRarad. nazurgad xvnis dros muSaoba iwyeba saqcevis Sua nawilidan.mis boloSi satransporto mdgomareobaSi gadayvanili agregati (traqtori guTniT) brundeba marjvniv da moZraobs ukve gatarebuli kvlis gverdze uku mimarTulebiT. amis Semdeg saqcevis SuaSi warmoiqmneba zurgi (Txemi), xolo saqcevis anapira mxareebSi naRari kvlebi.

 naRarad xvnis dros muSaoba iwyeba saqcevis ganapira mxareebidan. saqcevis bolos traqtori agregatebiT brundeba marcxniv da kvals atarebs saqcevis meore mxares. aseTi xvnis dros saqcevis SuaSi warmoiqmneba naRari, xolo saqcevbs Soris –zurgebi.

naRarebisa da nazurgebis Sesamcireblad saWiroa nazurgad da naRarad xvnebis urTierTmorigeoba. aseTi morigeoba uzrunvelyofs mindvris ufro swori zedapiris warmoqmnas.

xvnis xarisxze did gavlenas axdens misi Catarebis dro. yvelaze uketesia momwifebuli, sruli mindvruli wyaltevadobis 40-70% tenianobis nidagis damuSaveba.

niadagis xvna yovelwliurad erTi da imave siRmeze ar aris rekomendirebuli,radgan kvlis fskerze Cndeba gatkepnili fena, (e.w. guTnis terfi) romelic aZnelebs haerisa da wylis Sesvlas saxnav fenaSi. guTnis terfis warmoqmna gansakuTrebiT saSiSia Tixnar niadageze, Zirxvenebisa da bolqvianebisatvis misaRebia xvna 28-30 sm siRrmeze, simindis da mzesumzirisaTvis 25-27 sm, TavTaviani kulturebisaTvis 20-25 sm siRrmeze. magram sxvadasxva zonaSi damuSavebis sirrme damokidebulia konkretul pirobebze, saxnavi fenis siRrmeze, mindvris mdgomareobaze, winamorbedze da sxv.

ufrTo guTniT damuSavebisas sarevelebis Cacvenili Teslebi, sanawveralo anarCenebi, vegetaciaSi myofi sarevelebi, mavneblebi da avadmyofobis gamomwvevi organizmebi rCeba niadagis zedapirze. ufrTo guTniT damuSaveba gavrcelebulia gvalvian rionebSi, sadac beltis gadabruneba saxav fenaSi wylis damatebiT dakargvas iwvevs.

niadagis brtyladmWrelebiT damuSaveba gamoiyeneba qarismieri eroziis arsebobis zonebSi. amisaTvis iyeneben specialur brtyladmWrel Rrmad gamafxvierebeblebs, romlebic niadagis zedapirze toveben nawveralis mniSvnelovan raodenobas (70-80%) da erTdroulad afxviereben niadags 30 sm siRrmeze. aseTi damuSavebis dros niadagi naklebad mtveriandeba, xolo zedapirze SenarCunebuli nawverali xels uwyobs qaris siCqaris Semcirebas miwis zedapiris siaxloves, Tovlis dagrovebas da amcirebs qarismier erozias. gasaTvaliswinebelia, rom ufrTo iaraRebiT da brtyladmWrelebiT damuSavebisas gaZnelebulia sarevelebTan brZola, amitom TeslbrunvaSi saWiroa CairTos sxvadasxva saxis sufTa aneulebi da gamoyenebuli iqnes herbicidebi.

niadagis sxvadasxva siRrmeze damuSaveba. TeslbrunvaSi atareben Rrma xvnas 30-35 sm siRmeze, saSualos 20-22sm siRrmeze, zereled 12-16 sm-ze da zedapiruls 10 sm-ze.miwaTmoqmedebis sxvadasxva zonaSi damuSavebis siRme ar aris erTnairi da damokidebulia saxnavi fenis simZlavreze, mindvris mdgomareobaze, winamorbed kulturaze, ganoyierebis sistemaze da sxv. sxvadasxva sirrmeze damuSaveba iZleva saSualebas intensiurad vawarmooT kulturuli mcenareebis sarevelebTan, mavneblebTan, davadebebTan brZola. Rrmad CakeTebuli sarevelbis Teslebis, mavneblebisa da davadebebis gamomwvevTa umravlesoba cxovelunarianobas hkargaven Semdgomi ufro zereled damuSavebis periodSi (3-5 wlis ganmavlobaSi).

 niadagis zedapiruli damuSavebis wesebi da iaraRebi. niadagis zedapiruli damuSavebis amocanaa niadagis qerqis mospoba, zedapiruli datkepnili fenis gafxviereba, sasoflo-sameurneo kulturebis Teslis CasaTesi fenis momzadeba, sarevelebis moWra, mineraluri araRrmad CakeTeba. zedapiruli damuSavebis dros gafxvierebis siRrme ar aRemateba 12-14 sm-s. aseTi damuSavebis xerxebs ekuTvnis: aoSva, kultivacia, Semoyra, farcxva, daSleifeba, datkepna, moSandakeba.

aoSva uzrunvelyofs niadagis nawilobriv gafxvierebas, gadabrunebas da gadarevas. agreTve sarevelebis moWras. igi tardeba 5-14 sm siRrmeze, umTavresad TavTaviani kulturebis naTesebis mosavlis aRebis Semdeg. igi saSualebas iZleva SenarCunebuli iqnes teni, ganadgurdes gaRivebuli sarevelebi da mavne mwerebi, provocirebul iqnes sarevelaTa Teslebis gaRiveba.

kultivacia uzrunvelyofs niadagis dafSvnas, gafxvierebas da nawilobriv urTierTSerevas, agreTve sarevelebis srul moWras da mindvris zedapiris mosworebas. kultivatoris TaTebi sxvadasxvanairia-mmargvleli, erTmxriana brtyladmWreli, iarusebad brtyladmWreli da universaluri gamafxvierebeli.

niadags amuSaveben 5-6 sm siRrmeze, isriseburiT Wrian sarevelebs da niadags 10-12 sm siRrmeze afxviereben. kultivacia SeiZleba iyos mTliani an mcenareTa mwkrivTSorisi. Semodgomaze moxnul mindors akultivireben gazafxulze, rom gafxvierdes da gaswordes datkepnili zedapiruli fena, gaZlierdes haeris SeRweva,daCqardes niadagis gaTboba, moispos sarevelebi.

farcxva uzrunvelyofs niadagis gafxvierebas, Serevas da zedapiris mosworebas, agreTve sarevelebis gaRivebuli Teslebisa da aRmonacenis nawilobriv mospobas.RonisZieba gamoiyeneba didi beltebis dasaSlelad, niadagis zedafenis wvrilkoStovani struqturis Sesaqmnelad, niadagis qerqis dasaSlelad. samuSao organoebis mixedviT farcxebs yofen: kbilisebr, diskosebr, zambarisebr, badisebr saxeebad.

mZime, Zlier datkepnili niadagebis gasafxviereblad yvelaze ufro gamosadegia kbilisebri da diskosebri farcxebi, msubuq farcxebs iyeneben Tesvisa da naTesis movlisaTvis.

daSleifeba xels uwyobs mindvris zedapiris mosworebas. amisaTvis iyeneben Sleif-farcxebs, romelic gaTvaliswinebulia adre gzafxulze niadagis zedapiruli mosworebisa da gafxvierebsaTvis.

datkepna mdgomareobs niadagis gamkvrivebaSi, beltebis dafxvnaSi da nawilobriv zedapiris gasworebaSi. datkepnas mimarTaven rogorc Tesvamde ise mas Semdegac. Tesvamde datkepnis ZiriTadi daniSnuleba is aris rom Sekvrivdes zedapiruli fena da Seiqmnas pirobebi Teslis Tanabr siRrmeze CaTesvisa. amis meoxebiT miReba Tanabari aRmonaceni da mcenareebi erTdroulad momwifdeba. Tesvis Semdgom datkepna aumjobesebs kontaqts Teslisa da niadagis nawilakebs Soris, adidebs wylis dinebas qveda fenebidan.

Semoyra aris agreTve niadagis gafxviereba, nawilobriv Sereva da miyra. kartofilis miwiT miyrili reroebis nawilebi iZleva damatebiT wanazardebs, romlbzedac warmoiqmneba tuberebi.

moSandakeba warmoadgens niadagis mosworebas. erTdroulad mis mniSvnelovnad datkepna-gamkvrivebas atareben specialuri iaraRiT-momsworebliT. igi Sedgeba metalis Zelisagan, romelic mimagrebulia ori sawevriT traqtorze. moSandakebas iyeneben mindvris TesvisaTvis mosamzadeblad da mosarwyavad.

niadagis damuSavebis specialuri xerxebi. freziT damuSaveba uzrunvelyofs niadagis gaZlierebul dafSvnas da dasamuSavebeli fenis urTierT Serevas. mas iyeneben Rrmad gakordebul da torfian niadagebSi mineralizaciis, qimiuri procesebis dasaCqareblad

frezi didi dolia zambarovani TaTebiT da sxvadasxva formis danebiT. doli brunavs frezis moZraobis ukumimarTulebiT, TaTebi iWreba gruntis masaSi an kordSi da patara naglejebis saxiT isvris maT ukan, isini ecemian damcvel cxaurze da ifSvnebian. aseTi swrafi gafxviereba SeuZlebelia Cveulebrivi xvnis dros, magram frezi Zlier amtverianebs niadags.

saplantaJe xvna aris saplantaJe guTniT xvna 40 sm siRrmeze, es guTnebi gaTvaliswinebulia savenaxe mZime niadagebis saxnavad. xexilisa da tyis zolebis gasaSeneblad-60 sm –is siRrmeze.

oriarusiani damuSaveba ewodeba niadagis damuSavebas saxnavi fenis zeda nawilis amobrunebiT da erTdroulad qveda nawilis gafxvierebiT an zeda da qveda fenebis adgilebis urTierTSenacvlebiT.

samiarusiani damuSaveba aris niadagis sami fenis nawilobriv an sruli gadaadgileba. samiarusiani guTani niadags xnavs 60 sm sirrmeze 50 sm modebis ganiT. xvnisas niadagis gadabrunebuli zeda fena rCeba adgilze, qveda (mesame)gadaadgildeba meoris adgize, xolo meore mesamis adgilze. samiarusiani damuSaveba rekomendebulia damlaSebuli niadagebisaTvis.

niadagis damuSavebas dadebiT gavlenasTan erTad SeuZlia uaryofiTi gavlena moaxdinos mis nayofierebaze. mZime traqtorebis da iaraRebis gamoyeneba amkvrivebs saxnav fenas da zogjer qvesaxnav fenasac. niadagis damuSavebis uaryofiTi zemoqmedebis Tavidan asacileblad an mis minimumamde Sesamcireblad mimarTaven e.w. minimalur damuSavebas.

niadagis minimaluri damuSaveba aris mecnierulad dasabuTebuli minimalur operaciaTa erToblioba, romelic energetikuli danaxarjebis, damuSavebis ricxvisa da operaciebis erT samuSao procesSi SeTanawyobiT uzrunvelyofs mosavlisa da niadagis nayofierebis amaRlebas.

 niadagis damuSavebis sistemebi. niadagis damuSavebis sistema ewodeba mecnierulad dasabuTebul RoniZiebeTa erTobliobas, romelic sruldeba garkveuli TanmimdevrobiT TeslbrunvaSi MmTavari strategiuli amocanis Sesasruleblad, konkretuli niadagur-klimaturi pirobebis gaTvalis-winebiT. igi damokidebulia bunebriv pirobebze, mindvris konkretul mdgomarebaze, mosayvani kulturis ganoyierebaze, Teslbrunvasa da winamorbedze. damuSavebis sistema iTvaliswinebs gaTvaliswinebuli yvela operaciis Tavis droze da maRali xarisxiT Sesrulebas.

niadagis damuSaveba Seicavs ZiriTad, Tesviswina da TesvisSemdgom damuSavebas, niadagis damuSavebis sistema sagazafxulo da saSemodgomo kulturebisTvis gansxvavebulia.

sasoflo-sameurneo kulturebisagan garkveuli periodis ganmavlobaSi Tavisufal mindors, romelic SenarCunebulia sarevelebisagan sufTa mdgomareobaSi, saaneulo mindors uwodeben. arCeven aneulebs: sufTas, Savs (roca sufTa aneulis ZiriTadi damuSaveba iwyeba da tardeba wina wlis zafxulSi an Semodgomaze), adreuls (roca sufTa aneulis damuSaveba iwyeba gazafxulze), kulisurs, dakavebuls, sideralurs.

sufTa aneulebi kulturul mcenareTa winamorbedebis gansakuTrebuli jgufia, isini yvelaze did gavlenas axdenen niadagis fizikur da qimiur Tvisebebze, amcireben dasarevelianebas, mavneblebis da davadebebis gavrcelebas. Tu aneulebis movlis dros daculi iqneba agroteqnikis yvela moTxovna maSin niadagis metrian fenaSi damatebiT grovdeba 600 tonaze meti produqtiuli teni. amitom velian raionebSi sufTa aneulebi gvalvasTan brZolis ZiriTad saSualebas warmoadgens.

Savi aneulis zedapiri advilad eqvemdebareba qarismier da wylismier erozias da xels uwyobs niadagis Zvirfasi nawilis dakargvas. ase rom Savi aneuli SeiZleba Cvens pirobebSi gamonaklisis saxiT daiSvas yvelaze gvalvian mikroregionebSi (qarTli, kaxeTi), gansakuTrebiT deficituri saTesle masalis garantirebuli saswrafad gamravlebis mizniT.

niadagis damuSavebis sistema sagazafxulo kulturebisTvis. samuSaoTa Sesrulebis mixedviT TiToeuli damuSavebis sistema iyofa mzralad (anu zafxul-Semodgomis), Tesviswina da Tesvis Semdgomad.

mzralad xvnis qveS gulisxmoben niadagis ZiriTad damuSavebas zafxul-Semodgomis periodSi sagazafxulo kulturebis dasaTesad momdevno wels.

Tesviswina damuSaveba aris niadagis damuSaveba uSualod sasoflo-sameurneo kulturebis Tesvis an dargvis win, xolo Tesvis Sedgomi ki aris Tesvis an dargvis Semdeg.

niadagis mzralad damuSaveba saSemodgomo TavTaviani kulturebisa da erTwliani balaxebis Semdeg. mzralad xvnis sistemiT damuSaveba iwyeba nawveralis aCeCviT, winamorbedi kulturis mosavlis aRebisTanave. aCeCvis siRrme da iaraRis tipi damokidebulia Warbi sarevelebis saxeze. niadagis mzralad damuSaveba saSemodgomo damuSavebis aucilebeli xerxia aRmosavleT saqarTvelos umetesi raionebisaTvis. igi SeiZleba SeeTanewyos aCeCvas, kultivacias, misi Catarebis vada damokidebulia sarevelebis Teslebis gaRivebis vadaze.

saSemodgomo xvnis siRrme damokidebulia mraval garemoebaze: niadagis tipze, mindvris dasarevelianebaze, mosayvan kulturaze. Cveulebrivad bostneuli kulturebisTvis, kartofilisa da ZirxvenebisTvis aucilebelia Rrma xvna. marcvleulisTvis, teqnikuri kulturebisTvis ufro-zerele, erTi da imave kulturisaTvis Semodgomaze ufro Rrmad aris saWiro xvna vidre gazafxulze.

yvelaze ukeTesia kulturuli xvna, e.i. xvna winmxvneliani guTniT. garda aCeCvisa da xvnisa saWiroa damatebiTi damuSaveba sarevelebis mosaspobad da wylis dasagroveblad. Semodgomaze aseT damuSavebas uwodeben naxevrad aneuls. xvnis Semdeg tardeba kultivacia an xvnis win niadags aCeCaven orjer (8-12 sm siRrmeze).

niadagis mzralad damuSaveba mravalwliani balaxebis Semdeg tardeba sxvadasxva wesiT da sxvadasxva vadaSi misi meqanikuri Sedgenilobis, balaxdgomis xangrZliobis, balaxnarevis saxeze da mosayvani kulturaze damokidebulebiT. mTavari amocanaa kordis sicocxlisunarianobis SeCereba da Tavis droze gaxrwna. xrwnis procesi unda mimdinareobdes nela, rom sakvebi nivTierebebi dagrovebul da SenarCunebul iqnes niadagSi.

kordis damuSavebis yvelaze ukeTes meTodad miRbulia winmxvneliani guTniT xvna. am SemTxvevaSi moWrili kordi vardeba kvlis fskerze da zemodan ifareba gafxvierebuli miwiT, romelSic kargad aRwevs haeri, aseTi CakeTeba gamoricxavsmcenareebis wamozrdas da xels uwyobs kargad gaxrwnas.

kordis gazafxulze moxvna mniSvnelovnad amcirebs momdevno kulturebis mosavals.

niadagis mzralad damuSaveba saToxni kulturebis Semdeg. imis gamo, rom saToxni kulturebis naTesebs farcxaven, utareben kultivacias, Semoyras, mis qveS SeaqvT organuli sasuqebis maRali dozebi, niadags Rrmad amuSaveben.

Tu saToxni kulturebis Semdeg mindori Zlierad aris dasarevelianebuli aucilebelia mzralad Rrma xvna. xvnis win atareben aCeCvas 10-12 sm siRrmeze. qarismieri da wylismieri eroziis adgilebSi damuSavebas unda hqondes niadagdamcavi xasiaTi.

kordis damuSavebis sistema. arCeven xelovnur da bunebriv kords. bunebrivi kordi ewodeba bunebrivad mozardi veluri balaxa mcenareebis mravali wlis dgomis Sedegad Camoyalibebul kords. xelovnuri ki ewodeba kulturuli mravalwliani sakvebi balaxebis Tesvis gziT, misi nakveTze ori an meti wlis dgomis Sedegad.

kordis damuSavebis ramdenime xerxi arsebobda, Tavdapirvelad awarmoebdnen beltis srul gadabrunebas, iyenednen gaTerZviT xvnas anu beltis gadabrunebas 1350-iT, Tumca aseTi meTodebiT xvnas bevri uaryofiTi mxareebi gaaCnda. amJamad SemuSavebulia kordis damuSavebis sruliad axali wesi e.w. ormagi xvna, mas ormagi xvna imitom ewoda, rom erTi da imave kvalSi ori erTkorpusiani guTani moZraobs. winmavali guTani kordis mxolod zeda nawils iRebs da kvlis ZirSi aTavsebs, momyoli guTani ki qveda nawils Wris da zevidan ayris. kordis am wesiT damuSaveba agronomiulad sruliad damakmayofilebelia, mravalwliani balaxebis cxovelmyofeloba srulad ixSoba, beltis gamoSroba ar xdeba, igi ise fxvierdeba, rom TiTqmis araviTar damatebiT damuSavebas ar moiTxovs. xnuli miiReba sworzedapiriani.

xelovnuri kordis damuSaveb warmoebs winmxvneliani guTnebiT. xelovnuri kordis ZiriTadi damuSaveba marTlac winmxvneliani guTniT damuSavebiT Semoifargleba, zogierT SemTxvevis gamoklebiT,Tu xnuli uswormasworo gamovida saWiro xdeba misi dadiskoeba da dafarcxva. kordis moxvnis konkretuli vadebisa dadgenisas mxedvelobaSia misaRebi adgilobrivi klimaturi da niadagobrivi pirobebi, reliefi da sxv.

 Tesviswina damuSavebaSi igulisxmeba garkveuli TanmimdevrobiT Sesrulebuli damuSavebis wesebis erToblioba niadagis dasaTesad mosamzadeblad. igi unda Catardes Tesvis dRes (kultivacia, dafarcxva). Tu Tesviswina kultivaciis Semdeg wvimis mosvlis gamo an sxva raime mizeziT Seferxda Tesva aucilebelia kultivacia ganmeorebiT Catardes. Tesviswina damuSavebisas ar aris rekomendirebuli niadagis gadabruneba.

niadagis damuSavebis konkretuli wesebi ganisazRvreba mTeli rigi pirobebiT. mzralad xvnis CatarebiT,dasaTesi kulturiT, organuli sasuqis SetaniT da sxva. mxedvelobaSi miiReba agreTve meteorologiuri pirobebi da niadagis meqanikuri Sedgeniloba.

TesvisSemdgomi damuSaveba. niadagis Tesvis Semdeg damuSaveba mimarTulia sarevela mcenareTa ganadgurebisa da niadagis zedapiris gafxvierebisaTvis, Teslis gaRivebisa da aRmocenebisaTvis xelSemwyobi pirobebis Sesaqmnelad.

Tesvis Semdgomi damuSavebis gavrcelebul da efeqtian wess wamoadgens farcxva aRmonacenis gamoCenamde da mis Semdeg. Tu yvela mwkrivTSorisi, maT Soris mezobel gavlaTa Sorisac Tanabari siganisaa, kultivatoris modebis gans mniSvneloba ara aqvs, magram Tu mwkrivTaSorisebis siganeebi darRveulia, sxvadasxva kultivatoris samuSao modebis gani zustad unda Seesabamebodes saTesis modebis gans. amasTan kultivatorma unda iaros zustad saTesis kvalze. winaaRmdeg SemTxvevaSi mcenareebis moWra mwkrivebSi gardauvalia, mwkrivTaSorisebis damuSavebaTa Soris intervali ar unda aRematebodes 14-15 dRes, radgan misi gaxangrZlivebis dros sarevelebi aswreben gazrdas da dafesvianebas.

saSemodgomo kulturebi SeiZleba daiTesos aneulze da arasaaneulo winamorbedze (mravalwliani balaxebi, saToxni kulturebi), romlebic mindors aTavisufleben saSemodgomoebis daTesvamde, niadagis damuSavebis sistema damokidebulia winamorbedis Taviseburebaze.

niadagis damuSaveba sufTa aneulze. sufTa aneulze niadagi sistematurad muSavdeba, SenarCunebuli unda iyos sarevelebisagan sufTa mdgomareoba, ganoyieereba unda moxdes organuli da mineraluri sasuqebiT. sufTa aneuli SeiZleba iyos Savi da adreuli. Sav aneulze niadagis ZiriTadi damuSaveba iwyeba Semodgomaze, winamorbedi kulturis aRebisTanave adreul aneulze ZiriTadi damuSaveba tardeba gazafxulze.

Semodgomaze winamorbedis aRebis Semdeg iwyeba niadagis damuSaveba sufTa aneulad, sruldeba zonisaTvis tradiciuli mzralad xvna.

gazafxulze Savi aneulis damuSaveba iwyeba dafarcxviT msubuq niadagebze an zedapiruli kultivaciiT (5-6 sm) mZime niadagebze.

gvalvian zonaSi sufTa aneuli saSemodgomo TavTavianebis maRali da garantirebuli mosavlis miRebis ZiriTadi pirobaa. sufTa aneulis ZiriTadi amocanaa tenis dagroveba, sarevelebis ganadgureba da niadagis sakvebis reJimis gaumjobeseba organuli nivTierebis mineralizaciis xarjze. gvalvian pirobebSi ufro efeqturia Savi aneuli, radgan tenis ZiriTadi raodenoba modis Semodgomaze da adre gazafxulze.

Savi aneulis damuSaveba iwyeba nawveralis aCeCviT winamorbedi kulturis aRebisTanave 5-7 sm siRrmeze, oqtombris bolosa da noembris dasawyisSi tardeba Rrma xvna.

gazafxulze tardeba adreuli farcxva an kultivacia dafarcxviT, xolo 5-6 dRis Semdeg Rrma gafxviereba an kultivacia 14-16 sm-ze. zafxulis ganmavlobaSi Savi aneuli unda damuSavds 3-4jer mainc.

leqcia 13

Tesli da Tesva. Teslis xarisxi, Tesvis vadebi, Tesvis norma. Teslis CaTesvis siRrme. mobneviTi Tesva. mwkrivebad Tesva. Teslbrunva, misi SemoReba da aTviseba, TeslbrunvaSi ZiriTad kulturaTa winamorbedi. Sualeduri kulturebi TeslbrunvaSi, Teslbrunvis klasifikacia

Tesli mcenaris biologiuri da sameurneo Tvisebebis matarebeli organizmia. amitom maT xarisxze mniSvnelovanwilad damokidebulia miRebuli mosavlis sidide da xarisxi.

memcenareobaSi Teslad iwodeba mcenaris sxvadasxva nawili, romelic gamoiyeneba dasaTesad: sakuTris Tesli (marcvlovani da parkosani mcenareebi), nayofebi an maTi nawilebi (mzesumzira), tuberebi (kartofili).

arCeven Teslis jiSur, TesviT da mosavlianobiT Tvisebebs. jiSur TvisebebSi igulisxmeba maTi kuTvnileba garkveul jiSTan, jiSuri siwminde, reproduqcia. TviTdamamtverianebel marcvleul da samarcvle parkosnebSi pirvel kategorias ekuTvnian jiSebi, romlebsac aqvT jiSuri siwminde 99,5. meores-98, da mesames 95 %.

saseleqcio da sameTesleo samuSaoebi Seicavs Semdeg etapebs: seleqcia, e.i. axali maRalproduqtiuli kargi Tvisebebi mqone jiSebis gamoyvana, saxelmwifo jiSTa gamocda da jiSebis daraioneba, Teslis kontroli.

sawarmoo pirobebSi sasoflo-sameurneo kulturebis maRali mosavlis miReba SesaZlebelia mxolod daraionebuli, yvelaze ufro Zvirfasi jiSebisa da hibridebis TesviT. droTa ganmavlobaSi jiSebi da hibridebi uaresdeba maTi meqanikuri an biologiuri dasarevelianebisSedegad, agroteqnikis dabali doniT. amitom Zveli jiSebi da hibridebi saxelmwifo jiSTa gamocdis Sedegebis safuZvelze ixsnebian daraionebidan da meurneobaSi xorcieldeba jiSTa cvla.

Tesli da Tesva. Teslis xarisxi. Teslis TesviTi xarisxis maCvenebels ekuTvnian: siwminde, aRmoceneba, gaRivebis energia, 1000 marcvlis masa. marcvlis natura, tenianoba, sijansaRe. maT sazRvraven Teslis partiidan aRebuli saSualo nimuSis analiziT, saxelmwifo standartiT dadgenili wesebis zusti dacviT.

Teslis siwminde. mocemuli kulturis sufTa Teslebis masas gamoxatuls procentebSi, saerTo wonis mimarT, Teslis siwminde ewodeba. Tu siwmindis procenti dabalia, vidre saxelmwifo standartiT aris dadgenili, Teslis daTesva nebadarTuli ar aris da eqvemdebareba xxelaxal gawmenda. dasaTesad ar daiSveba is partiebi sadac aRmocndeba sakarantino sarevelebi.

Teslis simsxo. biologiuri araerTgvarovnebis gamo, agreTve garemo pirobebis, agroteqnikaze damokidebulebiT, erTi da imave kulturis Teslis simsxo SeiZleba gansxvavebuli iyos. rac ufro msxvilia Tesli miT ufro sicocxlsunarian mcenareebs iZlevian. mocemuli maCenebeli xasiaTdeba 1000 marcvlis woniT gramebSi. (mag. xorbalSi aris 25-30 g).

Teslis tenianoba. umetesi mcenareebis Teslis normaluri tenianoba tolia14-18%-is.ufro maRali tenianobis SemTxvevaSi maT SeiZleba dakargon aRmocenebis unari, amitom saWiroa damatebiT gamoSroba.

Teslis aRmocenebaSi igulisxmeba normalurad gaRivebuli Teslebis raodenoba, saanalizod aRebul nimuSSi, gamoxatuli procentobiT. Teslis laboratoriuli aRmoceneba isazRvreba gaRivebis optimaluri pirobebSi7-10 dRis ganmavlobaSi. sasurvelia rom Teslis aRmonaceni uaxlovdebodes 100%-s. vinaidancudi aRmocenebis dros mcenareebi dabali sicocxlisunarianobiT gamoiCevian, rac sabolo jamSi gavlenas axdens mosavlis xarisxze.

intensiur teqnologiaSi ganskuTrebiT didia jiSis roli. es kanonzomieri movlenaa, vinaidan mocemul SemTxvevaSi yvela procesi mimarTulia iqiTken, rom rac SeiZleba srulad gaixsnas jiSis genetikuri SesaZlebloba: bartyoba, Cawolisadmi avadmyofobebisadmi gamZleoba, momwfebis dro da sxv. jiSi aris erTi kulturis sameurneo biologiuri da morfologiuri TaviseburebebiT msgavsi mcenareTa erTobloba, romelTac naTesauri warmoSoba axasiaTebT da gadarCeuli da gamravlebulni arian garkveul sawarmoo pirobebSi mosayvanad, mosavlis gadidebis da produqciis xarisxis amaRlebis mizniT.

Tesvis win niadagis damuSavebis ZiriTadi daniSnulebaa, rac SeiZleba xelsayreli pirobebi Seiqmnas Tesvis, kulturuli mcenareebis Teslis daubrkolebeli aRmocenebisa da Semdgomi zrda-ganviTarebisaTvis.

niadagis SemodgomiT srul sRrmeze moxvniT da fxvier mdgomareobaSi datovebis erT-erTi mTavari amocanaa rac SeiZleba meti raodenobiT SeiTvisos niadagma teni Semodgoma-zamTris ganmavlobaSi. cnobilia, rom xnuli droTa ganmavlobaSi “jdeba”, mkvrivdeba, razedac garkveul gavlenas axdens Semodgoma-zamTris naleqebi. mZime meqanikuri Sedgenilobis ustruqturo niadagebi izepeba da SeSrobis Semdeg ikeTebs qerqs. es ki xels uwyobs niadagis zedapiridan tenis swraf aorTqlebas, amdenad iqmneba araxelsayreli wylisa da haeris reJimi, rac abrkolebs mikroorganizmTa cxovelmyofelobas.

rogorc vxedavT, sazrunavia niadagSi arsebuli tenis maragis dacva aorTqlebisgan, risTvisac saWiroa niadagis gafxviereba Catardes umal zamTris gasvlis Semdeg.

amdenad, niadagis Tesviswina damuSavebis sistemis winaSe dgas Semdegi amocanebi:1. gaiwmindos mindori sarevelebisagan da aRikveTos maTi gamoCena kulturuli Tesvis Semdeg, 2. Seqmnas niadagis fxvieri fena Teslis dasaTesad; 3. moasworos nakveTis zedapiri, Teslis Tanabar siRrmeze CaTesvisa, niadagis tenis Semcirebisa da mosavlis aRebis pirobebis gaumjobesebisaTvis; 4. uzrunvelyos sasuqebis Tanabar siRrmeze moTavseba niadagSi.

sagazafxulo Tesviswina damuSavebis pirveli xerxia xnulis mosworeba da niadagis Txeli fxvieri fenis Seqmna, romelic mulCis daniSnulebas asrulebs da qveda fenebidan tens aorTqlebisagan icavs. am xerxs uwodeben “tenis daxurvas”, es RonisZieba rac SeiZleba adre xnulis zedafenis fizikuri simwifis dadgomisTanave tardeba. ufro adre Catareba araa xelsayreli, radgan zedmetad teniani niadagi ar fxvierdeba, izileba da mkvrivi qerqi ekvreba. arc dagvianebaa dasaSvebi, radganac igi xels uwyobs niadagis gamoSrobas.

SemodgomiT damuSavebul mindvrebze “tenis daxurva” unda Catardes mindorSi gasvlis SesaZleblobis pirvel or dReSi.

fxvier, struqturul, agreTve qviSnar niadagebze tenis daxurvisaTvis iyeneben Sleifebsa da msubuq farcxebs. ufro mZime dawidul niadagebze ki ixmareba mZime kbilebiani farcxebi, nakveTi ifarcxeba diagonalze an Catarebuli xvnis mimarTulebis sawinaaRmdegod.

mzralze iTeseba sagazafxulo kulturebi, roelnic Tesvis vadis mixedviT iyofian or jgufad: adreul sagazafxulo da sagviano sagazafxulo kulturebad. maTTvis niadagis Tesviswina damuSavebac gansxvavebul xasiaTs atarebs. adreul sagazafxulo kulturebs miekuTvneba sagazafxulo TavTaviani kulturebi, sakvebi balaxebi, xolo sagviano sagazafxulos-simindi, Warxali, bostneuli, baRCeuli.

mas Semdeg, rac niadagi momzaddeba, SeirCeva saTesle masala, kultura unda davTesoT misTvis dawesebul vadaSi. Tavis droze da sworad SerCeul Tesvas udidesi mniSvneloba aqvs. droulad da sworad daTesili Tesli Tanabrad, srulad da male amodis, mcenare swrafad izrdeba. amas udidesi mniSvneloba aqvs, aseTi naTesi adre Semodis, uamindobas ascdeba, Tanabari da Cqari mozardi yana sarevelebsac ar uSindeba.

uxvi mosavlis miReba SeiZleba agroRonisZiebaTa kompleqsis gamoyenebiT, rodesac mocemul niadagur-klimaturi pirobebis Sesferisad miwis garkveul farTobze mcnareTa saTanado ricxvi iqneba.

Tesvis dros saWiroa Sesaferis sakvebi farTobi, anu kvebis are. yvela kulturas gansxvavebuli kvebis are aqvs. mag. pureulisaTvis 25 sm2, saToxni kulturebisTvis 0,64 m2 da metic. Tesva unda warmoebdes Tanabar siRrmeze.Rrmad CaTesili Tesli ver aswrebs aRmocenebas, zogi ki Cauflavi rCeba da iRupeba an SeiZleba frinvelma akenkos.

Tesvis siRrmec gansxvavebulia, ramdenadac Tesli wvrilia, imdenad is zedapirulad iTeseba, msxvili Tesli SedarebiT Rrmad unda daiTesos.

Tesvis mravali wesi arsebobs. ZiriTadad wesebi SeiZleba daiyos or jgufad: mobneviTi da mwkrivSi Tesva. mobneviTi Tesva uxsovari droidan aris cnobili da aTaseuli wlebis gnmavlobaSi xeliT sruldeboda, Semdeg specialuri mobneviTi manqana iqna SemoRebuli, mobneviT Tesvis amaxasiaTebeli is aris, rom Tesli cotad Tu bevrad Tanbrad moifanteba nakveTze da da Semdeg xdeba misi Cafla ubralo farcxiT.mobneviT Tesva ver akmayofilebs agroteqnikur moTxovnebs da araracionaluria.

mwkrivad Tesvis dros specialuri mwkrivd mTesveli manqanebi ixmareba. misi upiratesoba is aris, rom Tesva misi sruli saxiT erT operaciad sruldeba. amdenad igi agroteqnikurad misaRebia.

mwkrivad Tesvis efeqtianoba bevrad aris damokidebuli imazeTu romel saTes manqanas gamoviyenebT, rogori CamTesebi aqvs mas da ra manZilzea isini erTimeorisagan dayenebuli. arCeven ankerul (saxnisian) da diskoebian saTes manqanebs. ankeruli saTesi manqanebiT ukeTes Sedegs aRweven, vinaidan aseT SemTxvevaSi Teslis CaTesva Tanabar siRrmeze xdeba. arsebobs sami tipis CamTesi: evropuli, amerikuli da kombinirebuli –rusuli. mwkrivad Tesvis Semdeg saxeebs arCeven:

1.mTliani an Cveulebrivi mwkrivad Tesva-mwkrivTaSoris manZili 14-15 sm, xolo TviT mwkrivSi 1,5-2 sm.

2.jvaredini Tesva – rogorc sityva gviCvenebs mwkrivebi gadajvaedinebuli mas gaumjobesebul mwkrivad Tesvasac uwodeben.

3. viwromwkrivad Tesva-mwkrivTaSoris manZili 6-8 sm, xolomwkrivSi marcvlebi 3-4 sm arian erTmaneTisagan daSorebuli

4. farTomwkrivad Tesva –mwkrivTaSoris manZili 25-30 sm ase iTeseba saToxni kulturebi

5.zoluri anu lentiseburi Tesva- warmoadgens mwkrivad Tesvisa da farTo mwkrivad Tesvis Sereul saxes.

6.budobrivi Tesva- igive mwkrivad Tesvaa, sadac mwkrivebi wyvetilia,xolo budnaSi erTi an ramdenime marcvalia CaTesili.

7. Wadrakuli (kvadratuli), igive budobrivi Tesvaa, oRond im gansxvavebiT, rom aq mwkrivTaSorisebSi miimarTeba rogorc gaswvriv, ise gardigardmod.

8. punqtirebuli Tesva-mwkrivSi Teslis Tanabari ganawilebiT.

9. kvlebSi Tesva-xdeba xelovnurad Seqmnil kvlebSi Tesva.

10. Txemebze (baZoebze) Tesva-xdeba xelovnurad SemaRlebul adgilze.

miuxedavad imisa, rom mwkrivad Tesva mobneviT TesvasTan SedarebiT bevri upiratesoba aqvs, mainc mas erTi didi uaryofiTi mxare aqvs. es imaSi gamoixateba, rom mcenaris kvebis are warmoadgens wagrZelebul oTxkuTxeds, aseT pirobebSi Cayenebuli armoacenebi mwkrivSi metad aviwroeben erTmaneTs m dros, rodesac mwkrivtaSorisebSi didi gamouyenebeli adgili rCeba. cxadia rom mcenareebs arc normaluri ganaTeba aqvT yvela amis gamo mcenaris fesvebi da miwiszeda nawilebi araanabrad viTardeba. swored am uaryofiTi sakiTxis gamosworeba scades rodesac SemoiRes e.w. jvaredini Tesva. farTobze dasaTesi norma Suaze iyofa, Cveulebriv saTesi manqaniT naxevars Tesaven gaswvriv, meore naxevars ki gardigardmod anu jvaredinad. am SemTxvevaSi mcenareTa kvebis da ganaTebis pirobebi ukeTesi iqneba,mcenare ufro kargad ganviTardeba da mosavalic maRali miiReba.

 Tesvis norma, Tesvis vadebi. Tesvis norma Teslis is woniTi raodenobaa, romelic saWiroa erTi heqtari farTobis dasaTesad.

Tesvis normis dadgenis dros mravali piroba unda iqnes mxedvelobaSi mirebuli, saTesi masalis Rirseba, Tesvis wesi, mcenaris zrda-ganviTarebis pirobebi da sxva. saerTod cnobilia, rom Tu mcenaris zrda-ganviTarebis pirobebs gavaumjobesebT Tesvis norma Sesabamisad unda Semcirdes. Tu dasaTes mindorze wylis nakeboba igrZnoba maSin Tesvis norma unda Semcirdes. amitom erTi da igive kulturisaTvis sarwyav miwebze Tesvis norma metia, vidre urwyavze.

Tesvis norma icvleba Tesvis wesis mixedviTac. magaliTad, viwromwkrivad da jvaredini Tesvis dros Tesvis norma 15-20 %-iT unda gadiddes. farTomwkrivad Tesvis dros ki piriqiT Tesvis norma 30-40 % mcirdeba. Tesvis normaze gavlenas axdens Tesvis vadac.

Tesvis normaze gavlenas axdens Teslis sasoflo-sameurneo vargisianoba, absoluturi wona. Tesvis normas angariSoben Semdegnairad, miRebuli Tesvis normas (vTqvaT 170 kg) amravleben absolutur sasoflo- sameurneo vargisianobaze (100%) da yofen faqtiur vargisianobaze vTqvaT es vargisianoba udris 95% aRmoCndeba, rom Cvens SemTxvevaSi unda davTesoT ara 170 kg, aramed

$\frac{170.100}{95}$ $=$178,95 kg

Teslis absolutur wonas yuradReba miaqcies soflis meurneobis muSakebma da karg Sedegebic miiRes. gamoirkva, rom Teslis absoluturi wonis gadidebasTan erTad Sesabamisad unda gadiddes Tesvis normac cxadia 1000 wvrili marcvlis wona naklebi iqneba 1000 msxvili marcvlis wonaze.

Tesvis vadebs agroteqnikur kompleqsSi metad didi mniSvneloba aqvs. droulad da wesierad daTesili Tesli Tanabrad, srulad da male amodis. mcenare xSir izrdeba da kargad viTardeba.

saSemodgomo kulturebis Tesvis vadebi. saSemodgomo TavTaviani pureulis Tesva SemodgomiT warmoebs, rogorc adreuli ise dagvianebuli Tesva sazianoa, radgan daTesili bartyobas veRar aswrebs, zamTars moumzadebeli xvdeba da mosalodnelia naTesis didi nawilis daRupva. adreuli ki piriqiT swrafad viTardeba, xangrZlivi Tbili Semodgomis pirobebSi SeiZleba muxlSic Sevides, Tovlis qveS moeqces da yana mTlianad daiRupos.

aRmosavleT saqarTvelos dablobSi saSemodgomo pureulis masobrivi Tesvis periodi saerTod oqtombris Tvea. dasavleT saqarTvelos saSemodgomo TavTaviani kulturebis Tesvis saukeTeso vadad iTvleba pirvelidan 20 noembramde periodi.

sagazafxulo kulturebis zafxulSi Tesva. mosavlis aRebis Semdeg CvenSi kidev didxans grZeldeba Tbili periodi, am xnis ganmavlobaSi SesaZlebelia zogierTi kulturis ganmeorebiT moyvana es e.w. sanawveralo kulturebia, romelTa gamoyeneba metad aqtualur sakiTxs warmoadgens saerTo mosavlis gadidebis saqmeSi.

sanawveralo kulturebis Tesva aRmosavleT saqarTveloSi SesaZlebelia sarwyav raionebSi da alaznis gaRma mxareSi, dasavleT saqarTveloSi ki TiTqmis yvelgan mosaxerxebelia(mTiani adgilebis garda).

Teslbrunva, misi SemoReba da aTviseba. sasoflo- sameurneo kulturebis morigeobas drosa da sivrceSi Teslbrunva ewodeba. misi ZiriTad amocanaa niadagis nayofierebis gadideba, kvebis elementebis racionaluri gamoyeneba, mosavlis gazrda da memcenareobis produqciis xarisxis amaRleba, mindvrebis dasarevelianebis, mcenareebis mavneblebiTa da davadebebiT dazianebis Semcireba, qarismieri da wylismieri eroziis uaryofiTi gavlenis Tavidan acileba.

Cveulebriv Teslbunvis TviTeul mindorze iTeseba TiTo kultura, rac kidev ufro amartivebs agroteqnikuri RonisZiebebis Catarebas. zogjer erT mindorze iTeseba ori garemo piorbebisadmi erTnairi moTxovnilebis da agroteqnikiT msgavsi kultura. aseT mindors sadac iTesebaori an meti kultura Sedgenils uwodeben.

sasoflo-sameurneo kulturebisa da aneulebis droSi morigeobiT CamonaTvals Teslbrunvis sqemas uwodeben. Tu erTi da igive kultura iTeseba erTsa da imave mindorzemravajeradi ganmeorebiT mas monokultura ewodeba.

ramdenadac mecnierulad damtkicebulia erTi da igive kulturis zedized Tesvis uaryofiTi Sedegi, Teslbrunvis aucilebel moTxovnas warmoadgens maTi morigeoba. periods, romlis ganmavlobaSi kulturebi da aneulebi gaivlian morigeobas yovel mindorze Teslbrunvis sqemiT gaTvaliswinebuli TanmimdevrobiT, Teslbrunvis rotacia ewodeba.

akad. d. pianiSnikovma gamoyo oTxi umTavresi mizezi, rac iwvevs sasoflo sameurneo kulturebis mosavlis amaRlebas maTi TeslbrunvaSi swori morigeobis dros: qimiuri, fizikuri, biologiuri da ekonomikuri.

qimiuri mizezebi. sxvadasxva mcenare vegetaciiis periodSi sxvadasxva odenobis sakveb nivTierebebs moiTxovs, marcvlovnebs magaliTad meti azoti da fosfori esaWiroebaT, sxvebs mag. kartofils, Saqris Warxals meti odenobiT kaliumi.

marcvleuli kulturebis morigeoba saToxnebTan da parkosnebTan gamoricxavs niadagis calxmriv gaRaribebas sakvebi nivTierebebiT, normaluri mosavlis dros erTwliani parkosani kulturebi (lobio, barda, cercvela) niadagSi agroveben 50-70 kg/ha-ze azots, xolo mravalwliani parkosani balaxebi (ionja, samyura, esparceti ) 120-150 kg/ha da mets.

mcenareebi sakvebi nivTierebebis SeTvisebis sxvadasxva unarianobiT xasiaTdebian. am unarianobas isini avlenen fesvebis masis sididiT da sakvebi nivTierebebis advilad da Znelad xsnad SenaerTebTan damokidebulebiT.

TeslbrunvaSi kulturaTa morigeoba saSualebas iZleva aramarto Tavidan aviciloT niadagis calmxrivi gaRaribeba, aramed efeqtianad gamoviyenoT kvebis elementebis maragi.

fizikuri mizezebi. TeslbrunvaSi kulturaTa swori morigeoba dadebiTad moqmedebs niadagis struqturaze, saxnavi fenis sifxviereze, mis haerovan da wylis reJimze, niadagis simtkiceze. gansakuTrebuli mniSvneloba aqvs mravalwlian balaxebs. mzesumzira, Saqris Warxali sudanis balaxi Zlierad aSroben niadags, maT Semdeg ar SeiZleba daiTesos wylisadmi gadidebuli moTxovnis mqone kulturebi.

biologiuri mizezebi. kulturaTa morigeoba sxvadasxvanairad moqmedebs sarevelebis, mavneblebisa da davadebebis ganviTarebaze. amitom morigeobis dawesebiT SesaZlebelia mizanmimarTulad daigegmos maTTan brZolis strategia. farTofoTliani, maRalReroiani kulturebi Crdilavs ra niadags, Zlier Trgunavs sarevelebs. sarevelebTan brZola advilia Tu sworad aris dagegmili saSemodgomo da sagazafxulo kulturebis morigeoba, marcvleulisa-saToxnebTan an samarcvle parkosnebTan. yvelaze srulad sarevelebi nagurdeba sufTa aneulebze.

kulturaTa ganmeorebiT an erTi da igive nakveTze zedized Tesvisas xelasyreli pirobebi iqmneba mavneblebisa da davadebebis gavrcelebisTvis. mag. saSemodgomo xorblis zedized Tesvisas swrafi gavrcelebis pirobebi eqmneba puris bzuilas, xorblis mxerxavas, Svedur buzs da a.S.

ekonomikuri mizezebi. kulturaTa moigeoba mizanSewonilia Sromisa da teqnikuri saSualebebis racionaluri gamoyenebisaTvis. amastan maTSi unda iyos sxvadasxva vadaSi dasaTesi da asaRebi kulturebi. es uzrunvelyofs mindvris samuSaoebis optimalur vadaSi da maRali xarisxiT Catarebas, minimaluri danaxarjebiT maqsimaluri da stabiluri mosavlis miRebas.

Teslbrunvis SemoReba aris Teslbrunvis damuSavebuli proeqtis teritoriaze naturaSi gadatana. Semdeg atareben samiwaTmowyobo samuSaoebs: yofen Teslbrunvebs da mindvrebs naturaSi.

mindvrebi SesaZleblobis mixdviT unda iyos sworkuTxedi, kulturebi gaadgilebuli unda iyos gabatonebuli qarebis perpendikularulad. sasurvelia mindvrebis sazRvrebis damTxveva bunebriv sazRvrebTan (gza, mdinare ).

Teslbrunvis TviTeul mindorze Tesaven erT kulturas, rac gvaZlevs saSualebas gamoyenebuli iqnes teqnika, sasoflo-sameurneo kulturebis moyvanis intensiuri teqnologia.

swor Teslbrunvaze gadasvlis dros asruleben Semdeg moTxovnebs: iReben yvela kulturis gegmiur mosavals, racionalurad iyeneben miwas, kulturebs ganalageben ukeTes winamorbedze da qmnian xelSemwyob pirobebs, mecxoveleobisaTvis iReben dagegmili raodenobis maRalxarisxovan sakvebs, awyoben Sromis swor organizacias.

swori Teslbrunvebi SesaZleblobas iZleva ufro racionalurad gamoviyenoT niadagis kvebis elementebi da sasuqebi, gaadvildes sarevelebTan, mavneblebTan da davadebebTan brZola. ufro produqtiulad daixarjos niadagis tenis maragi, Tanabrad ganawildes yvela mindvris samuSao, mwarmoeblurad iqnes gamoyenebuli teqnika, efeqturad dainergos warmoebaSi mecnierebis miRwevebi. Teslbrunvis mindvris istoriis wigni umniSvnelovanesi dokumentia, romelSiv asaxula TiToeuli mindvris istoria da miwaTmoqmedebis kulturis arsebuli done. msSi yvela Canaweri keTdeba pirveladi Canawerebis safuZvelze. mindvris istoriis wigni srulyofili matianea imisa Tu mocemul mindorze ra samuSaoebi, rogor da rodis aris Catarebuli, rogori Sedegebia miRebuli, maTgan Tavisuflad SeiZleba ganisazRvros Catarebuli agroteqnikuri da sxva RonisZiebebis ekonomikuri efeqtianoba.

TeslbrunvaSi ZiriTad kulturaTa winamorbedi. sasoflo-sameurneo kulturas an aneuls romelsac ukaviaT mocemuli mindori wina wels, winamorbedi ewodebaT, aneuli ki garkveuli periodis manZilze sasoflo-sameurneo kulturis moyvanisagan Tavisufal mindors.

aneulebi da sasoflo-sameurneo kulturebi, maTi moyvanis wesebi mniSvnelovan gavlenas axdenen niadagis Tvisebebze, rac arsebiTad aisaxeba momdevno kulturaTa mosavalze. am gavlenis xarisxis mixedviT yvela winamorbeds yofen saukeTesod, kargad, damakmayofileblad da aerTianeben Semdeg jgufebSi: 1. sufTa da dakavebuli aneuli, 2. mravalwliani balaxebi, 3. samarcvle parkosnebi, 4. saToxni, 5. teqnikuri arasaToxni, 6. saSemodgomo marcvlovnebi, 7. sagazafxulo marcvlovnebi, 8. erTwliani balaxebi.

 sufTa aneuli miekuTvneba Savi, adreuli da kulisuri aneulebi. sufTa aneuls uwodeben savegetacio periodSi sasoflo sameurneo kulturebis moyvanisagan Tavisufal mindors. igi uzrunvelyofs wylisa da sakvebi nivTierebebis dagrovebas, ukeTes fitosanitarul pirobebs Semdegi mosayvani kulturisaTvis.

Savi aneuli aris sufTa aneuli, romlis damuSaveba iwyeba wina wels winamorbedi kulturis mosavlis aRebisTanave, wylis dakavebisa da sakvebi nivTierebebis mobilizaciis, agreTve sarevelebis winaaRmdeg brZolis TvalsazrisiT, gvalviani miwaTmoqmedebis pirobebSi.

saqarTvelos mciremiwianobis da mTagorianobis gaTvaliswinebiT Sav aneuls ZiriTadad ar iyeneben. vinaidan ferdobebis mcenareuli safaris gareSe datoveba da maTze mxolod meqanikuri samuSaoTa ganxorcieleba eroziuli procesebis gaZlierebas gamoiwvevs. amdenad Savi aneulebis praqtikaSi gamoyenebis sakiTxi iSviaTi gamonaklisebis garda TiTqmis ar xdeba.

adreuli aneuli-igive sufTa aneulia, romlis damuSaveba iwyeba ara wina wlis Semodgomaze aramed adre gazafxulze.

kulisuri aneuli-aseve sufTa aneulia, romelzedac Tesaven maRalReroian mcenareebs zolebis saxiT, misi amocanaa Tovlis dagroveba da saSemodgomo pureulis dacva araxelsayreli eroziuli procesebisgan.

arCeven agreTve mTlianad moTesil, saToxn da sideralur aneulebs. mTlianad moTesilia, rodesac aneulSi damkavebel kulturas iyeneben mTlianad mosaTes mcenareebs (marcvleuls, parkosnebs, erTwlian da mravalwlian balaxebs, cercvelas, barda-Svriis narevs). saToxn damkavebel aneulSi damkavebel kulturas (kartofili, simindi sasilosed) Tesaven 60-70 sm mwkrivTSorisebiT da mTeli vegetaciis periodSi atareben mwkrivTSorisebis movlas. sideraluri ewodeba, rodesac mindori dakavebulia mcenareebiT da isini gansazRvrulia niadagSi Casaxnavad mwvane sasuqis saxiT. ZiriTad sasiderato kulturas warmoadgens xanWkola, am mizniT iyeneben agreTve ZiZos.

mravalwliani parkosani balaxebi samyura, ionja, esparceti da maTi narevebi marcvlovnebTan niadags amdidreben azotiT da organuli nivTierebebiT, aumjobeseben mis struqturas. amitom tenian raionebSi da sarwyavebSi isini saukeTeso winamorbedebia saSemodgomo xorblisa, fetvis da brinjisaTvis.

saToxni kulturebi. Warxali, simindi, kartofili da mzesumzira wmenden niadags sarevelebisagan, amaRleben niadagis mikobiologiur aqtiurobas. maTgan gansakuTrebiT gamoirCeva sasilose simindi.

samarcvle parkosan kulturebi saukeTeso winamorbedia yvela sazafxulo sa saSemodgomo kulturebisTvis. saSemodgomo xorblisaTvis gansakuTrebiT karg winamorbedad iTvleba lobio da barda.

erTwliani sakvebi balaxebi. am saxis balaxebs aRebuls mwvane sakvebad, Tivad da silosad iyeneben uwinares yovlisa saSemodgomo kulturebis winamorbedad.

aneulisa da sxvadasxva kulturis Rirseba rogorc winamorbedisa, ZiriTadad damokidebulia bunebrivi zonis Taviseburebaze da TeslbrunvaSi ganxorcielebul agroteqnikaze. intensiuri miwaTmoqmedebis pirobebSi SesaZlebelia winamorbedis Rirsebis amaRleba mecnierulad dasabuTebul agroteqnikis pirobebSi.

Sualeduri kulturebi TeslbrunvaSi. Sualeduri kultura ewodeba im kulturas, romlebic moiyvaneba TeslbrunvaSi ZiriTadi naTesebisagan Tavisufal periodSi. maT ZiriTadad iyeneben cxovelebis sakvebad (mwvane sakvebi, senaJi, silosi, balaxis fqvili ).

Sualeduri naTesebi miwaTmoqmedebis intensifikaciis umniSvnelovanesi faqtoria. isini saSualebas iZlevian srulad iqnes gamoyenebuli miwa. adideben sakvebis warmoebas, aumjobeseben mis xarisxs. es kulturebi asruleben sanitarul rols sasoflo-sameurneo kulturebis sarevelebTan, davadebebTan da mavneblebTan brZolis saqmeSi. niadags amdidreben organuli nivTierebebiT, icaven niadags wylismieri da qarsmieri eroziisagan. aumjobeseben mis struqturas da xels uwyoben nayofierebis amaRlebas. sarwyav miwamoqmedebaSi isini amcireben niadagis damlaSebas,swrafad mozardi Sualeduri kulturebi uzrunvelyofen ra ReroTa xSir dgomas, arsebiTad Trgunaven sarevelebs.

yvela Sualeduri kultura movla-moyvanisa da vadis mixedviT iyofa: saSemodgomo, sanawveralo, saganaTibo da SesaTes kulturebad.

saSemodgomo Sualeduri kultura iTeseba zafxulis bolos da aiReba gazafxulze. maTi aRebis Semdeg ki iTeseba Teslbrunvis ZiriTadi kultura. aseT kulturebad mohyavT saSemodgomo Wvavi, saSemodgomo xorbali, tritikale, saSemodgomo qeri, mozamTre Svria, cercvela saSemodgomo rafsi, isini gvaZleven yvelaze adreul mwvane masas da arsebiTad avseben sakvebis deficits am vadaSi.

sanawveralo kulturad iwodeba ZiriTadi kulturis aRebis Semdeg naTesi kulturebi zafxul-Semodgomis darCenili savegetacio periodis gamosayeneblad. maTTvis saWiroa 65-70 uyinvo dRe. aqtiur temperaturaTa jami aranakleb 10000- isa. am mizniT yvelaze mosaxerxebelia simindis, mzesumziris, rafsis, erTwliani balaxebis Tesva.

saganaTibo kulturebi-ewodeba ZiriTadi kulturebis mwvane sakvebad, senaJad, silosad an Tivad aRebis Semdeg imave wels naTes kulturebs.

SesaTesi Sualeduri kulturebi iTeseba gazafxulze, ZiriTadi kulturebis safarqveS. am mizniT iyeneben sagazafxulo da saSemodgomo cercvelas, erTwlian koindars, bardas, xanWkolas, samyuras, esparcets da sxv.

Teslbrunvis klasifikacia. Cveni qveynis bunebriv-klimaturma pirobebma da kulturul mcenareTa mravalferovnebam ganapiroba miwaTmoqmedebSi Teslbrunvis SemoReba.

Tanamedrove klasifikaciiT gamoyofilia Teslbrunvis sami tipi: mindvris, sakvebi da specialuri. am dayofas safuZvlad udevs mocemul teslbrunvaSi warmoebuli ZiriTadi produqciis saxe.

mindvris Teslbrunvas miekuTvneba iseTi Teslbrunvebi, romlebic gaTvaliswinebulia marcvlisa da teqnikuri kulturebis sawarmoeblad. mindvris Teslbrunvebi specialzdebian kulturebis mcire jgufis moyvanaze, 1-2 damxmare kulturis gavalswinebiT. Teslbrunvebi Tavis mxriv iyofa saxeebad: marcvleul-aneuliani, marcvleul-aneulian-saToxni, marcvleul-balaxiani, marcvleul-saToxni, nayofcvliTi, balaxovan saToxni, sideraluri, niadagdacviTi Teslbrunvebi. mindvris Teslbrunvis klasifikaciis dros iTvaliswineben mindvris raodenobas da Teslbrunvis mimarTulebas. TviTeuli Teslbrunva Sedgeba rgolebisagan.

sakvebi Teslbruvebi aris iseTi Teslbrunvebi, romlebic gaTvaliswinebulia wvniani da uxeSi sakvebis sawarmoeblad. sakvebi Teslbrunvebi iyofa saTib-saZovrebis da fermispira Teslbrunvebad. saTib-saZovrebian TeslbrunvaSi Warbobs sxvadasxva mizniT gamosayenebeli mravalwliani balaxebi, xolo fermispiraSi-sasilose kulturebi, Zirxvenebi da balaxebi-mwvane msakvebad.

specialuri Teslbrunvebi gamoiyeneba arTi an ramdenime Zvirfasi kulturis mosayvanad, romlebic gansakuTrebiT nayofier niadagebs moiTxoven, magaliTad bostneuli kulturebi, Tambaqo da sxv.

meurneobaSi, rogorc wesi, racionalurad unda SeeTanawyos sxvadasxva tipis Teslbrunvebi (mindvris, sakvebi, specialuri), am SeTanawyobas miwaTmoqmedebaSi TeslbrunvaTa sistemas uwodeben.

leqcia 14.

niadagis erozia. eroziis saxeebi. niadagis erozia da sasoflo sameurneo kulturaTa mosavali. niadagis eroziasTan brZolis agronomiuli saSualebebi. niadagis wylismieri erozia da masTan brZola. qarismieri erozia da masTan brZolis RonisZiebebi.

niadagis erozia ewodeba misi zedapiruli yvelaze nayofieri fenisa da misi qveda qanebis daSlis process nadnobi da naleqebis wylebiT (wylismieri erozia) an qaris ZaliT (qarismieri erozia).

eroziis Sedegad daSlil niadagebs erodirebuls uwodeben. daSlili humusovani 2-3 sm fenis aRsadgenad saWiroa 300-1000 weliwadi. amitom, damuSavebaSi myofi miwebi mudmiv gaumjobesebasa da dacvas moiTxoven. winaaRmdeg SemTxvevaSi isini dakargaven nayofierebas.

eroziuli procesebi warmoiqmneba da mimdinareobs miwis araswori eqsploataciis, agroteqnikis Sablonuri gamoyenebis, nadnobi da naleqebis wylis araregulirebiT, tyis nargaobis daucvelobiT, mindorsacavi tyis zoleis sraswori gaadgilebiT. igi Slis sasoflo-sameurneo warmoebis umTavres saSualebas, ferdobi adgilebidan (20 da meti) nadnob da Camonaden wylebTan erTad yovelwliurad mindvrebis yoveli heqtaridan irecxeba 50-100 t-mde niadagi da 100-150 kg-mde sakvebi nivTierebebi. wylismier da qarismier eroziasTan sistematuri brZola umniSvnelovanesi saerTo saxalxo saqmea. am brZolis saerTo warmatebazea damokidebuli sasoflo-sameurneo savargulebis SenarCuneba da gaumjobeseba. niadagis nayofierebis amaRleba. mosavlianobisa da produqciis saerTo mosavlis zrda.

niadagis eroziis saxeebi. niadagis eroziis yvela formas yofen Semdeg saxeebad:

geologiuri erozia-igi vlindeba bunebriv pirobebSi da mimdinareobs Senelebulad. vidre yalibdeba TviT niadagis profili. misi procesebi bunebrivia, gardauvali, ganuwyveteli da nela mimdinareobs. niadagis dakargvis siswrafe yovelwliurad 0,4 t/ha-ze.

anTropogenuri erozia aris araracionaluri sameurneo saqmianobis Sedegi. igi mimdinareobs ufro intensiurad, vidre niadagwarmomqmneli procesi, cxadia, rom niadagis eroziis xangrZlivi zemoqmedebiT, romelic aRemateba aqtiurobiT geologiurs, niadaguri fenis simZlavre mcirdeba.

wylismieri erozia SeiniSneba yvelgan, sadac adgili aqvs wylis zedapirul moZraobas. gansakuTrebiT rTuli reliefis mqone ferdobebze, mas adgili aqvs rogoc dasavleT ise aRmosavleT saqarTveloSi da seriozul zians ayenebs bunebas da sasoflo sameurneo warmoebas. arCeven wylismieri eroziis Semdeg saxeebs: wveTovans, sibrtyiTs, xazovans (siRrmiTs) da irigaciuls.

 wveTovani, rogorc saxelwodeba gviCvenebs gamoixateba wveTebis zemoqmedebiT niadagze. wylismieri erozia iwyeba wvimis wveTebisagan. misi umravlesobis diametri 1-5 mm-mdea. wveTebis saboloo siCqare Sesabamisad 4,5-9 m/wm-s Seadgens. niadagis agregatebi iSleba wvimis wveTebis dartymis Sedegad. wveTovani eroziis Sedegad niadagis forebi ixSoba wvril-wvrili nawilakebiT, mcirdeba wylis gamtaroba, Zlierdeba zedapiruli dineba da niadagi Camoirecxeba.

sibrtyiTi erozia. niadagis eroziis es forma niadagis SedarebiT Tanabari Camorecxvis Sedegia, nadnobi da naleqebad mosuli wvimis wvrili nakadebi erTdeba wylis Txel fenad. eroziis es saxe yvelaze gavrceelebuli da veragi formaa. igi iwvevs niadagis didi raodenobiT dakargvas da amave dros TvalisaTvis yvelaze naklebad SesamCnevia. sbryiTi erozia axarisxebs niadagis nawilakebs, tovebs ra yvelaze msxvilebs adgilze, miaqvs gamtverianebuli wyalSi gajerebuli organuli humusovani nawili, romelTanac yvelaze metad aris dakavSirebuli niadagis nayofiereba.

xazovani (siRrmiTi) erozia. sibrtyiT eroziastan gansxvavebiT niadags Slis siRrmeze, am saxis erozias iwvevs nadnobi da naleqebis wylebi, romlebic meti daqanebis gamo Zlieri siswrafiT mieqanebian dablobisaken Slian da angreven ra niadagsa da dedaqans, jer warmoqmnian mcire naRarebs da Txrilebs, romlebic TandaTan diddebian da gadadian xevebSi. xevebis warmoqmnas xels uwyobs adgilis uswormasworo reliefi da zogierT adgilas Camorecxvadi niadagebis fizikuri Tvisebebi.

irigaciuli erozia. mimdinare wylebiT niadagebi irecxeba agreTve sarwyavi miwaTmoqmedebis pirobebSi. sarwyavwyals sistematurad gamoaqvs mindvridan niadagis nawilakebi, risTvisac mas irigaciuli uwodes. igi umetesad warmoiqmneb arakvalificiuri rwyvis (wylis unormod miSveba, araTanabari nakadi, umeTvalyureod datoveba da sxv.) Sedegad.

qarismieri erozia. am saxis erozias, ama Tu im masStabiT adgili aqvs yvela qveyanaSi. saqarTvelosi igi yvelaze metad aris gavrcelebuli veliani da gvalviani miwaTmoqmedebis zonaSi-gare kaxeTis zeganze. qarismier erozias yofen or saxed: mtvriani qariSxali da yoveldRiuri (adgilobrivi) erozia.

mtvriani qariSxali qarismieri eroziis yvelaze aqtiuri formaa, romlis dros (12-15 m/wm) niadagi iwyebs daSlas da deflacias. niadagis humusovan fenasTan erTad qars miaqvs kulturaTa da sarevelaTa Teslebi, areTve aRmonaceni. mtvrian qariSxals yvelaze meti zarali moaqvs maSin, roca niadagi Zlier aris gamomSrali da misi zedapiri mcenareulobiT ar aris dafaruli.

yoveldRiuri (adgilobrivi) erozia. garegnulad am saxis erozia vlindeba niadagis zedapirze niadagis nawilakebisagan mtvris mcire svetebis warmoqmnis saxiT. yoveldRiuri erozia, rogorc mtvriani qarSxali Slis niadags da Rupavs naTesebs, TumcaSedarebiT naklebi ZaliT. kulturuli mcenareebisaTvis yvelaze mavnebelia niadagis zedapiris daSla. niadagis wvrili koStebi da kenWebi gorviT moZraobas ganicdian da azianeben (Wrian ) mcenareebs.

mindvrebi, romelTa zedapiris aranakleb 50 % Sedgeba sxva minarevebis 1-2 mm da meti diametris mqone nawilakebisagan, ar eqvemdebareba erozias. 1mm-ze naklebi diametris mqone koStebi Zlieri qarebis zemoqmeebiT gorviT moZraobas ganicdis, niaagis zedapirze moZravi koStebi nawilobriv iSleba. eroziis ganviTarebaSi yvelaze saSiSia 0,5-1,0 mm diametris mqone nawilakebi. isini yvelaze metad Slian niadags, adgilidan adgilamde naxtomiseburad moZraoben. Slian ufro msxvil koStebs da azianeben naTesebs. Zlieri qarebis mier (15 m/wm meti siCqaris) gadaitanebian did manZilze. sxvadasxva winaaRmdegobebTan qmnian mtvris namqers, rac did zians ayenebs soflis meurneobas.

niadagis erozia da sasoflo sameurneo kulturaTa mosavali. iq sadac niadagi xSirad ganidis qaris zemoqmedebas kulturuli mcenareebi iRupebian fesvTa sistemis gaSiSvlebisagan. didi siCqariT moZravi nawilakebisagan motacebuli miwis nawis nawilakebis dagrovebis adgilebSi naTesebi imarxeba mtvriseburi namqerebis sqeli feniT.

erodirebuli niadagebis rukis Sedgenisas adgenen humusis Semcvelobas 0-50 sm siRrmis fenaSi. kordian ewerian niadagebSi 0-30 sm siRrmeze. humusis raodenoba erodirebul miwebze araerodirebulTan SedarebiT gamoyenebulia sadiagnostiko maCveneblad Camorecxvis ama Tu im xarisxis dasadgenad. Tu humusis Semcveloba Semcirebulia 10-20%-iT, maSin niadagebs akuTvneben sustad Camorecxilebs, 20-50%-iT saSualod Camorecxilebs, xolo 50 %-ze metad Semcirebuls Zlier Camorecxilebs.

am jgufebis gamoyeneba SeiZleba nakelisa da azotis Setanis minimaluri dozebis gansazRvrisas sxvadasxva xarisxiT erodirebuli niadagebisaTvis. amis mixedviT unda gaizardos Sesatani sasuqis doza.

erodirebaze yvelaze metad reagirebs Saqris Warxali, mzesumzira, saSemodgomo xorbali, simindi da sxvebi. yvelze naklebad Svria, saSemodgomo Wvavi da mravalwliani balaxi. erodirebulobis xarisxis Sesabamisad mcirdeba kulturul mcenareTa mosavali.

niadagis eroziasTan brZolis agronomiuli saSualebebi. organizaciul-sameurneo ronisZiebebi. wylismier da qarismier eroziaTan brZola, rogorc wesi unda warmoebdes niadagdamcavi miwaTmoqmedebis gamoyenebiT. amisaTvis saWiroa am moTxovnebis gaTvalswineba Siga sameurneo miwaTmowyobis proeqtebSi. teritoriis eroziis sawinaaRmdego organizacia mdgomareobs im organizaciul-sameurneo kompleqsis, agronomiul, agrosatyeo-samelioracio RonisZiebebis gatarebaSi, romlebic xels uSlian wylisa da qarisagan niadagis daSlas.

maRal niadagdamcav da ekonomikur efeqts uzrunvelyofs: mecnierulad dasabuTebuli Teslbrunvebi, niadagis damuSavebis, Tesvisa da naTesis movlis racionaluri wesebi, sasuqebis Setana, balaxebis Tesva, tyis zolebis gaSeneba, wylisa da qarisadmi winaaRmdegobebis Seqmna (nawveralis datoveba, kulisebisa da mravalwliani nargavebis gaSeneba, Tovlis dnobis regulireba, sideratebisa da Sualeduri kulturebis Tesva, mZlavrad ganviTarebuli fesvTa sistemis kulurebis moyvana). amitom eroziis sawinaaRmdego Teslbrunvis daproeqtebisas, upirveles yovlisa mxedvelobaSi iReben sxvadasxva kulturis niadagdamcav unarianobas.

swori da mcire daxrilobis ferdobebze, sadac TiTqmis gamoricxulia eroziis warmoqmnis SesaZlebloba, mzanSewonilia SemoRebuli iqnas mindvirs, specialuri da fermispira Teslbrunvbi, maTi saToxni kulturebiT maqsimaluri datvirTviT, xolo cicabo ferdobebze da ufro erodirebul miwebze-mTlianad moTesili kulturebi iqnes gamoyenebuli.

eroziasTan brZolaSi udidesi mniSvneloba aqvs agrTve niadagis eroziis sawinaaRmdego damuSavebasac. daqanebis xarisxis, erodirebulobis donis da sxva pirobebis mixedviT. iyeneben daqanebis perpendikularul xvnas, niadagis kulturul xvnas, Rrma ufrTo xvnas nawveralis niadagis zedapirze SenarCunebiT,xvnas niadagis gaRrmavebiT,xvnas bazoebis SeqmniT xvnas daRarviT, kombinirebul da dsafexurian xvnas, dabudnebas, danapralebas, daRruebas da sxv.

mraval qveyanaSi eroziasTan sabrZolvelad warmatebiT iyeneben zolur miwaTmoqmedebas.

niadagis wylismieri erozia da masTan brZola. Tovlis nadnobi da atmosferuli naleqebis Camonadeni wylebi iwveven niadagebis Camorecxvas, ris Sedegad warmoiqmneba Rartafebi, xevebi. iSleba uZvirfasesi sasoflo-sameurneo savargulebi, mkveTrad mcirdeba maTi nayofiereba, diddeba teritoriis danawevreba. Camorecxvis dros mcirdeba humusovani horizonti, uaresdeba niadagis fizikuri da qimiuri Tvisebebi, gansakuTrebiT wyalgamtaroba da wyaltevadoba, uaresdeba haerovan-wylieri da sakvebi reJimebi. erodirebul miwebze mniSvnelovnad mcirdeba kulturaTa mosavlianoba.

ZiriTadi bunebrivi faqtorebi, romelzedac damokidebulia erozia aris klimati, reliefi, eqspozicia, da niadagis tipi. rac ufro metad aris niadagi dafaruli mcenareebiT miT naklebia niadagis Camorecxva.

wylismieri eroziis winaarmdeg sabrZolvelad iyeneben niadagis damuSavebis diferenciul sistemas, konkretuli pirobebis-mosuli naleqebis, niadagis tipis granulirebuli Sedgenilobas mindvris reliefis da mcenareuli safaris gaTvalswinebiT.

wylismieri eroziis adgilebSi Teslbrunvebis mindvrebs aTavseben ise, rom TiToeuli maTganis grZeli mxare mdebareobdes daqanebis gardigardmod, rac saSualebas iZleva Semcirdes niadagis Camorecxva.

agroteqnikuri RoniZiebebi

eroziis sawinaaRmdego RonisZiebebSi agroteqnikur RonisZiebebs gansakuTrebuli mniSvneloba eZleva, radgan isini yvelaze ufro xelmisawvdomia da tardeba sxva sasoflo-sameurneo samuSaoebTan erTad. amasTan atareben sistematiur xasiaTs.

niadagis damuSaveba. niadagis eroziis sawinaaRmdego damuSavebis dros gansakuTebuli mniSvneloba eZleva konkretul adgilobriv pirobebs.

moxvna. es agroteqnikuri RoniZieba taredeba swor ferdobebze 1,5-2,00 daqanebiT, mkacrad daqanebis perpendikularuli mimarTulebiT-25-27 sm siRrmeze.

konturuli xvna. bunebaSi xsirad gvxvdeba sxvadasxva mxares daxrili ferdobebi. isini praqtikulad ar SeiZleba moixnas mkacrad daqanebis mimarTulebiT. am mouxerxeblobis aRsakveTad iyeneben e.w. konturul xvnas.

niadagis zoluri gafxviereba. wylismieri eroziis ZiriTadi mizezi wylis balansis darRvevaa mosul atmosferul naleqebsa da niadagis mier STanTqmul raodenobas Soris. yvlaze meti Camonadeni iq aris, sadac niadagis wyalamtaroba ferdobze minimaluria.

20-mdedaqanebis ferdobebze kokispiruli wvimebis Camonadenis dasakaveblad erTi Rrma xvna sakmarisi ar aris. am SemTxvevaSi damatebiT qmnian wylis dasakavebel mikroreliefs. Txemebiani, safexurebiani safexurebian-Txemebiani moxvniT.

Txemebiani gardigardmo moxvna sruldeba Cveulebrivi guTniT, erTi frTis 40-50 sm –iT dagrZelebiT. aseTi frTa belts agdebs wina gavlilze da warmoqmnis 12-16 sm –is simaRlis Txems (bazos), tovebs ra Ria kvlebs, bazoebi da kvlebi qmnian mniSvnlovan tevadobebs wylisTvis.

niadagis danapraleba da daRrueba. niadagis danapralebas 40-50-sm siRrmeze nadnobi wylis zedapiruli dinebis mniSvnelovani nawili gadahyavs niadagSida fenaSi da amdidrebs qveda fenas sakvebi elementebiT.

daRruebas iyeneben daWaobebuli niadagebSi Warbtenianobis aRsakveTad.

sasuqebis Setana. erodirebul miwebze niadagis nayofierebis aRdgenisa da mosavlianobis amaRlebis efeqturi saSualeba organuli da mineraluri sasuqebia. isini mniSvnelovnad aumjobeseben mcenareul safars, rac aZlierebs niadagis eroziisagan dacvas.

eroziis sawinaaRmdego niadagdamcavi Teslbrunvebi. niadagur safars eroziisagan yvelaze saimedod icavs mravalwliani balaxebi. saToxni kulturebis eroziis sawinaaRmdego efeqturoba dabalia, amitom maT aTavseben mxolod damrec ferdobze 1,0-1,50 daqanebs dros.

sasoflo –sameurneo kulturebis zoluri ganlageba. ferdobebze niadagdamcav TeslbrunvebSi Camorecxvisa da gadarecxvis winaaRmdeg sabrZolvelad iyeneben kulturul mcenareTa zoluri ganlagebas daqanebis gardigardmo mimarTulebiT, romlebic morigeoben mravalwlian balaxebian buferul zolebad.

Tovlis dakaveba da Tovlis dnobis regulireba. am samuSaos asruleben niadagis zolebad gaSavebiT, rac gulisxmobs zolebad mSrali torfis nafxvenebis moyriT (0,3-0,5 t/ha).

Tovlis zolebrivi datkepna. Tovlis swori zolebrivi datkepna daqanebis perpendikularuli mimarTulebiT aCerebs Tovlis dnobas 3-5 dRiT, rac xels uwyobs wylis mniSvnelovani raodenobis niadagSi CaJonvas.

hidroteqnikuri RonisZiebebi

eroziis sawinaaRmdego hidroteqnikuri RonisZiebebs miekuTvneba terasebis, jebirebis, daxramvis sawinaaRmdego RonisZiebebis limanebis mowyoba.

terasebis ramdenime forma arsebobs, romelic SeirCeva ferdobis daxrilobis mixedviT. ferdobis 5-100 daxrilobis dros SeiZleba moewyos beqobiani terasa. beqobiani terasa SedarebiT martivi terasaa. gamoiyeneba mindvris kulturebis dasaTesad. beqobis mimarTuleba keTdeba horizontalebis mixedviT, ferdobis daxrilobis perpendikularulad. sarwyav ferdobebze yvela beqobiani terasis Tavsa da boloSi unda gakeTdes kvlebi: pirveli kvali sarwyavi wylisaTvis, meore-naJuri wylisaTvis. urwyav ferdobebze ki sakmarisia mxolod qveda Semkrebi kvali, romelmac unda Seakavos, SeaCeros zdapiruli Camonadeni.

wylis damWeri bazoebi xels uSlis xazur erozia. isini zedapirul dinebas aqceven niadagSida dinebad, ris meoxebiT sasoflo-sameurneo savargulebis wylis reJimi umjobsdeba. bazoebs aTavseben horizontalebis mixedviT mzardi xevebis simaRleebis win.

jebirebis mowyoba. jebirebis daniSnulebaa Seakavos da SeaCeros wylis moZraobis Zala, raTa Tavidan iqnes acilebuli niadagis Camorecxva da sxva. jebirebi erTmaneTisgan garkveuli manZiliT unda iyos dacilebuli, rac damokidebulia ferdobis daxrilobis sidideze, ferdobis didi daxrilobis dros jebirebi axlo-axlos unda iyos, naklebi daxrilobis SemTxvevaSi Sori-Sors. jebirebis asagebad SeiZleba gamoyenebuli iqnes wneli, fiCxi, qva.

limani. Tovlis nadnobi wylis, agreTve wvimebis dros warmowmnili wylis SekavebisaTvis, Camonadenis da Camonarecxis Tavidan acilebisaTvis mimarTaven limanebis, liman-akumulatorebis mowyobas, romelSic grovdeba wyali. limanebi fedobebze ewyoba iarusebad, igi unda iyos oTxkuTxedi formis. limanis oTxive mxareze akeTeben SemaRlebul bazoebs(miwayrilebs), romlebic akaveben ara marto wyals, aramed saimedod icavs Camonadeni wylisagan, mis qvemoT arsebul savargulebs. SemdgomSi limanebSi dagrovili wyali gamoiyeneba sasoflo-sameureneo kulturaTa rwyvisaTvis.

satyeo-samelioracio RonisZiebebi

eroziis sawinaaRmdego tyis nagebobas (zolebs) ramdenime saxisas akeTeben. umTavresia: wyalgamyofebisa, romlebic ganlagebulia wyalgamyof amaRlebebze da xels uwyoben maTze Tovlis dagrovebas da icaven mimdebare ferdobebs qarisgan.

wyalregulirebisa, romlebic ganlagebulni arian ferdobebis gadaxrebze wyalgamyofebidan hidrografiuli qselis midamoebamde (aCereben zedapirul dinebas da amcireben mis damangrevel Zalas).

xeobebisa da xevebisa, romlebic dargulia mindvrebis sazRvrebis gaswvriv Releebisa da xevebis napirebidan 3-5 m-iT zeviT.

Relispirebisa, romlebic gaadgilebulni arian mdinaspira dablobebis gaswvriv da xevebis daqanebebis npirebze da amagreben, agreTve winaaRmdegobas uweven gadarecxvas, aCereben ufro zemodan wamosul Camonadenebs.

fskerisa, romlebic ganlagebulni arian xevebisa da Releebis fskerze da uzrunvelyofen ferdobis dacvas gadarecxvisgan.

qarismieri erozia da masTan brZolis RonisZiebebi. qarismieri erozia, iseve rogorc wylismieri did zians ayenebs soflis meurneobas, gansakuTrebiT karbonatul Savmiwebze da wabla niadagebze. agreTve msubuqi granulometruli Sedgenilobis niadagebis tipebs. rogorc aRiniSna, qarismier erozias hyofen or saxed: mtvriani qariSxali da yoveldRiuri erozia. qarismieri erozia saqarTveloSi ZiriTadad xdeba zamTarSi da adre gazafxulze. gaSiSvlebuli niadagi Sreba da moitaceba erTi mindvridan da namqerebs qmnis meore mindorze.

miwaTmoqmedebis niadagdamcavi sistemis safuZvels warmoadgens niadagis damuSavebis wesis Zireuli Secvla.

uaris Tqma frTian guTanze da sxva niadagdamamuSavebel manqanebze, romelTac siRrmeSi CaaqvT mcenareuli narCenebi.

niadagis damusaveba brtyelmWreliani tipis iaraRebiT, romlebic niadagis zedapirze inarCuneben nawveralsa da sxva mcenareul narCenebs;

 niadagdamcavi Teslbrunvis SemoReba da aTviseba kulturaTa naTesebis zoluri ganlagebiT, kulturebis Seqmna sufTa aneulebze, sanawveralo saTesebiT Tesva, herbicidebis gamoyeneba.

marcvleuli kulturebis nawveralebi amcireben qaris siCqares mindvris zedapirze. xels uwyoben Tovlis dagrovebas, ukeesad StainTqmeba nadnobi wyali da mcirdeba niadagis mier dakarguli wyali aorTqlebisa da gamoqarvisagan.

mindvris zedapirze nawveralis SesanarCuneblad niadags amuSaveben brtyelmWreliani samuSao organoebis mqone iaraRebiT. niadagis am iaraRebiT damuSavebi dros mindvrebis zedapirze rceba nawveralis 70-90%. am miznisaTvis gamoiyeneba Stangiani kultivatorebi, romlis samuSao organo niadagis zdapiris qveS 6-7 sm siRrmeze mbrunavi Stanga.

adre sagazafxulo gafxvierebisatvis iyeneben nemsisebur farcxs rotaciuli Toxis tipis samuSao organoebiT. am forcxs SeuZlia muSaoba mindorSi nawveralis nebismieri raodenobisas. igi inarCunebs nawverals (80%-mde), kargad afxvierebs da asworebs niadags.

niadagis qarismieri eroziis Sesamcireblad did gavlenas axdens mcenareuli safari. Semodgomaze kargad dabuCqebuli saSemodgomo xorblis aRmonaceni dauzianeblad itans mtvrian qariSxlebs da niadagi ar iqareba. am SemTxvevaSi mniSvneloba aqvs niadagis Tavis droze da xarisxobriv damuSavebas,optimaluri Tesvis vadisa da normis dacvas.

didi mniSvneloba aqvs erodirebuli miwebis gamdeloebasac.

niadagis kompleqsuri dacva eroziisagan. niadagis qarismieri da wylismieri eroziisagan dacvas didi mniSneloba aqvs. mis saimedo safuZvels warmoadgens teritoriis erozis sawinaaRmdego organizacia. Sigasameurneo miwaTmowyobis dros adgenen meurneobis da sawarmoo danayofebis sazRvrebs, azusteben meurneobis specializacias, savargulebis transformacias, hyofen farTobebs gasamdeloeblad, gasatyeveblad, amuSaveben saTesi farTobebis racionalur struqturas, adgenen Teslbrunvebis raodenobasa da tips, kulturaTa Sedgenilobasa da morigeobas.

wylismieri da qarismieri eroziis erToblivad gamovlenisas warmatebiT SeiZleba brZola niadagis brtyladmWreli iaraRebiT damuSavebiT. es gasazRvrulia imiT, rom qarismieri da wylismieri eroziis moqmedebis moqmedebis meqanizmi principSi TiTqmis erTnairia. pirvel SemTxvevaSi nawverali amcirebs qaris siCqares haeris miwiszeda fenaSi da xels uSlis niadagis gadatanas. meoreSi-nawverali amcirebs Camonadeni wylis kinetikur Zalas da winaaRmdegobas uwevs niadagis nawilakebis gadaadgilebas.

brtyladmWreli iaraRebiT damuSavebis MmTavari Rirseba imaSia, rom aRebis Semdgom periodSi niadagi daculia eroziisagansanawveralo anarCenebiT, iqmneba zedapiruli organo-mineraluri fena wylis mSanTqavi kargi unarianobiT, nawverali amcirebs Tovlis gatacebas ferdobebidan, aumjobesebs humusis balanss niadagis zedapirul fenaSi, xels uSlis beltebis warmoqmnas xvnis dros, diddeba kvebis elementebis Semcveloba niadagis zedapirul fenaSi, adgili aqvs guTnis terfis warmoqmnas. Zlier danawevrebul ferdobebze, sadac SeuZlebeli xdeba konturuli damuSaveba, daqanebis mimarTulebiT damuSavebisas eroziis gamovlenis naklebi saSiSroeba iqmneba, vidre frTiani guTniT damuSavebisas.

qarismieri da wylismieri eroziis erToblivad gamovlenisas msubuqi meqanikuri Sedgenilobis niadagebze xvnis optimaluri siRrme unda iyos 14-16 sm, mZime meqanikuri Sedgenilobisa-25-27 sm.

irigaciuli eroziis Taviseburebani. niadagis irigaciuli erozia vlindeba sarwyavi wylis nakadis gavleniT kvlebiT rwyvis dros, rTuli reliefis pirobebSi. misi sidide damokidebulia ferdobis daqanebaze, eqspoziciasa da formaze. dadgenilia, rom irigaciuli eroziis Sedegad, sarwyavi miwebis arasworad gamoyenebisas, yovelwliurad TiTOeuli heqtaridan ikargeba daaxloebiT 100-150 t niadagi. niadagis am raodenobiT gaitaneba daaxloebiT 0,8-1,0 t humusi, 100-120 kg azoti, 110-165 kg fosfori, uaresdeba niadagis fizikur-qimiuri Tvisebebi.

irigaciuli eroziis aRsakveTad rekomendacias aZleven Semdeg RonisZiebebs:

sarwyavi kvlebis daWras yvelaze mcire daxrilobis mixedviT arauRrmes 10-12 sm-isa.

ferdobebis daxrilobis 20-dan 60-mde gadidebisas kvlebis sigrZe mcirdeba 150-200 m-mde da morwyva warmoebs 0,1-0,05 l/wm-Si.

msubuq niadagebian ferdobebze morwyva unda Catardes dawvimebiT. Camorecxil miwebze 25-40%-iT unda gadiddes mineralur sasuqebis dozebi.

organuli sasuqebi (30-40 t/ha-ze) unda Sediodes sideraciastan ertad an masTan morigeobaSi.

leqcia 15

 miwaTmoqmedebis sistemebis warmoSoba da srulyofa. primitiuli sistemebi. axoian-cecxlovani sistema. tye-veliani sistema. yamirian da nasveniani sistema. miwaTmoqmedebis eqstensiuri sistemebi. miwaTmoqmedebis intensiuri sistemebi. miwaTmoqmedebis sistemebis Taviseburebani saqarTvelos niadagebis klimatur zonebSi

Tanamrdrove soflis meurneoba da gansakuTrebiT, agrosamrewvelo kompleqsis mTeli sistema mniSvnelovnad garTulda. imis gamo, rom niadagur-klimaturi pirobebi yvelgan gansxvavebulia, amitom SemoRebuli iqna mecnierulad dasabuTebuli soflis meurneobis gaZRolis adgilobrivi sistemebi, romlebsac gansazRvravs bunebrivi da ekonomikuri faqtorebi.

 cnobilia, rom miwaTmoqmedebis istoria saukuneTa siRrmeebdan momdinareobs da asaxavs sawarmoo Zalebis, urTierobisa da kulturis ganviTarebis msvlelobas garkveul socialur-ekonomikur pirobebSi.

 miwaTmoqmedebis sistemebi warmoadgenen xangrZlivi istoriuli ganviTarebis produqts. miwaTmoqmedebis sistema warmoadgens erT mTlianobamde dayvanil umaRlesi formiT gamoxatul dagrovil mecnierul da praqtikul codnas.

miwTmoqmedebis sistema Tanamedrove gagebiT, rogorc soflis meurneobis gaZRolis mecnieruli safuZveli, aris agroteqnikuri, melioraciuli da organizaciuli RonisZiebebis erTmaneTTan dakavSirebuli kompleqsi, mimarTuli miwis efeqturi gamoyenebis, niadagis nayofierebis SenarCunebis da amaRlebis, sasoflo-sameurneo kulturebis maRali da myari mosavlis misaRebad.

miwaTmoqmedebis sistemebis warmoSoba da srulyofa. pirobiTad miwaTmoqmedebis yvela arsebuli sistemebi intensiurobis xarisxis mixedviT SeiZleba daiyos primitiul, eqstensiur, gardamaval da intensiur sistemebad.

primitiuli sistemebi. maT mekuTvneba axoian-cecxlovani, tye-veliani sistema, - yamiriani da nasveni sistemebi.

axoian-cecxlovani sistema. am sistemis dros swvavdnen bunebriv tyis mcenareulobas. xolo gaTavisuflebul farTobs iyeneben sasoflo-sameurneo kulturebis, ZiriTadad marcvleuli kulturebis mosayvanad. magram aseT farTobebze maRal mosavals iRebdnen pirvel ramdenime wels, Semdeg ki niadagi swrafad kargavda Tavis nayofierebas.

 tye-veliani sistema. saxnavi farTobebis gadidebis mizniT aucilebeli gaxda dabrunebodnen im nakveTebs, romlebsac adre iyenebdnen saTesad, Semdeg miatoves da tyiT daifara.. aseTi iyo tye-veliani sistema. es sistema winasTan SedarebiT ufro ganviTarebuli iyo, vinaidan am sistemaSi miwis eqsploatacias ufro organizebuli, gegmiani xasiaTi hqonda. kerZod, tyis garkveul farTobs ramdenime nawilad yofdnen da TandaTanobiT iTvisebdnen. gamoyenebis Semdeg nakveTs miatovebdnen da axal nakveTs iTvisebdnen, Zveli ki isev tyiT ifareboda.

 yamiriani da nasveni sistemebi. velian raionebSi, sadac saxnavad iTvisebdnen balaxa mcenareulobiT dakavebul da maRali nayofierebis mqone miwebs (Savmiwebi, wabla niadagebi) Camoyalibda miwaTmoqmedebis yamiriani da nasveni sistemebi. magram aqac marcvleulis ganmeorebiT moyanisas mosavali TandaTanobiT mcirdeboda, ufro xelsayreli iyo daetovebinaT mindori nasvenad daaeTvisebinad yamiri. nasvenad datovebul miwebze jer viTardeboda Sambnari, xolo 15-20 wlis gasvlis Semdeg mas kvlav xnavdnen da iyenebdnen sasoflo-sameurneo kulturebis dasaTesad.

miwaTmoqmedebis primitiuli sistemebi damaxasiaTebeli iyo feodalur wyobilebamde periodisaTvis. saqarTveloSi mas adgili hqonda me-20 saukunis dasawyisSic ki.

miwaTmoqmedebis eqstensiuri sistemebi. miwebis moxvnasTan erTad miwaTmoqmedebis primitiuli sistemebi, TiTqmis yvelgan Seicvala, igi Caanacvla: aneulianma, marcvlovan-balaxovanma, balax-mindvrianma da aneulian-saToxnma sistemam.

kapitalisturi sazogadoebis pirobebSi, qalaqis mosaxleobis zrdasTan erTad izrdeboda moTxovnileba soflis meurneobis produqtebze. aRar iyo imis SesaZlebloba miwebi daesvenebinaT xangrZlivad, amitom nasvenis xangrZliobis vadam miaRwia Tavis minimums- Semcirda erT wlamde. amasTan, mosaxnavad vargisi miwebis 2/3 daTesili iyo, xolo 1/3 Cveulebrivaad muSavdeboda, masze tardeboda sarevelebis mospobis RoniZiebebi. aseTma nasvenma miiRo aneuliani sistemis saxelwodeba. am sistemis upiratesoba iyo is rom mTeli saTesi farTobi muSavdeba. aneuliani sistemebisTvis damaxasiaTebelia aneuliani Teslbrunvebi. kulturaTa morigeoba iyo an ormindvriani, an sammindvriani. Sesabamisad 1 aneuli da 1 saSemodgomo kultura, an 1 aneuli, 1 saSemodgomo da 1 sagazafxulo marcvlovnebi.

miwaTmoqmedebis marcvlovan-aneuliani sistema batonobda dasavleT evropaSi me-18 saukunemde, ruseTSi 1917 wlamde, xolo saqarTeloSi soflis meurneobis koleqtivizaciamde (1929-1930).

aneuliani miwaTmoqmedebis ganviTarebis procesSi TandaTan umjobesdeboda niadagis damuSavebis xerxebi da teqnikuri saSualebebi. xis kavi, guTani, wnelis farcxi Seicvala ufro srulyofili iaraRebiT, umjobesdeboda sasoflo-sameurneo kulturebis xalxuri seleqciis meTodebi da am gziT umjobesdeboda jiSebi. niadagis nayofierebis aRsadgenad iyenebdnen nakls, sideratebs da kompostebs. aneulianma sistemam ver uzrunvelyo soflis meurneobis sakmarisi progresi, da marcvlovanebis mosavalmaheqtarze 6-7 centners ver gadaaWarba.

kapitalizmis ganviTarebasTan erTad sasoflo-sameurneo warmoebaSi ganviTareba iwyes miwaTmoqmedebis ufro srulyofilma gadamavalma sistemebma (aneul-marcvlovan- saToxniani, aneul-marcvlovan balaxovani). miwaTmoqmedebis am sistemebis gaumjobeseba xdeboda TeslbrunvaSi mravalwliani balaxebis an saToxni kulturebis CarTvis gziT.

miwaTmoqmedebis intensiuri sistemebi. me-18 saukunis dasawyisSi dasavleT evropis qveynebSi warmoiSva miwaTmoqmedebis intensiuri nayofcvliTi sistema. am sistemisTvis tipurad iTvleba inglisSi damuSavebuli norfouklis Teslbrunva: 1.samyura, 2.saSemodgomoebi, 3.saToxni (kartofili, Zirxvenebi), 4. sagazafxuloebi samyuras SeTesviT. kulturaTa mititebuli morigeoba SesaZleblobas iZleoda miRebuliyo marcvali saSualod 1,6-1,7 t/ha. mineraluri sasuqebis gamoyenebiT ki SesaZlebeli gaxda es monacemebi gazrdiliyo 2,5-3,0t/ha. nayofcvliTi sistema xelSemwyobi foni gaxda mineraluri sasuqebisa da sxva agroteqnikuri RonisZiebebis gamosayeneblad.

miwaTmoqmedebis nayofcvliT sistemaze gadasvla niSnavda sufTa marcvleulis sistemis gadasvlas ganviTarebuli mecxoveleobis warmoebad teqnikuri saToxni kulturebis moyvaniT (kartofili, Saqris Warxali da sxv.). mecxoveleobis ganviTarebam moiTxova sakvebi balaxebis da sakvebi Zirxvenebis naTesebis gafarToeba da saSualeba Seqmna gadidebuli organuli sasuqebis raodenoba. niadagis nayofierebis amaRlebis umniSvnelovanes saSualebad iqca kulturaTa morigeoba, romlis drosac yovelwliurad icvleboda mcenareebi.

saqarTveloSi nayofcvliT sistemas ar misdevdnen arc Zvelad da arc Cvens droSi. misi ZiriTadi niSani iyo is, rom mindvris da sakveb TeslbrunvebSi, romelSic 50% ekava mavalwlian balaxebs, mniSvnelovan adgils ikavebda sufTa aneulebi. amdenad naTesbalaxiani sistema ar iZleoda marcvlis warmoebis moculobisa da mosavlianobis gadidebas ha-ze.

saqarTvelos marcveulis mwarmoebel raionebSi (kaxeTi, qarTli) ZiriTadad gavrcelebulia marcvlovan-saToxniani sistema, sadac saxnavis ZiriTadi nwili daTmobili aqvs saSemodgomo marcvleuls.

miwaTmoqmedebis sistemebis Taviseburebani saqarTvelos niadagebis klimatur zonebSi. saqarTvelo Tavisi bunebrivi pirobebiT didi mravalferovnebiT xasiaTdeba. mkveTrad gamoxatuli vertikaluri zonaloba ganapirobebs sxvadasxvagvari geomorfologiuri elementebis arsebobas. am zonalobis mixedviT saqarTvelos teritoria Semdegnairad nawildeba:0-500 m simaRleze mdebareobs teritoriis 26,7%, 500-1000 m-mde-19,1%, 1500-3000 m-mde 31,5%, xolo 3000-is zeviT 1,5%.

saqartvelo mTiani qveyanaa. mTebiT dakavebulia misi teritoriis TiTqmis 53,6%, mTiswinebiT 33,4%, xolo vakeebi Seadgenen mxolod 13 %. vertikaluri zonalobis gamo saqarTvelos bunebrivi da sameurneo pirobebi xasiaTdeba didi mravalferovnebiT. am mravalferovnebis meoxebiT sasoflo-sameurneo warmoeba zonalur xasiaTs atarebs. adgilobriv bunebriv–ekonomikuri, niadagur-klimaturi pirobebis gaTvalswinebis gareSe ar SeiZleba arsebobdes miwaTmoqmedebis maRali kultura da maRalganviTarebuli sasoflo-sameurneo warmoeba.

saqarTveloSi gamoyofen Semdeg zonebs da qvezonebs:

alaznis vakis da gare kaxeTis zegnis samrewvelo mevenaxeobis zona, moicavs a. alaznis vakis mevenaxeobis qvezonas (axmetis, Telavis, gujaanis, yvarelis raionebi), b. alaznis vakis meTambaqoeobis da mevenaxeobis qvezonas, g. gare kaxeTis zegnis marcvleuli-mevenaxeoba da mecxoveleobis qvezonas (siRnaris, dedoflswyaros, sagarejos raionebs).

alaznis velis da gare kaxeTis zeganis zonis pirveli rigis amocanas warmoadgens: niadagis nayofierebis amaRleba daWaobebuli kerebidan wylis mocilebis gziT, ganmarilianeba, wylismieri eroziisagan niadagis dacva. aq umTavresad gamoiyeneba marcvlovan-balaxovani, marcvlovan-saToxiani mindvris nayofcvliTi, fermispira da specialuri savebi Teslbrunvebi.

Tbilisis da rusTavis (qvemo qaTlis baris) sagareubno soflis meurneobis zona. zona moicavs: mcxeTis, gardabnis, marneulis, TeTri wyaros, bolnisis raionebs.

 zonis bunebrivi pirobebi da soflis meurneobis specializacia upirveles amocanebad ayeneben: niadagis nayofierebis amaRlebas organuli da mineraluri sasuqebis gamoyenebiT, niadagis damuSavebis sistemis gaumjobesebas konkretuli mikroregionis mixedviT, kvalificiuri rwyvis uzrunvelyofas da gvalvasTan brZolas, biologiuri azotis gamoyenebas, sasoflo-sameurneo kulturebis sarevelebTan, mavneblebTan da avadmyofobebTan integrirebul brZolas. Teslbrunvebidan iyeneben marcvlovan-parkosani kulturebis narevebs, marcvlovan saToxnian Teslbrunvebs, agreTve specializiebul sakveb Teslbrunvebs.

aRmosavleT kavkasionis mTis mecxoveleobis zona. raionebia: duSeTi, TianeTi, yazbegi.

 zonis bunebrivi da sameurneo pirobebi xeSemwyobia mTis mecxoveleobis, upiratesad momTabare mecxvareobis, xolo dablob nawilSi (Sida qarTlis vake) mindvris kulturebis, mexileobisa da nawilobriv mevenaxeobis ganviTarebisaTvis.

am zonaSi Semavali raionebis soflis meurneobis ganvitarebis mtavari amocanebia: bunebrivi sakvebi savargulebis produqtiulobis amaRlebisa da mindvrad sakvebmopovebis gadidebis gziT naxevrad nazmatyliani mecxvareobis, mexorcul-merZeuli mesaqonleobis da momtabare meRoeobis ganviTareba.

Sida qarTlis baris samrewvelo mexileobis zona sagareubno soflis meurneobiT (kaspis, goris, qarelis, xaSuris raionebi).

Sida qarTlis mexileobisa da mecxoveleobis zona. zonis bunebrivi -sameurneo pirobebi xelSemwyobia mravalfervani sasoflo-sameurneo kulturebis-xilis, yurZnis, Saqris Warxlis, bostneulis, xorblis, qeris, simindis da sxvaTa mosayvanad. sasoflo-sameurneo savargulebSi sakmaod maRali xvedriTi woniT warmodgenilia mravalwlovani nargavebi, umTavresad xexilis baRebi 21%. maTSi gaerTianebuli ori qvezona: mexileobis da mecxoveleobs qvezona (cxinvalis, znauris raionebi), mTis mecxoveleobis qvezona mexileobiT (axalgoris, javis raionebi).

javaxeTis mTianeTis mecxoveleobis da mekartofileobis zona (walka, dmanisi, ninowminda axalqalaqis raionebi).

zonis bunebrivi pirobebi xelSemwyobia marcvleulis (umTavresad sagazafxulo TavTavianebi), kartofilisa da sakvebi kulturebis mosayvanad. alpuri da subalpuri saZovrebis arseboba xels uwyobs mecxoveleobis ganviTarebas.

samcxe -TrialeTis mecxoveleobis da mexileobis zona (axalcixe, aspinZa, adigeni, borjomis raionebi).

zonis dablobi nawilis niadagur-klimaturi pirobebi xelsayrelia maRalxarisxovani xilis mosayvanad, xolo naklebad xelsayreli mevenaxeobis ganviTarebisaTvis. mindvis kulturebidan warmatebiT moiyvaneba kartofili, xorbali, qeri, simindi, bostneuli da sakvebi kulturebi. sasoflo-sameurneo savargulebis mTeli farTobis 80% modis bunebriv sakveb savargulebze, rac mecxoveleobis ganviTarebis safuZvelia.

imereTis maRlobisa da raWa-leCxumis qvabulis mevenaxeobis zona mecxoveleobiT. zonis bunebrivi pirobebi xelsayrelia mevenaxeobis ganviTarebisaTvis, romelic maRalxarisxian produqcias iZleva. aqve moiyvaneba xili, dablobSi simindi, bostneuli, mindvris sakvebi kulturebi. igi moicavs: imereTis maRlobis mevenaxeobis qvezonas ganviTarebuli mecxoveleobiT (Terjolis, zestafonis, WiaTuris, saCxeris, xaragaulis, baRdadis, vanis raionebi) da raWa-leCxumis qvabulis mevenaxeobis mecxoveleobisa da mevenaxeobis qvezonas (cagerisa da ambrolauris raionebi).

dasavleT kavkasionis mTis mecxoveleobis zona (onis, lentexis, mestiis raionebi). zonis bunebrivi pirobebi xelsayrelia mecxoveleobis saxorce-sarZeve mesaqonleobis (ZiriTadad bunebrivi resursebis bazaze) ganviTarebisavis, sagazafxulo marcvleulisa d kartofilis moyvanisaTvis. umniSvnelo masStabiT aris mevenaxeobis da mexileobis ganviTarebis pirobebi.

 afxazeTis subtropikuli kulturebisa da meTambaqoeobis zona, ganviTarebuli sagareubno soflis meurneobiT; moicavs mecitruseobisa da meTambaqoeobis qvezonas, ganviTarebuli sagareubno soflis meurneobiT (cageris, gudauTis, soxumis, gulrifSis raionebi) da meCaieobis da mecitruseobis qvezonas (oCamCire, galis raionebi). zonis bunebrivi pirobebi xelsayrelia mecxoveleobis saxorce-sarZeve mesaqonleobis (ZiriTadad bunebrivi resursebis bazaze) ganviTarebisaTvis. sagazafxulo marcvleulis da kartofilis moyvanisaTvis, xolo mcire raodenobiT mexileobisa da mevenaxeobis ganviTarebisaTvis. sasoflo-sameurneo savargulebis saerTo farTobis 90%-ze meti modis saZovrebsa da saTibebze.

 kolxeTis dablobis subtropikuli kulturebis zona (ozurgeTis, lanCxuTis, Coxatauris, foTis, xobis senakis, zugdidis walenjixis, Cxorowyus, martvilis raionebi).

bunebrivi da sameurneo pirobebi xels uwyobs zonaSi mravalferovani subtropikuli kulturebis warmoebis ganviTarebas. zona subtropikuli meurneobs ZiriTad bazas warmoadgens. aq warmatebiT mohyavT Cai, citrusi da sxva subtropikuli kulturebi, maRalxarisxovani Tambaqo, eTerzeTovani kulturebi da tungo, agreTve simindi da sxva sasoflo-sameurneo kulturebi.

 q. quTaisis sagareubno soflis meurneobis zona. ganviTarebuli meCaieobiT (abaSis, samtrediis, wyaltubos, tyibulis raionebi). zonis niadagur-klimaturi pirobebi xelsayrelia sagareubo mebostneobisa da mecxoveleobis da meCaieobis ganviTarebisaTvis. mcire masStabiT warmodgenilia marcvleuli kulturebi, kartofili, sakvebi kulturebi. kargad aris ganviTarebuli mevenaxeoba da mexileoba. mecxoveleobidan umtavresia msxvili rqosani saqoneli.

aWaris subtopikuli kulturebis da meTambaqoeobis zona. ganviTarebulia mTis mecxoveleobiT. moicavs mecitruseobis da meCaieobis qvezonas (qobuleTis, xelvaCauris raionebi) da meTambaqoeobis da mecoveleobis qvezonas (qedis, Suaxevis, xulos raionebi).

zonaSi sakmaod maRali xvedriTi wiliT aris warmodgenili (75%-ze meti) saTib-saZovrebi. savargulebis gamoyenebis done dabalia. saxnavi miwebi cicabo ferdobebzea ganlagebuli. Zlierad ganviTarebulia wylismieri erozia. mcire masStabiT mohyavT marcvleuli kulturebi, mravalwlovanebidan Cai, misdeven mecxoveleobas da mefrinveleobas.