**saleqcio kursi**

**intensiuri miwaTmoqmedeba**

**(studentebis, fermerebisa da sakvebwarmoebis dargis specialistebisaTvis)**

**Tbilisi**

**2012 weli**

**S e s a v a l i**

miwaTmoqmedebis uaxloesi teqnologiebis ugulebelyofis Sedegad gasuli saukunis Sua ricxvebidan nayofieri miwebis msoflio danakargma 20%-s miaRwia. ramdenadac cnobilia, niadagis bunebrivi nayofierebis aRdgenisaRvis saWiroa 20-30 weli, xolo intensiuri miwaTmoqmedebis pirobebSi 20 welic ki sakmarisia imisaTvis, rom niadagi unayofo gaxdes. mineraluri sasuqebis gadaWarbebuli riodenobiT Setanis Sedegad SeimCneva misi narCenebis dagroveba niadagSi, gruntis wylebSi, mcenareSi da mecxoveleobis produqtebSi. sakvebisa da kvebis produqtebis nitratuli dabinZurebis Sedegad izrdeba daavadebaTa raodenoba mcenareSi, cxovelsa da adamianSi. qimiuri saSualebebi farTod inergeba mecxoveleobaSic. farmacevtuli preparatebi (antibiotikebi da sxva), aseve maTi daSlis produqtebi araswori, anda gadidebuli normiT gamoyenebisas grovdeba cxovelTa organizmSi da xvdeba kvebis produqtebSi, rogoricaa: rZe, kvercxi, xorci, safrTxes uqmnis adamianis janmrTelobas. qimiuri saSualebebis gamoyenebiT ferxdeba evoluciis bunebrivi procesebi, cocxali samyaros TviTganaxlebis procesi, sustdeba dacvis Zala mcenareSi, cxovelebSi da adamianSi.

biosferosa da adamianis janmrTelobis SenarCunebis interesebidan gamomdinare umniSvnelovanes da amavdroulad swor strategias warmoadgens TandaTanobiT Semcirdes qimiuri saSualebebis gamoyeneba soflis meurneobaSi da farTod iqnes danergili alternatiuli kompleqsuri teqnologia. Seqmnili mdgomareobidan gamomdinare erT-erTi SedarebiT kanonzomieria swrafad da masobrivad dainergos niadagis aRdgenisa da mosavlianobis matebis uaxloesi teqnologia.

intensiuri miwaTmoqmedeba gulisxmobs niadagisa da mcenaris rogorc cocxali organizmis erTobliobas, raTa miviRoT optimaluri da xarisxiani mosavali. miwaTsargeblobis amJamad moqmedi sistema ver pasuxobs Tanamedrove moTxovnebs, risTvisac saWiro gaxda farTod dainergos axali koncefcia, romelic daeyrdnoba sasursaTo usafrTxoebas da mosavlianobis kanonzomier matebas.

amJamad moqmedi miwaTmoqmedebis koncefcia unda Seicvalos bioteqnologiuri srulyofis mimarTulebiT, radgan TvalnaTliv Cans, rom qimiuri saSualebebis intensiuri gamoyenebiT SeimCneva rigi uaryofiTi Sedegebi, rogoricaa: niadagis struqturis gauareseba, azotis, fosforisa da kaliumis sxnadi formebis Semcireba, eroziis warmoqmna, garemos dabinZureba mavne nivTierebebiT, sasoflo-sameurneo produqtebis xarisxis gauareseba, masSi nitratebis, nitritebisa da pesticidebis dagroveba, rac sabolood iwvevs niadagis nayofierebis mniSvnelovan gauaresebas.

intensiuri miwaTmoqmedebis ZiriTadi arsi gulisxmobs, niadagSi, bunebriv pirobebSi mcxovrebi, efeqturi mikroorganizmebis gamoyenebiT, gavaumjobesoT advilad SesaTvisebeli sakvebi elementebis raodenoba, niadagi gavxadoT nayofieri da uzrunvelvyoT igi saWiro vitaminebiT, fermentebiT, aminomJavebiT da sxva. maqsimalurad efeqturad iqnes gamoyenebuli niadagis potencia da SevinarCunoT misi nayofiereba xangrZlivi periodis ganmavlobaSi. miRebuli produqti iyos ekologiurad sufTa da sruliad usafrTxo adamianisaTvis.

xangrZlivi periodis manZilze qimiuri preparatebis gamoyenebiT dairRva niadagSi mcxovrebi organizmebis TviTregulirebis bunebrivi procesi, Sesustda mcenaris dacvis Zala. cnobilia, rom mineraluri sasuqebi moqmedebs rogorc stimulatori niadagidan sakveb nivTierebaTa maqsimaluri gamoyenebisaTvis-moxmarebisaTvis da Sesabamisad mcenaris mier gamotaneba mosavalTan erTad, rac iwvevs niadagis kvebiTi balansis Semcirebas. imisaTvis, rom niadagma mogvces maRali da xarisxovani mosavali, saWiroa gamoviyenoT mikro da makroelementebiT dabalansebuli sakvebi saSualebebi da rac mTavaria uaxloesi efeqturi teqnologiebi. niadagis Tanaswori balansuri srulyofis SenarCuneba praqtikulad SeuZlebelia, xolo marto sakvebi saSualebebis dabalansebuli Setana niadagSi ver SeZlebs aRdgenili iqnes niadagSi biologiurad aqtiuri nivTierebebi, xolo maT gareSe rogorc niadagi, aseve mcenare ver SeZlebs iyos janmrTeli da iZleodes maRal mosavals. aRniSnuli problemis mogvarebis mcdeloba efuZneba niadagis gamoyenebis strategiuli teqnologiuri procesebis marTvas.

**mecnieruli miwaTmoqmedebis ZiriTadi kanonebi**

1. **mcenaris sasicocxlo faqtorebis Seunacvleblobis da Tanabar mniSvnelobis kanoni.** (faqtorebis Seunacvlebloba).

mcenaris arc erTi sasicocxlo faqtori ar SeiZleba Seicvalos romelime sxva faqtoriT. gamomdinare aqedan `yvela faqtori fiziologiurad TanabarmniSvnelovania~. ar SeiZleba wyali Seicvalos haeriT, sinaTliT an sakvebiT. kaliums ver Secvli azotiT da a.S., radgan yvela faqtori garkveul fiziologiur funqcias asrulebs.

2. **minimumis, optimumis da maqsimumis kanoni**. am kanonis ZiriTadi arsi isaa, rom mcenaris normaluri zrda-ganviTareba mimdinareobs sasicocxlo faqtorTa moqmedebis optimalur pirobebSi. mcenaris mosavlianobis done ganisazRvreba im faqtorebiT, romelic minimumSia. am faqtoris minimumis gadideba optimalur sazRvrebamde, iwvevs mosavlianobis gadidebas, xolo misi gadaWarbebuli raodenoba maqsimumisaken abrkolebs mcenaris normalur ganviTarebas da amcirebs mosavlianobas. haeris maRali temperatura iwvevs mcenaris Wknobas. zedmeti wyali iwvevs haeraciis Semcirebas da sxva.

**3. mcenareTa sasicocxlo faqtorebis erToblivi moqmedebis kanoni.** es kanoni amtkicebs, rom sasoflo-sameurneo kulturebis maRali mosavlis misaRebad aucilebelia yvela sasicocxlo faqtorebis optimalur TanafardobaSi arseboba.

bunebaSi sicocxlis faqtorebi mcenareze moqmedeben erToblivad. erTmaneTTan mWidro kavSirSi da ara erTmaneTisgan izolirebulad. magaliTisaTvis: siTbos momateba gazafxulze teniT uzrunvelyofis pirobebSi aCqarebs sakveb nivTierebaTa SeTvisebas. niadagis aeraciis gaZliereba teniTa da siTboTi uzrunvelyofis dros iwvevs haeris Jangbadis SeTvisebis gaZlierebas da naTesis aRmonacenebis daCqarebas.

4**. dabrunebis kanoni**. am kanonis Tanaxmad kulturuli mcenareebis mier niadagidan gamoitaneba sakvebi nivTierebebi, romelTa mxolod nawili, nakelis saxiT kvlav ubrundeba niadags. miwaTmoqmedebis ZiriTadi amocanaa – gamotanili sakvebi nivTierebebis kvlavdabruneba niadagSi. niadagSi nivTierebaTa dabrunebasTanaa dakavSirebuli azotis fiqsireba baqteriebis mier. ase magaliTad, azotobaqteria erTi wlis ganmavlobaSi erT heqtarze 25-30 kg azots agrovebs, xolo parkosani kulturebis koJris baqteriebi kulturaTa saxeobebis mixedviT, 150-200 kg-s.

**niadagis ekologiuri mniSvneloba**

niadagis ZiriTad faqtorebs, fizikur da qimiur Tvisebebs gansakuTrebuli ekologiuri mniSvneloba aqvs.

niadagis **granulimetruli (meqanikuri)** Sedgeniloba sxvadasxva zomis myari nawilakebis TanafardobiT ganisazRvreba. saerTaSoriso klasifikaciis mixedviT, nawilakebi, romelTa zoma 2 mm-s aRemateba **xreSisa da qvis nawilebs (**fraqciebs) qmnis, 2-0,06 mm – **qviSis fraqcias**, ufro wvrili nawilakebi ki – mtvrisa da Tixis fraqciebs (lamis CaTvliT). es fraqciebi ufro wvril fraqciebadac iyofa. aseT niadagSi ukeTaa gamoxatuli mcenaris fesvebis areSi mineraluri marilebis STanTqmis unarianoba. gasagebia, rom qviSnar niadagebs uaresi STanTqmis unarianoba axasiaTebs. struqturul Tixnar niadagebs tenis Sekavebis ukeTesi unari aqvs, kapilarobac ukeTesi axasiaTebs. anu zeda horizontis gamoSrobisas qveda teniani horizontidan wylis amoqaCva kargad `exerxeba~. samagierod wylisa da haeris gamtarianobis mixedviT qviSnari niadagebi ukeTesia.

sxvadasxva meqanikuri Semadgenlobis niadagebi, sxvadasxva saxis organizmebis gavrcelebas gansazRvravs. magaliTad, qviSnar niadagebs (qviSiani naxevradudabnoebi, udabnoebi, plaJebi) miesadageba qviSis moyvarul mcenareebi da cxovelebi.

didi ekologiuri da sasoflo-sameurneo mniSvneloba aqvs niadagis **organuli nawilis umTavres komponents – humuss**, romelic Sav, mura an rux ferad Rebavs niadagebs da Zalze rTuli qimiuri Semadgenlobis mqone amorfuli nivTierebaa. igi **0,0001 mm-ze mcire nawilakebisagan Sedgeba** da mniSvnelovanwilad gansazRvravs niadagis tenis Sekavebisa Tu STanTqmis unars. amave dros humusis xrwnisas – naxSirorJangi da mineraluri marilebi gamoiyofa, romelic SeiTviseba mcenaris mier, xolo naxSirorJangi – wyalTan erTad, mcenares miuwvdomeli mineraluri elementebis gamoyenebaSi uwyobs xels. humusis Semcveloba, romelic sxvadasxva tipis niadagebSi araTanabaria (magaliTad, maRalmTis mTa-mdelos niadagebSi 10-12%-ze metia, udabnos rux miwebSi ki 1%) niadagis nayofierebaze didad moqmedebs.

niadagis humusis fenaSi Tavmoyrilia niadagis uxerxemloTa faunis ZiriTadi masac. es organizmebi niadagSi auracxeli raodenobiT gvxvdeba da erTad aRebuli, gacilebiT ufro met zoomasas qmnis, vidre sxva cxovelebis mTeli erToblioba.

didi mniSvneloba aqvs niadagis mJavianobas (pH). niadagis xsnaris reaqcia, niadagSi wyalbadis Tavisufali ionebis arsebobasTan aris dakavSirebuli. erTmaneTisgan ansxvaveben neitralur (pH=7), mJave (7-ze naklebi) da tute (7-ze meti) niadagebs. sxvadasxva tipis niadagebis pH ZiriTadad 3-8 farglebSi icvleba. es maCvenebeli ganpirobebulia havis TaviseburebebiT, dedaqanis ragvarobiT da sxv. **cxel da mSral pirobebSi neitraluri an tute reaqciis mqone niadagebi yalibdeba. civsa da tenian klimatSi mJave.** kirqvian qanebze – tute. torfiani niadagebi mudam mJavea. organizmebis nawili mJave niadagis moyvarulia, meore nawili – kalciumis ionebiT mdidari tute niadagebisa. am ukanasknelTa ricxvs miekuTvneba Cveulebrivi qaTamic. igi wyvets myarnaWuWiani kvercxis debas, Tuki saqaTme dgas iseT adgilas, sadac niadagSi arasakmarisi raodenobiTaa kalciumi.

N **niadagis damuSaveba**

niadagis damuSavebis ZiriTadi amocanaa kuluruli xnulis Seqmna, romelic uzrunvelyofs sasoflo-sameurneo kulturaTa zrda-ganviTarebis xelsayrel pirobebs.

swori damuSavebis Sedegad umjobesdeba niadagis struqtura, iqnmneba xelsayreli pirobebi niadagSi tenis Sewovisa da SenarCunebisaTvis, umjobesdeba niadagis haeraciis procesi da siTburi Tvisebebi, iqmneba aucilebeli pirobebi mcenareTa normaluri zrda-ganviTarebisaTvis.

niadagis damuSavebis mTavari amocanaa saxnavi fena moiyvanos fxvier, koStovan mdgomareobaSi; gavlena moaxdinos wylis, haerisa da siTbos reJimebze; mis fizikur-qimiur da biologiur procesebis dinamikaze. niadagis damuSavebis umniSvnelovan amocanas sarevela mcenareebis mospoba warmoadgens.

niadagis damuSaveba uzrunvelyofs mikroorganizmebis cxovelmoqmedebis pirobebis gaumjobesebas, aZlierebs naSTebisa da neSompalis daSlis process niadagSi.

niadagis meqanikuri damuSavebis dros sruldeba Semdegi teqnologiuri procesi: beltis gadabruneba, beltis daSla-gafxviereba. niadagis nawilakebis erTmaneTSi areva, zedapiris mosworeba, sarevelebis moWra, kvlebisa da Txemebis gakeTeba da niadagis SemWidroeba.

**niadagis zedapiruli damuSavebis xerxebi**

**aoSva (aCeCva),** romelic sruldeba niadagis 6-8 sm siRrmeze diskoebiani an saxnisiani saoSebiT. (xnulis damuSavebas hqvia aoSva, nawveralisas – aCeCva). misi mizania sarevela mcenareebis amotyueba. amasTanave aCeCviT ispoba niadagis zedapirul fenebSi arsebuli daavadebebisa da mavneblebis kerebi.

aoSvauzrunvelyofs niadagis gafxvierebas, beltis nawilobriv gadabrunebas, niadagis nawilakebis erTmaneTSi Serevas da sarevelebis moWras.

**kultivaciis** daniSnulebaa niadagis gafxviereba, qerqis daSla, wylis aorTqlebis Semcireba, sarevelebis mospoba da sxva.

kultivacia aris ori saxis: mTliani – romelsac awarmoeben: niadagis ZiriTadi damuSavebis Semdeg, Tesvis win da aneulebze, ramdenjerme, Teslis CaTesvis siRrmeze da mwkrivTaSorisuli – romelsac awarmoeben saToxn kulturebSi, mwkrivTSoris gafxvierebisa da sarevelebis mosaWrelad.

**farcxva** – uzrunvelyofs niadagis gafxvierebas, zedapiris mosworebas da nawilobriv sarevelebis axali aRmonacenis mospobas. farcxvisaTvis gamoiyeneba kbilebiani, zambarovani, badisebri, diskebiani da rotaciuli farcxebi.

**daSleifeba** – uzrunvelyofs xnulis zedapiris mosworebas da nawilobriv gafxvierebas. tardeba – kabdiT (saTrevela), Sleif-farcxiT, kbilebiani Sleifis da sxv.

**motkepna** – romlis mizania niadagis gamkriveba da misi zedapiris mosworeba. agreTve msxvili beltebis daSla. misi saSualebiT niadagis nawilakebsa da Tesls Soris myardeba mtkice kontaqti. kapilaruli wyali advilad aRwevs Teslamde da Cqardeba gaRiveba-aRmocenebis procesi.

**niadagis damuSavebis sistemebi**

niadagis damuSavebis sistema aris garkveuli TanmimdevrobiT ganxorcielebuli niadagis damuSavebis erToblioba.

gamoiyofa niadagis damuSavebis Semdegi sistemebi: 1) niadagis damuSavebis sistema sagazafxulo kulturebisaTvis; 2) niadagis damuSavebis sistema saSemodgomo kulturebisaTvis da 3) Tesvis Semdgomi damuSavebis sistema.

sagazafxulo kulturebisaTvis niadagis damuSavebis sistema moicavs mzralad da Tesviswina damuSavebas. mzralad damuSavebis dros saWiroa nawveralis aCeCva diskoebiani an saxnisiani iaraRebiT, romlis mizania niadagis zedapirze Cabneuli sarevelebis Teslebis niadagSi moqceva da maTi aRmonacenebis daCqareba. aCeCviT mcirdeba agreTve aorTqleba da ispoba mavneblebis da daavadebebis kerebi. aCeCvidan 2-3 kviris Semdeg nakveTi ixvneba winmxvneliani guTniT, aranakleb 22-25 sm siRrmeze, romelsac mzralad xvnas uwodeben.

normalur tenianobisa da temperaturis pirobebSi moklexnovani sarevelebi aRmocendebian aCeCvidan 15-20 dRis Semdeg, mravalwlovani sarevelebis ylortebi ki 12-15 dReSi. swored am periods unda daukavSiroT niadagis moxvna.

zamTarSi xneuli rCeba beltovan mdgomareobaSi, kargad iJRinTeba wyliT da yinvebis zegavleniT belti iSleba.

niadagis Tesviswina damuSavebis amocanaa niadagis tenis SenarCuneba, sarevela mcenareebis mospoba da Teslis CaTesvisaTvis xelsayreli pirobebis Seqmna.

adre gazafxulze, niadagis fizikuri simwifis miRwevisas, tenis daxurvis mizniT tardeba mzralis gadafarcxva, xnulis gardigardmi mimarTulebiT.

saadreo sagazafxuli kulturebisaTvis Tesvamde tardeba niadagis kultivacia Tanmiyolebuli farcxiT.

farcxvis Semdeg tardeba Rrma kultivacia 10-12 sm siRrmeze, frTamoxsnili saoSebiT.

meore Tesviswina kultivacia tardeba Teslis CaTesvis siRmeze. tenian da gril gazafxulze, rodesac Seferxebulia sagviano sagazafxulo kulturebis Tesva da mindorze wamoizrdebian sarevelebi, mizanSewonilia mesame kultivaciis Catareba.

wvrilTeslian kulturebiT Tesvis SemTxvevaSi Tesviswina damuSavebaSi CarTulia niadagis motkepna.

**saSemodgomo kulturebi** iTeseba zafxulis bolos an Semodgomis dasawyisSi da mosavali aiReba Semdegi wlis zafxulSi.

saSemodgomo kulturebisaTvis gankuTvnili mindvrebi SeiZleba sam jgufad daiyos: 1) sufTa da kulisebiani aneuli; 2) moTesili da sideraluri aneuli da 3) araaneuliani winamorbedebi.

**sufTa aneuli** iseTi mindvrebia, romlebic mTeli savegetacio periodis ganmavlobaSi dauTesavia da mimdinareobs masze niadagis gafxviereba, sarevelebis mospobis mizniT.

arCeven sufTa aneulis or saxes: Sav anu saSemodgomo aneuls da adreuls anu sagazafxulos.

Savi aneulis damuSaveba mzralad xvniT iwyeba, adre gazafxulze ki tenis SenarCunebis mizniT aneuli ifarcxeba.

adreuli aneulis damuSavebisas xvna tardeba adre gazafxulze.

arsebobs kulisebiani aneulic, romelic saSemodgomo kulturebisTvisaa gankuTvnili.

**niadagis damuSavebis** pirveli rigis amocanebia: saxnavi fenis fxvier mdgomareobaSi moyvana da mcenarisaTvis sasicocxlo faqtorebis - wylis, haeris, siTbos da sakvebi elementebis optimalur pirobebSi - advilad SesaTvisebel mdgomareobaSi moyvana, sarevelebTan brZolis RonisZiebebis Catareba, niadagis nayofierebis amaRleba, qarismieri da wylismieri eroziisagan niadagis dacva warmoadgens.

niadagis damuSavebis dReisaTvis arsebuli sistemebi warmoadgens niadagis meqanikuri damuSavebis Tanmimdevrul, erTmaneTTan dakavSirebul sxvadasxva xerxebis erTobliobas da uzrunvelyofs mcenaris zrda-ganviTarebis optimalur pirobebs.

reliefis mixedviT niadagis meqanikuri damuSavebis sistemebis diferencirebisaTvis, saxnavi farTobebi sam kategoriad SeiZleba daiyos:

1. dablobi, vake, terasebi da mTis ferdobebi ara umetes 50 daxrilobiT; romelTa dasamuSaveblad unda gamoviyenoT Cveulebrivi teqnikuri saSualebebi (guTnebi);
2. saSualo (5-100-mde) daxrilobis ferdobebi, romelTa damuSaveba SeiZleba Cveulebriv an nawilobriv modificirebuli teqnikiT (specialuri manqana-iaraRebis gamoyenebiT);
3. Zlier (10-150-mde) daxrilobis ferdobebi, romelTa dasamuSaveblad unda gamoviyenoT specialuri teqnika e.w samTo teqnika. iseTi daxrilobis ferdobebi, romlebic 150-s aRemateba saxnavad gamoyeneba yovlad dauSvebelia da Tu amis saSualebas iZleva niadagobriv\_klimaturi pirobebi unda iqnes aTvisebuli baR-venaxebis gasaSeneblad, anda Sesabamisi RonisZiebebis Catarebis Semdeg gamoviyenoT saTib-saZovrebad da nawilobriv gasatyeveblad.

**niadagis ZiriTadi xvna.** dReisaTvis niadagis ZiriTadi damuSavebis yvelaze ufro gavrcelebuli xerxia xvna beltis gadabrunebiT. garda imisa, rom igi awesrigebs niadagSi mcenaris ZiriTad sasicocxlo pirobebs, mis xarsixze didad aris damokidebuli niadagis damuSavebis momdevno rgolebis xarisxic. beltis gadabrunebiT xvnas awarmoeben winmxvneliani guTniT da cnobilia **kulturuli** xvnis saxelwodebiT. misi arsi SemdegSi mdgomareobs: guTnis moZraobis dros winmxvneli niadagis 8-10 sm-is sisqis zeda fenas Wris, amoabrunebs 1800 da aTavsebs kvalis fskerze, xolo guTnis ZiriTadi korpusi beltis qveda, 15-20 sm-is fenas Wris, abrunebs 1800 da aTavsebs winmxvneliT moWrili beltis zemoT. amgvarad xdeba niadagis fenebis Senacvleba-gadaadgileba erTdrouli gafxvierebiT. saxnavi fenis aseTi Senacvlebis dros eqceva ra zeda, SedarebiT ustruqturo, gamomSrali (fena) niadagi, kvalis fskerze da qveda, SedarebiT struqturuli da teniani zeviT. Umjobesdeba niadagis haeracia da masTan dakavSirebuli mikroorganizmebis aqtiuri moqmedeba, nadgurdeba niadagis zedapirze arsebuli sarevela mcenareebi da maTi Tesli, magram miuxedavad am dadebiTi mxareebisa niadagis saxnavi fenis sistematurad, yovel wels amobrunebas gaaCnia Tavisi uaryofiTi mxareebic. niadagis sistematuri, zog SemTxvevaSi weliwadSi 2-3 jer damuSaveba iwvevs mis gamtverianebas, niadagidan tenis zedmetad aorTqlebas, xSirad niadagis qveda fenebSi moxvedrili sarevelaTa Tesli zedapirze gadaadgilebisas (moxvedrisas) aqtiurdeba da iwvevs nakveTis sagrZnob dasarevlianebas, wylismieri da qarismieri eroziis uaryofiTi Sedegebis gaZlierebas da a.S. amitom bolo wlebSi, marTalia umniSvnelo farTobebze, magram mainc mimarTaven niadagis damuSaveba\_gafxvierebas saxnavi fenis amobrunebis gareSe (Cveulebrivi xvna mimdinareobs 3-4 weliwadSi erTxel), rac sagrZnoblad efeqturia da momavalSi es RonisZieba perspeqtiulad unda CaiTvalos. saerTod niadagis ZiriTadi damuSavebis raime standartuli xerxi ar arsebobs da gansxvavebulia winamorbedi da momdevno kulturebis, niadagobrivi\_ klimaturi da reliefuri pirobebis mixedviT.

**kordis ZiriTadi damuSaveba.** rogorc cnobilia, mravalwlovani sakvebi balaxebi fesvTa sistemis saSualebiT Zlier energiulad aRadgens niadagis struqturas, zrdis mis nayofierebas. struqturuli niadagebi xasiaTdeba da sxva niadagebisagan gamoirCvea simtkiciTa da bmulobis maRali xarisxiT. gamomdinare aqedan kordis ZiriTadi damuSavebis xerxebi gansxvavdeba magaliTad nawveralis, nasimindaris, mzralis damuSavebisa sxva xerxebisagan.

miuxedavad imisa Tu respublikis romel klimatur zonaSi gvixdeba kordis damuSaveba, samuSaoebi unda daiwyos zafxulis meore naxevris dasawyisSi. xvna unda CavataroT winmxvneliani guTniT raTa niadagis zeda fena moTavsdes xnulis fskerze, xolo qveda feniT unda Seivsos kvali. kordis amgvari danawileba xels uwyobs kordis SedarebiT ukeTes daSlas, magram imis gamo, rom ionja da sxva mravalwlovani parkosnebiT dakavebuli mindori, damuSavebis amgvar wess naklebad emorCileba, momaval wels moxnul kordze Caxnuli mcenareebi Zlier asarevlianeben naTesebs. aRniSnulis Tavidan asacileblad ZiriTad xvnamde, pirvel rigSi, unda CavataroT kordis aoSva 7-8 sm siRrmeze, raTa fesvis yeli davaSoroT ZiriTad fesvebs. moWrili da niadagis zedapirze amobrunebuli fesvis yeli, masTan erTad SesaZlo sxvadasxva sarevelebic, gansakuTrebiT fesurianebi, mzis sxivebis moqmedebiT kargad Sreba, ekargeba zrdis unari da xmeba. amis Semdeg vatarebT kordis ZiriTad xvnas winmxvneliani guTniT.

**niadagis aneulad damuSavebis wesi.** Aaneulad iwodeba moxnuli miwis nakveTi, romelzedac tardeba yvela agroteqnikuri RonisZiebebi, magram ar iTeseba kultura mosavlis misaRebad. igi ZiriTadad mimarTulia sarevelebis winaaRmdeg sabrZolvelad. aneulad damuSaveba iwyeba winamorbedi kulturis aRebisTanave, zafxulSi an adre SemodgomiT. naxnavi adre gazafxulze niadagSi wylis SenarCunebis mizniT unda daifarcxos. aneulis pirveli sagazafxulo damuSaveba iwyeba adreuli sarevela balaxebis masiurad aRmocenebis Semdeg. niadagis damuSaveba mimdinareobs kultivatorebiT an frTamoxsnili saoSebiT 12-14 sm-is siRrmeze. aneulis meore damuSaveba unda emTxveodes gviani gazafxulis sarevelebis aRmocenebas da mimdinareobs 8-10 sm-is siRrmeze, xolo Semdeg periodSi, Tesvamde, vatarebT 2-3 kultivacias 6-8 sm-is siRrmeze. yoveli wvimis Semdeg nakveTi ifarcxeba msubuqi farcxebiT. teniani klimatis pirobebSi aneulis damuSaveba iwyeba nakleb siRmeze da TandaTan Rrmavdeba momdevno samuSaoebis dros. gvalviani pirobebisagan gansxvavebiT, tenian adgilebSi aneulis damuSaveba mimdinareobs SedarebiT met siRrmeze.

mxedvelobaSi unda iqnes miRebuli erTi friad mniSvnelovani agriteqnikuri RonisZieba, romelic cnobilia niadagis aCeCvis da aoSvis saxelwodebiT. aCeCva gulisxmobs nawveralis (moxvnamde) damuSavebas, xolo aoSva gulisxmobs xnulis (moxvnis Semdeg niadagis) damuSavebas. gansakuTrebiT maRal efeqts iZleva igi mSral, gvalvian pirobebSi Zlier dasarevlianebul niadagebze, sadac gaTvaliswinebulia saSemodgomo TavTavianebis Tesva.

saSemodgomo TavTavianebisaTvis niadagis ZiriTadi xvnis win, winamorbedi TavTavianebis aRebisTanave niadagi unda damuSavdes specialuri saoSi iaraRebiT 10-14 sm-is siRmeze, raTa sarevela mcenareebis Tesls, romlebic niadagis zedapirzea moTavsebuli SeuqmnaT gaRivebisa da aRmocenebisaTvis Sesabamisi pirobebi. xolo aRmocenebis Semdeg unda CavataroT niadagis ZiriTadi xvna srul (25-30 sm-is) siRrmeze.

**sagazafxulo kulturebisaTvis Nniadagis damuSaveba**

**(mzralad xvna).**

mzralad xvna tardeba SemodgomiT (noembris bolos, iSviaTad ki klimaturi pirobebidan gamomdinare dekembris pirvel dekadaSi), saxnavi fenis srul siRrmeze da moxnuli farTobi zamTris ganmavlobaSi rCeba xeluxlebeli. wvimisa da yinvebis moqmedebiT belti iSleba (zamTarSi), mosuli naleqebis SenarCunebis mizniT daifarcxeba gazafxulze, pirvelive SesaZleblobisTanave. imisaTvis rom niadagSi srulad SevinarCunoT zamTarSi mosuli naleqebi. momdevno samuSaoebi tardeba agroteqnologiis Sesabamisad saTesi kulturebis mixedviT.

Aadreuli sagazafxulo kulturebisaTvis (TavTavianebi, mzesumzira, Warxali, erTwlovani parkosnebidan barda, xanduri da sxva) Tesvis win vatarebT niadagis Tesviswina damuSavebas, mzralis mdgomareobis mixedviT\_ gadaxvnas naxevar siRrmeze an mTlian kultivacias farcxviT, xolo Semdeg Tesvas. rac Seexeba gvian saTes kulturebs, rogoricaa: simindi, soia, lobio, sorgo da sxva niadagis pirveli farcxvis Semdeg (Tesvamde) sakmaod didi dro rCeba da Tanac xelsayreli pirobebi sarevelebis ganviTarebisaTvis, amitom aRmocenebuli sarevelebis winaaRmdeg sabrZolvelad saWiroa niadagis 8-10 sm-is siRmeze kultivacia farcxviT, xolo Tesvis win ganmeorebiT kultivacia 6-7 sm-is siRrmeze farcxviT.

niadagis damuSavebis zemoT aRniSnuli teqnologia misaRebia naklebtenian, teniT uzrunvelyofil da vake adgilebis pirobebSi, xolo rac Seexeba sakmaod daxril (100-zeviT) ferdobebs da dasavleT saqarTvelos Warbtenian pirobebs-niadagis mzaralad damuSaveba xSir SemTxvevaSi uaryofiT Sedegebs iZleva da dakavSirebulia wylisa da qarismieri eroziis uaryofiT movlenebTan, niadagis zedmet datenianebasTan. gamomdinare aqedan aRniSnul pirobebSi sagazafxulo kulturebisaTvis niadagis momzadeba diferencirebuli unda iyos klimaturi, reliefuri da niadagobrivi pirobebis gaTvaliswinebiT.

ferdobebze niadagis xvna unda mimdinareobdes gardi-gardmo mimarTulebiT, imis gaTvaliswinebiT ramdenad amcirebs igi wylis zedapirul Camonadens da niadagis Camorecxvis intensivobas da xels uwyobs niadagSi tenis regulirebas.

Warbteniani niadagebis damuSaveba sagazafxulo kulturebisaTvis Zireulad gansxvavdeba mzralis damuSavebisagan. ZiriTadi xvna aseT niadagebze mimdinareobs gazafxulze, pirvelive SesaZleblobisTanave. imis gamo, rom moxnuli niadagebi Zlieri beltianobiT xasiaTdeba, saWiroa beltebis daSla diskebiani farcxiT im angariSiT, rom niadagis zedapiri erTis mxriv moswordes, xolo meores mxriv daiSalos beltebi. mZime Tixnari niadagebi, Tu is Zlier datenianebulia, saWiroebs gadaxvnas tenis intensiuri aorTqlebis mizniT, raTa niadagSi moxvedril Tesls Seeqmnas idealuri pirobebi aRmocenebisaTvis.

**niadagis Tesviswina damuSaveba.** niadagis Tesviswina (Tesvamde 2\_-4 dRiT adre) damuSaveba metad efeqturi saSualebaa maRali da stabiluri mosavlis misaRebad.

niadagis Tesviswina damuSaveba ZiriTadad mimdinareobs da gamoixateba naxnavis mTlian kultivaciaSi xnulis gardi-gardmo mimarTulebiT. gafxvierebuli niadagi qmnis idealur pirobebs marcvlis gaRivebisaTvis da asufTavebs nakveTs SesaZlebeli sarevelebisagan, asworebs niadagis zedapirs da uzrunvelyofs saTesle marclis erT sibrtyeSi ganlagebas. erT siRrmeze daTesili marclis aRmoceneba xdeba erTdroulad (Tanabrad), rac mosavlis aRebis optimalur vadaSi Catarebis saukeTeso RonisZiebad SeiZleba CaiTvalos.

**naTesis movliTi RonisZiebebi.** Ppirveli movliTi RonisZiebebi gulisxmobs aRmonacenis dafarcxvas naTesis gardi-gardmo mimarTulebiT. TavTavianebSi agroteqnikuri cikli amiT amoiwureba, xolo saToxn kulturebSi movliTi RonisZiebebi gamoixateba rigTaSorisebis gafxvierebaSi\_kultivaciaSi. magaliTad, simindis aRmonaceni, rodesac miaRwevs sami foTlis fazas vatarebT kultivacias 8-10 sm-is siRrmeze da vafxvierebT niadags (Toxna). amave dros mimdinareobs mcenareTa pirveli gamoxSirvac. Ppirveli kultivaciidan 20-25 dRis Semdeg tardeba meore Toxna-kultivacia (5-6 sm-is siRrmeze) mcenaridan 8-10 sm-is daSorebiT da TanmiyolebiT meore bolo gamoxSirviT. aseve viqceviT mzesumziras, sorgos da sxvaTa SemTxvevaSic.

**niadagis damuSavebis minimalizacia**. Tanamedrove soflis meurneoba pirveli rigis amocanad ayenebs uxvi da stabiluri mosavlis miRebis sakiTxs. igi, rogorc wesi dakavSirebulia niadagis optimalur damuSavebasTan, saxnavi agregatebis Tu amRebi manaqana\_iaraRebis zemoqmedeba xSir SemTxvevaSi iwvevs niadagis zedapiris zedmet motkepnas, rac 60-70% amcirebs wtyalgamtarobas, niadagis agregatebis sidides, iwvevs struqturis daSlas, nayofierebis mkveTr Semcirebas. gamomdinare aqedan, dRis wesrigSi dgas principulad axali, niadagdamcavi sistemis damuSaveba. aRniSnulis gadasawyvetad sul ufro metad ikidebs fexs niadagis damuSavebis axali wesi e.w. niadagis damuSavebis **minimalizacia**.

niadagis damuSavebis minimalizacia sam ZiriTad pirobas gulisxmobs: 1. ekonomikurs (mosavlianobis mateba, produqciis TviTRirebulebis Semcireba). 2. niadagis nayofierebis SenarCuneba-gadidebas (niadagSi humusis da wylis balansis gaumjobeseba). 3. melioraciuli RonisZiebebis farTo gamoyenebas.

niadagis damuSavebis minimalizaciis yvelaze ufro xelmisawvdomi gza aris ZiriTadi da Tesviswina samuSaoTa gaerTianeba, Cveulebrivi guTnis, farcxisa da satkepnelis erToblivi gamoyenebiT. pirvel rigSi, im SemTxvevaSi Tu winamorbedi kulturis aRebisaTanave momdevno kulturis Tesvis optimaluri vada metad SezRudulia. magaliTad, nawveralze sanawveralo (sasilose simindi) an sanaTibo (balaxebis Tesva) Tesvis SemTxvevaSi. aRniSnulis garda es RonisZieba gulisxmobs ZiriTadi xvnis siRrmis 12-15 sm-mde Semcirebas. garda aRniSnulisa, mosavlianobis Seumcireblad sagrZnoblad amcirebs sawvavisa da saerTod sawarmoo xarjebs, amasTan niadagSi zrdis hemusis Semcvelobas da aerobuli procesebis Senelebis zegavleniT amcirebs mis yovelwliur xarjvas, garda amisa aRiarebulia, rom igi xels uwyobs niadagSi tenianobis reJimis gaumjobesebas. yuradReba unda miqeces imasac, rom niadagis damuSavebis minimalizacia xelsayrel pirobas qmnis mindvris samuSaoebis SemWidroebul vadebSi da droul Catarebas, rasac udidesi mniSvneloba eniWeba warmoebis pirobebSi.

imisaTvis, rom mizanSewonili iyos da amasTanave sasargebloc niadagis minimaluri damuSaveba unda SemuSavdes adgilobrivi niadagur-klimaturi da sameurneo pirobebisaTvis Sesaferisi naTesis struqtura, SeirCes sasoflo-sameurneo kulturaTa maRalproduqtiuli jiSebi, organuli da mineraluri sasuqebis saWiro raodenoba, unda gamoviyenoT mcenareTa mavnebelebisa da daavadebaTa winaaRmdeg brZolis Sesaferisi meTodebi, winaaRmdeg SemTxvevaSi niadagis damuSavebis aRniSnuli progresuli meTodi naklebad efeqturi iqneba, xSir SemTxvevaSi ki sazianoc.

cdebiT dadginda, rom umaRles doneze Sesrulebuli niadagis damuSavebis minimalizaciis samuSaoebis drosac ki 3­-4 weliwadSi erTxel saWiroa niadagis damuSavebis Cveulebrivi meTodiT beltis gadabruneba, rac xels Seuwyobs niadagSi mikrofloris ganaxlebas, sakveb nivTierebaTa mobilizacias, aerobuli procesebis gaaqtiurebas, gaaZlierebs sarevelebTan brZolis meqanikur saSualebaTa efeqturobas, rac saboloo jamSi uzrunvelyofs kulturaTa maRal mosavlianobas.

aRniSnuli RonisZiebebis praqtikaSi danergva metad efeqturi da aucilebelic aris samTo miwaTmoqmedebis pirobebSi, saSualod da Zlieri daxrilobis ferdobebis damuSavebis SemTxvevaSi. igi sagrZnoblad amcirebs an saerTod gamoricxavs eroziul procesebs.

**ZiriTadi cnobebi mcenareTa ekologiis Sesaxeb**

ekologiis (berZnulad – “oikos” niSnavs “saxls”, “binas”, “adamianis uSualo garemocvas”) sagans, farTo gagebiT, warmoadgens organizmebsa da maT garemos Soris erToblioba an kavSirebis struqtura. igi bilogiuri mecnierebaa da or ZiriTad nawilad iyofa: zogadi da kerZo ekologia. es ukanaskneli Tavis mxriv moicavs mcenareTa da cxovelTa ekologias. mcenareTa ekologiis, anu calkeul mcenareTa, agreTve mcenareul Tanasazogadoebebsa da garemos Soris urTierdamokidebulebis codna, sxva sakiTxebTan erTad, ganapirobebs konkretuli sakvebi savargulis mcenareuli safaris tipisa da adgilsamyofelis pirobebidan gamomdinare, am savargulis botanikuri Sedgenlobis gaumjobesebis, balaxnaris produqtiulobis gadidebis da racionaluri gamoyenebis agrotqenikuri da organizaciul-sameurneo xasiaTis RonisZiebebis sworad dadgenas. garemo pirobebis umTavresi faqtorebis mimarT sakvebi balaxebis damokidebulebis codnas gadamwyveti mniSvneloba aqvs balaxnarevis SerCevisas adgilobriv pirobebs morgebuli maRalproduqtiuli naTesi saTibis an saZovris Seqmnis dros.

garemo mraval ekologiur faqtors moicavs, romlebsac sasicocxlo mniSvneloba aqvT mcenareTa zrda-ganviTarebisaTvis. isini ganapirobeben mocemul adgilsamyofelze ama Tu im mcenaris, an mcenareuli Tanasazogadoebis arsebobis SesaZleblobas. mcenareTa da garemos Soris urTierTmoqmdeba metad mravalferovani da mravalgvaria. erTi mxriv mcenare garemodan iTvisebs misi arsebobisa da cxovelmoqmedebisaTvis saWiro yvela nivTierebas (wyals masSi gaxsnili mineraluri marilebiT, Jangbads, naxSirorJangs da sxv), STanTqavs mzis energias da maTi saSualebiT qmnis misTvis aucilebel organuli nivTierebebs. meores mxriv mcenareSi mimdinare bioqimiuri procesebis Sedegad garemos ubrundeba Jangbadi, naxSirorJangi, wyali, nivTierebis cvlis produqtebi da a.S.

ekologiuri faqtorebis ramdenime jgufs gamoyofen: 1. atmosferuli anu klimaturi (sinaTle, haeri, temperatura, wyali); 2. niadaguri anu edafuri, (niadagis qimiuri, fizikuri, meqanikuri Taviseburebebis gavlena mcenareze); 3. topografiuli (reliefi, simaRle zRvis donidan); 4. bioturi (cxoveluri organizmebis, agreTve sxva mcenareTa gavlena mcenareze); 5. anTropogenuri (adamianis gavlena mcenareze). rogorc wesi bunebrivi sakvebi savargulebis da naTesi saTib-saZovrebis balaxnaris zrda-ganviTareba da mosavlianoba ganpirobebulia zemoTCamoTvlili ekologiuri faqtorebis mTeli kompleqsis erToblivi moqmedebiT. maT Soris erTgvari upiratesi mniSvneloba aqvs mcenaris uzrunvelyofas wyliT da mineraluri kvebis elementebiT. es miT ufro yuradsaRebia, rom adamianis mier farTo masStabiT swored am ori faqtoris regulirebaa SesaZlebeli (cxadia garkveul farglebSi) sasuqebis SetaniT da saTanado samelioracio samuSaoebis CatarebiT. rasakvirvelia es ise ar unda gavigoT, rom wylisa da sakvebi nivTierebebis Tundac suboptimaluri pirobebis uzrunvelyofa gamoricxavs sxva ekologiuri faqtoris zegavlenas mcenareTa zrda-ganviTarebaze. ekologiuri faqtorebi urTierTSeunacvlebelia, erTi faqtoris moqmedeba mWidro urTierTkavSirSia sxva faqtorebis moqmedebasTan da mxolod yvela maTganis optimaluri an optimalurTan miaxloebuli parametrebis moqmedebisas aris SesaZlebeli mcenaris potenciuri SesaZleblobebis gamovlineba.

TavianTi istoriuli ganviTarebis procesSi mcenareebi TandaTanobiT eguebodnen garemos gansazRvrul pirobebs, romlebic mocemuli saxeobisaTvis sasicocxlo mniSvnelobis gaxdnen. ekologiuri faqtorebis cvalebadobaze damokidebuli am pirobebis mkveTri Secvla aferxebs mcenareTa normalur ganviTarebas da xSirad maT daRupvas iwvevs. bunebrivi sakvebi savargulebis mcenareTa zrda-ganviTarebis pirobebi icvleba, rogorc vegetaciis periodis, e.i. erTi wlis manZilze, aseve wlebis mixedviTac. aqedan gamomdinare sakvebi balaxebis ekologiuri TvalsazrisiT daxasiaTebisaTvis metad mniSvnelovania dazustdes maTi damokidebuleba cvlilebebis am ori jgufis mimarT. aseve aucilebelia gairkves mcenareTa saxeobebis gamZleoba, e.i. unari ganviTardnen romelime ekologiuri faqtoris an faqtorTa kompleqsis mimarT suboptimalur pirobebSi, anda win aRudgnen araxelsayreli pierobebis droebiT moqmedebas. ase, magaliTad, saqarTvelos naxevrad udabnosa da mSrali velis sartyelSi gavrcelebul mcenareTa bevr saxeobas gvalvis dadgomasTan erTad scviva foToli, rac transpiraciis da wylis moTxovnilebis Semcirebas iwvevs. alpebSi, sadac dRe-Ramuri temperaturis cvalebadobis didi amplitudaa, farTod aris gavrcelebuli e.w. baliSa-mcenareebi, romelTa SigniT SedarebiT Tanabari temperaturaa, grovdeba teni da mcenaris ukeT ganviTarebis pirobebi iqmneba.

aRsaniSnavia isic, rom Tavis mxriv mcenarec moqmedebs garemoze da mis mniSvnelovan cvlilebebs ganapirobebs. cnobilia tyis dadebiTi gavlena saerTo klimatze; balaxovani mcenareuloba aumjobesebs haeris da niadagis temperaturul reJims, aorTqlebis Semcirebis gamo adidebs niadagis zedapiris da haeris tenianobas, amcirebs qaris siCqares, xels uwyobs Tovlis safaris SenarCunebas. mcenareebi amdidreben niadags organuli nivTierebebiT, aumjobeseben mis qimiur Sedgenilobas da struqturas, haer da wyalgamtarobas, ganapirobeben mikrofloris ganviTarebas da saboloo jamSi naidagis nayofierebis amaRlebas.

**F mosavlianobaze moqmedi faqtorebi**

niadagis wylis da sahaero reJimi mWidro kavSirSia da maTi urTierToba garkveul farglebSi ganapirobebs mcenareTa momaragebas JangbadiT. sakvebi balaxebis normaluri ganviTarebisaTvis optimaluri pirobebi aRiniSneba maSin, rodesac niadagis wyliT gajerebis maCveneblebi meryeobs zRvruli mindvruli tentevadobis 70-80%-is farglebSi.

zrdisa da ganviTarebis calkeul etapebze sakvebi mcenareebi wylis sxvadasxva raodenobas moiTxoven. marcvlovanebis moTxovnileba wylis mimarT ganuwyvetliv matulobs Teslis gaRivebis an vegetaciis ganaxlebidan (mravalwlovan balaxebSi) dawyebuli yvavilobamde, Semdeg ki TandaTanobiT klebulobs. wylisadmi kritikuli periodi simindSi aRiniSneba yvaviloba – rZisebri simwifis fazaSi, mzesumziras igi kalaTis formirebisas ewyeba, TavTavianebSi ki aRereba-daTavTavebas emTxveva.

wyali aucilebelia agreTve niadagSi mobinadre mikroorganizmebis cxovelmoqmedebisaTvis. ase, magaliTad, atmosferos azotis mafiqsirebeli baqteriebis gamravleba swarmoebs mxolod niadagis 25%-iani tenianobis dros, xolo maTi normaluri ganviTarebisaTvis saWiro optimaluri tenianoba niadagis sruli wyaltevadobis 60%-is dros miiRweva.

sakvebi savargulebis balaxnaris ganviTarebasa da mosavlianobaze metad didi gavlena aqvs gruntis wylis dones. mdelos balaxebis zrda-ganviTarebis optimaluri pirobebi iqmneba maSin, rodesac vegetaciis periodSi kapilaruli wylebi aRweven niadagis fesvTa ganlagebis fenas. gavixsenoT, rom kapilaruli ewodeba meniskis molekuluri ZaliT dakavebul wyals, romelic niadagis kapilarul forebSia da meniskis ZaliT yvela mimarTulebiT moZraobs. mcenareTa fesvebsa da gruntis wylis Soris kontaqtis gawyveta, iseve rogorc gruntis wylis donis droebiT amaRleba da iqidan haeris gandevna qmnis araxelsayrel pirobebs balaxis zrdisa da ganviTarebisaTvis. ustruqturo, gamtverebul da mkvriv niadagebze wyali kapilarebiT zeviT miimarTeba, rac aswrafebs saxnavi fenis amoSrobas. amitomaa, rom niadagis zeda fenis gafxviereba da masSi kapilarebis mospoba mniSvnelovnad amcirebs aorTqlebas da xels uwyobs niadagSi tenis SenarCunebas. amasTan erTad, calkeul SemTxvevebSi, pirvel rigSi Tesvis dros, gansakuTrebiT gvalvian regionebSi, aucilebelia tenis akumulacia qveda fenebidan zedaSi, rac miiRweva niadagis motkepvniT. mZime sagoravebiT niadagis damuSaveba mkveTrad adidebs kapilarebis raodenobas da tenis mozidvas niadagis qveda fenebidan Teslebis ganlagebis zonaSi.

gruntis wylis done sakmaod did farglebSi meryeobs wlis, sezonis, amindis, wylis xarjvis, savargulis gamoyenebis xasiaTis da sxva faqtorebisagan damokidebiT. Tu ra gavlenas axdens gruntis wylis done balaxnaris mosavalze naTlad Cans. v. frekmanis mier germaniaSi warmoebuli cdebis Sedegebidan:

gruntis wylis ganlagebis siRrme (sm) 40 70 100 130

SefardebiTi mosavali (damrgvalebuli) (%) 100 89 85 7

daskvnis saxiT unda aRiniSnos, rom balaxnaris zrda-ganviTarebisaTvis gruntis wylis ganlagebis yvelaze ufro optimaluri done meryeobs 40-100 sm farglebSi da igi mraval faqtorzea damokidebuli; maT Soris gadamwyveti mniSvneloba aqvs gruntis wylis donis cvalebadobis amplitudas vegetaciis manZilze. balaxnaris saZovrad gamoyenebis dros gruntis wylis done sasurvelia ufro dabla iyos, vidre saTibebze.

wylisadmi damokidebulebis mixedviT sakveb savargulebze gavrcelebuli mcenareebi sxvadasxva ekologiur tipebs miekuTvnebian, romlebic TandaTanobiT Camoyalibdnen evoluciis procesSi. es tipebia: mezofitebi, qserofitebi da higrofitebi.

mezofitebs miekuTvneba tenianobis saSualo pirobebSi mozardi mcenareebi. maTi optimaluri zrda-ganviTarebisaTvis saWiroa niadagis datenianeba sruli wyaltevadobis 75-80% farglebSi meryeobdes. mezofitebs axasiaTebT farTo, Txeli, Seubusavi an sustad bususiani foTlebi. teniT sakmarisad uzrunvelyofil pirobebSi mezofiluri balaxebi inviTareben SedarebiT zedapirul fesvTa sistemas, romelic ufro mSral niadagebze gacilebiT met siRrmes aRwevs. mezofitebi farTod arian gavrcelebuli tyisa da tye-stepis zonaSi, subalpebsa da alpebSi, salek mdeloebze. maTi umravlesoba maRali kvebiTi RirebulebiT xasiaTdeba. mezofitebs miekuTvnebian saTiTura, mdelos wivana, mdelos timoTela, lurji ionja, mdelos samyura da mravali sxva, sakvebad Zvirfasi mravalwlovani balaxi.

qserofitebi warmoadgenen mSrali adgilsmyofelisaTvis damaxasiTebel mcenareebs, romlebic Seguebulni arian haeris maRal temperaturas da tenis naklebobas niadagSi, e.i. gaaCniaT atmosferuli da niadaguri gvalvis (cxadia garkveul farglebSi) gadatanis unari. maT axasiaTebT mZlavri fesvTa sistema, rac niadagis Rrma fenebSi arsebuli wylis gamoyenebis saSualebas aZlevT. qserofitebs axasiaTebT viwro, xSirad danawevrebuli foToli, romelic zogjer dafarulia cvilisebri nafifqiT an bususebiT, rac amcirebs aorTqlebas. maTi fesvTa sistema mZlvradaa ganviTarebuli da miwisqveSa masa ramdenjerme aRemateba miwiszedas. fesvis ujredebSi ujredis wvenis maRali osmosuri wnevis gamo qserofiti mcenareebis umravles saxeobas unari aqvs maqsimalurad gamoiyenos niadagis xsnaris mcire raodenobac ki, agreTve ukeT Seeguos niadagis damlaSebas.

**qserofitebis** or qvetips ganasxvaveben: sklerofitebs da sukuluntebs. sklerofitebs uwodeben mSrali adgilsamyofelis gvalvagamZle xeSeSfoTlian mcenareebs, romlebsac sxvadasxva samarjvi gaaCniaT cxel periodSi wylis aorTqlebis SemcirebisaTvis. ase, magaliTad, sklerofit marcvlovanTa zogierTi warmomadgeneli gvalvis dadgomisas maTTvis damaxasiaTebel viwro foTols milad axvevs da mniSvnelovnad amcirebs aorTqlebas (velis wivana, lesingis vaciwvera, koxta kewewura, iaponuri Svriela dasxva); sklerofitebis erTi jgufi foTlis saxesxvaobas – ekals – inviTarebs (kavkasiuri glerZi, wvrilTavaka glerZi, cercvekala da sxv); zogierTs zafxulSi mTlianad scviva foToli (Savi avSani) da a.S.

**sukulentebs** axasiaTebT xorcovani wvniani foTlebi (kldisduma, aloe, agava, kldis vaSla), an gamsxvilebuli Rero da reducirebuli foTlebi; es ukanasknelni zogjer eklebadaa gadaqceuli (kaqtusebi da rZianas zogierTi saxeoba). foTlis da Reros Zlier ganviTarebul wylis Semcvel parenqimaSi didi raodenobiT grovdeba wyali (kaqtusebis zogierT saxeobaSi 2-3 t), romelic TandaTanobiT da ekonomiurad ixarjeba gvalvian periodSi.

saqarTvelos bunebriv sakveb savargulebze qserofiti mcenareebi gavrcelebulia naxevrad udabnosa da mSrali velis zonaSi, amasTan mravali maTgani intensiurad gamoiyeneba pirutyvis sakvebad (velis wivana, sisxlis SemaCerebeli uro, udabnos kapueta, vaciwverebis ramdenime saxeoba, avSani, wiTelwvera, mTis, mananisebri da xisebri mlaSa, TaTruli TuTubo da sxv.).

**higrofiti** mcenareebi gavrcelebulia Warbtenian niadagebze, (mdinareTa da tbebis pirebi, daWaobebuli mdeloebi da sxv); maTTvis damaxasiaTebelia farTo da nazi foToli, susti fesvTa sistema, bageebis foTlis orive mxareze ganlageba. hidrofitebis didi umravlesoba an ar, an cudad iWmeva, xasiaTdeba metad dabali yuaTianobiT, Tumca pirutyvis sakvebad mainc gamoiyeneba. maT miekuTvneba islebis, gvimras, Wilis saxeobebi, leli da sxv.

WaobebSi, mdinareTa, tbebis napirTan axlos, wyalSi, gvxvdeba **hidrofitebi,** anu mcenareebi, romlebic wyalSi CaZirulni arian mxolod qveda nawiliT (gansxvavebiT **hidatofitebisagan,** romlebic mTlianad an sxeulis umetesi nawiliT arian CaZiruli wyalSi). maT miekuTvneba zogierTi isli, frTaTeTra, wylis vazi, TeTri da yviTeli dumfara da sxv.

higrofitebis mravali warmomadgeneli, gansakuTrebiT nairbalaxebidan, Sxamiania (lobelis Sxama, Sxamiani baia, didbaia, Sxamiani cikuta da sxv). zogierTi hidrofiti da hidatofiti mcenare gamoiyeneba Tevzis (TeTri amuri, sqelSubla da sxv), pirutyvis da frinvelis sakvebad.

maRalmTis bunebriv sakveb savargulebze farTo gavrceleba aqvT e.w. **fsiqrofitebs,** mcenareebs, romlebic viTardebian tenian da civ niadagebze (Zigva, maxrCobela, Wreli wivana da sxv). maRalmTis savargulebze gvxvdeba agreTve **kriofitebi** – sicivis gamZle, magram fsiqrofitebisagan gansxvavebiT mSrali adgilebisaTvis damaxasiaTebeli mcenareebi.

wylisadmi damokidebulebis mixedviT CamoTvlil ZiriTad tipebs Soris gardamavalic gvxvdeba, rasac ganapirobebs mcenareTa plastikuroba: mezofitebidan qserofitebamde an higrofitebamde SeiZleba gamoiyos mcenareebi, romlebic garegnulad mezofitebs uaxlovdebian, xolo biologiiTa da ekologiiT an qserofitebs an higrofitebs miekuTvneba. ase magaliTad, mezo-qserofitebs miekuTvneba: savarcxlisebri kapueta, cimbiruli kapueta, yviTeli ionja, esparceti, agreTve efemerebi da efemeroidebi, romlebsac rogorc ukve aRvniSneT, Zalze mokle savegetacio periodi axasiaTebT da gazafxulzeve amTavreben ganviTarebis cikls. gardamavals mezofitebidan haerofitebamde warmoadgenen Waobis Tivaqasra, lerwmisebri Sriala-balaxi, Cveulebrivi xuWuWa da sxv.

haerisa da niadagis simSralis, agreTve maRali temperaturis da tenis naklebobis dros mcenaris unars normaluri pirobebis dadgomisas ganagrZos zrda – ganviTareba da mogvces mosavali, ewodeba **gvalvagamZleoba.** igi ganisazRvreba adgilsamyofelis klimaturi da niadaguri pirobebiT, romelTa zemoqmedebiT mcenareebs gamoumuSavdaT qserofitebisaTvis damaxasiaTebeli niSan-Tvisebebi (transpiraciis, agreTve foTlis da Reros aRnagobis Taviseburebebi, foTlis kanis gasqeleba, Rrma, mZlavri fesvTa sistema da sxv). gvalvagamZle balaxebs miekuTvneba mravali mravalwlovani marcvlovani, rogorc qserofiti (kapuetebis, vaciwverebis ramdenime saxeoba, datotvili Wanga da sxv), aseve mezofiti mcenare (maRali koindari, ufesuro Wanga da sxv).

bunebriv sakveb savargulebze gavrcelebuli balaxebi gansxvavdebian erTmaneTisagan tengamZleobiTac. gvalvagamZleobis sapirispiro mcenareTa es Tviseba mdgomareobs maT unarSi SeinarCunon cxovelmoqmedeba xanmokle an xangrZlivi Warbtenianobis (datborvis) pirobebSi, xolo normaluri tenianobis aRdgenisas warmoqmnan mosavali. naRrulavi wylebis gavlena mdelos mcenareebze damokidebulia datborvis xangrZlivobaze da nalamis nafenis sisqeze. ganasxvaveben zedapirul da qvemodan – niadagidan wyalSedgomiT datborvas. pirveli damaxasiaTebelia saleki mdeloebisaTvis da limanuri morwyvisas. salek mdeloebze, romlebic saqarTveloSi didi mdinareebis napirebzea warmodgenili, mcenareTa ganviTarebis intensivobaze mniSvnelovan gavlenas axdens wylis davardnis Semdeg darCenili nalami. datborebis mimarT damokidebulebis mixedviT mcenareTa sam jgufs gamoyofen: 1) sustad gamZle, romlebic datborvas uZleben araumetes 10-15 dRisa (saTiTura, velis wivana, maRali koindari, wvrilfoTola Tivaqasra da sxv); b) saSualod gamZle 15-30 dRe, (mdelos wivana, wiTeli wivana, mdelos timoTela, maxrCobela, mdelos Tivaqasra, Zirtkbila da sxv); g) Zlier gamZle – 40 dReze meti (TeTri namikrefia, mdelos melakuda, ufxo Svriela, mxoxavi Wanga, lerwmisebri Sriala-balaxi, Cveulebrivi xuWuWa da sxv). aRsaniSnavia, rom naRvaruli wyliT datborvas mcenareebi gacilebiT ukeT itanen gazafxulze, vidre zafxulsa da SemodgomiT. es aixsneba ara marto imiT, rom am dros mcenare ganviTarebis adreul fazaSi imyofeba, aramed imiTac, rom gazafxulis wylebi gacilebiT mdidaria JangbadiT.

**Nniadaguri faqtorebi**. mcenaresa da niadags Soris urTierTmoqmedeba da urTierTgavlena metad mravalmxrivia. upirveles yovlisa mcenaris zrda-ganviTarebis msvlelobasa da intensivobaze moqmedeben niadagis fizikuri (struqtura, meqanikuri Sedgeniloba, tentevadoba, bmuloba, simkvrive da a.S.) da qimiuri Tvisebebi (niadagis reaqcia, humusi, marilianobis reJimi, ZiriTadi sakvebi nivTierebebi da a.S.), agreTve niadagSi mobinadre mikroorganizmebis (baqteriebi, sokoebi da a.S). Sedgeniloba da raodenoba. aRsaniSnavia dedaqanis moqmedeba niadagze, rac rogorc Sedegi gavlenas axdens mcenarezec. Tavis mxriv mcenare aumjobesebs niadagis struqturas, amdidrebs mas organuli narCenebiT, aregulirebs aerobuli da anaerobuli mikrorganizmebis moqmedebas, xels uwyobs azotis dagrovebas da sxv.

mcenaris organizmi 75-ze met qimiur elements Seicavs, romelTagan 16 absoluturad aucilebelia mcenaris zrda-ganviTarebisa da sicocxlisunarianobisaTvis. esenia: organogenuli elementebi – naxSirbadi, Jangbadi, wyalbadi da azoti; nacris elementebi –fosfori, kaliumi, kalciumi, magniumi, rkina da gogirdi; mikroelementebi – bori, manganumi, spilenZi, TuTia, molibdeni da kobalti. am elementebidan sams – naxSirbads, Jangbadsa da wyalbads, romelTa wilad modis mcenaris mSrali masis 93,5%, mcenare Rebulobs haeridan da niadagidan wyalTan erTad. azotis – mcenaris kvebisaTvis erTerTi umniSvnelovanesi elementis \_ ZiriTad wyaros warmoadgens niadagis organuli nivTierebebi, agreTve Sesabamisi baqteriebis mier fiqsirebuli haeris azoti. wlis ganmavlobaSi balaxovani mcenareebis da niadagSi mobinadre cocxali organizmebis kvdomis ganuwyvetel procesTan da organuli SenaerTebis dagrovebasTan erTad mimdinareobs maTi mineralizacia mcenarisaTvis SesaTvisebeli azotis formebis - amoniumis da nitratebis – warmoqmniT. yvela saWiro sakveb nivTierebebs mcenare STanTqavs niadagis xsnaridan advilad xsnadi marilebis saxiT. mcenarisaTvis saWiro am elementebis ZiriTadi nawili niadagSi uxsnad, mcenarisaTvis Znelad SesaTvisebeli an SeuTvisebeli SenaerTebiT da nivTierebebiTaa warmodgenili. es uxsnadi organuli da mineraluri SenaerTebi sakvebi nivTierebebis samarago fonds warmoadgenen, romlebic qimiuri da biologiuri procesebis zegavleniT TandaTanobiT gadadian xsnad, mcenarisaTvis advilad SesaTvisebel formaSi. nacris elementebis dagroveba swarmoebs niadagis mineraluri nawilis gamofitvis, an organuli nivTierebebis mineralizaciis Sedegad.

sxvadasxva botanikur-sameurneo jgufis mcenareebi optimaluri zrda-ganviTarebisaTvis sakvebi elementebis mimarT gansxvavebul moTxovnilebas amJRavneben. ase, magaliTad, marcvlovani balaxebi maRali mosavlis misaRebad didi raodenobiT azots saWiroeben, romelic niadagSi amoniumis marilebis an nitratebis formiT unda iyos. parkosani balaxebi ki, romlebic TviTon iTviseben atmosferul azots azotmafiqsirebeli baqteriebis saSualebiT, pirvel rigSi fosforsa da kaliums moiTxoven. gansxvavebulia erTi da igive mcenaris moTxovnileba sakveb elementebze vegetaciis sxvadasxva fazaSi. ase, magaliTad, marcvlovani balaxebi daTesvidan bartyobamde ufro metad fosfors saWiroeben, bartyobis fazaSi – azots, aRebisas-upiratesad kaliums.

sakvebi nivTierebebis mimarT moTxovnilebis mixedviT mcenareebi sam ZiriTad jgufad iyofa: a) mcenareebi, romlebic eguebian mwire niadagebs, e.w. oligotrofebi; b) mcenareebi, romlebic mxolod noyier, mdidar niadagebze xaroben, e.w. eutrofebi; g) maT Soris gardamavali, saSualo noyierebis niadagze mozardi mcenareebi, e.w. mezotrofebi.

mwiri niadagebisaTvis damaxasiaTebelia iseTi balaxebi, rogoricaa Cveulebrivi namikrefia, Zigva, orsaxla busustana, kurdRlis balaxi, Cveulebrivi manana da sxv. saSualo nayofierebis niadagebze gvxvdeba bunebriv sakveb savargulebze gavrcelebuli marcvlovani da parkosani mcenareebis umravlesoba – mdelos timoTela, saTiTura, mdelos wivana, ufxo Svriela, lurji ionja, mdelos (wiTeli) samyura, mxoxavi (TeTri) samyura da mravali sxva. sakvebi nivTierebebiT mdidar niadagebs moiTxoven sosnovskis diyi, orsaxla WinWari, veluri kanafi, TeslfoTola qafura, mamula, mariamsxala da sxv.

mcenaris unari gamoiyenos niadagSi arsebuli azoti, nacris elementebi da sxva sakvebi nivTierebebi damokidebulia upirveles yovlisa misi fesvTa sistemis ganviTarebis xarisxze: rac ufro mZlavri da ganStoebulia fesvTa sistema, rac ufro didia fesvebis Semwovi zedapiri, miT ufro srulad SeuZlia mcenares gamoiyenos niadagSi arsebuli misTvis aucilebeli makro da mikroelementebi. amasTan dakavSirebiT gansakuTrebiT mniSvnelovania im fesvebis roli, romlebic ganlagebulia niadagis organuli nivTierebebiT mdidar zeda fenaSi, sadac am nivTierebebis mineralizaciis Sedegad warmoiqmneba azotis, fosforis da sxva elementebis mcenarisaTvis SesaTvisebeli formebi. yuradsaRebia agreTve sakvebi balaxebis calkeuli saxeobebis fesvTa sistemaTa gansxvavebuli unari gamoiyenon mineraluri azotis, fosforis, kaliumis da sxva elementebis naerTebis erTi da igive da sxvadasxva formebi, aseve niadagis organul nivTierebebSi arsebuli azoti da nacris elementebi. ase, magaliTad, marcvlovanebi ukeT iyeneben kaliumis niadagSi arsebul SesaTvisebelSenaerTebs, vidre parkosnebi; zogierTi parkosani (xanWkola) kargad iyenebs Znelad SesaTvisebel fosfatebs, ris unarsac marcvlovanebi moklebulia.

gansakuTrebuli ekologiuri mniSvneloba aqvs mdelos mcenareebis azotiT uzrunvelyofas. mdelos balaxebisaTvis azotis wyaros warmoadgens atmosferuli da sxva wyali, niadagSi arsebuli azoti, mikroorganizmebis mier fiqsirebuli atmosferuli azoti, pirutyvis mier gamoyofili eqskrementebi da sasuqebi. azotis CamoTvlil wyaroebs Soris metad umniSvneloa atmosferuli wylebi da gansakuTrebiT mcire ki niadagis teni da gruntis wylebi. ramdenamde meti azoti Semoaqvs mdeloebze naRvarev wylebs, miTumetes wvrilmiwa, organuli nivTierebebiT mdidari lamis daleqvisas, agreTve savargulis morwyvisas Camdinare wylebiT. bmuli azotis did raodenobas agroveben niadagSi mikroorganizmebi azotis fiqsaciis Sedegad (parkosnebis koJris baqteriebi, niadagSi binadari azotisfiqsatorebi).

cnobilia, rom mdelos mcenareebisaTvis misawvdomi azoti niadagSi warmodgenilia amoniuri da nitratuli formiT, amitom mcenareTa im saxeobebs, romlebsac unari aqvT ufro srulad gamoiyenon amoniuri azoti, garkveuli upiratesoba aqvT imave mcenareul TanasazogadoebaSi warmodgenil da nitratul kvebas Sexamebul saxeobebTan SedarebiT. mcenarisaTvis misawvdomi mineraluri azotis Semcveloba niadagSi sakmaod mcirea da 100 g mSral niadagSi 5-20 mg farglebSi meryeobs, m.S. nitratebis raodenoba 100 g mSral niadagSi 1 mg ar aRemateba. amasTan saZovris niadagSi zogjer 3-4 jer meti mineraluri azotia, vidre saTibebze, igi metad araTanabradaa ganawilebuli da eqskrementebis gamoyofis adgilebze 600-700 mg-mde diddeba (100 g mSral niadagSi). amiT aris ganpirobebuli aseT lokalur adgilebze balaxis gadaxrukva da amiakis aqroleba. amoniumis da nitratebis mcenaris mier SeTvisebuli raodenobis aRdgena niadagSi warmoebs amonifikaciis da nitrifikaciis procesebis xarjze, romlebic sxvadasxva intensivobiT mimdinareoben, xolo warmoqmnili amoniumi da nitratebi swrafad STainTqmeba xolme mcenareebis mier. unda gvaxsovdes, rom nitratebis mcire raodenoba niadagSi amoniumTan SedarebiT ganpirobebulia ara marto mcenareebis mier maTi ufro swrafi STanTqmiT, aramed imiTac, rom amonifikacia mimdinareobs ekologiuri TvisebebiT sakmaod gansxvavebuli mravali saxeobis mikroorganizmebis cxovelmoqmedebis Sedegad da xorcieldeba ekologiuri pirobebis ufro farTo farglebSi, vidre nitrifikacia. amonifikacia warmoebs rogorc aerobul, aseve anaerobul pirobebSi lpobis baqteriebis, aqtinomicetebis da obis sokoebis mier. maTi cxovelmoqmedebis Sedegad gamoiyofa amiaki, romlis mcire nawili neitraldeba niadagSi organuli da araorganuli mJavebiT; am procesebis Sedegad warmoqmnil amoniumis marilebs iTviseben uSualod mcenareebi (an mikroorganizmebi), xolo nawilis daJangviT miiReba nitratebi. nitrifikaciaSi, romelic mxolod aerobul pirobebSi mimdinareobs, monawileoben baqteriebis saxeobaTa SezRuduli ricxvi-umetesad NNitrosomonas, romlebic ganapirobeben amoniumis daJangvas nitritebad da Nitrobacter, romelTa meSveobiTac warmoebs nitritebis daJangva nitratebad. niadagSi warmoqmnili nitratebi STainTqmeba mcenareTa mier, amasTan maTi nawili SesaZlebelia gamoirecxos niadag-gruntis wylis zedapirTan axlo ganlagebul tenian niadagebze, an xangrZlivi wvimiani periodis dros. gasaTvaliswinebelia, rom nitratebis nawili denitrifikaciis Sedegad gardaiqmneba molekulur azotad.

azotis mimarT meti moTxovnilebiT xasiaTdebian maRali koindari, saTiTura, mdelos melakuda, mxoxavi Wanga, mravalwlovani koindari, Cveulebrivi Tivaqasra, tyis Wyimi, pontiuri diyi, blagvfoTla Rolo da sxv. azotis mimarT mcire moTxovnilebebiT gamoirCevian cxvris wivana, swormdgomi Zigva, cisferi isli, orsaxla busustana, monacisfro isli, Sebusuli xarnuya, ewris gvimra, oTxfurcela, marwyva balaxi da sxv. mcenareTaTvis misawvdomi fosforiT Rarib niadagebze kargad xarobs Zigva, cxvris wivana, Cveulebrivi namikrefia, saSualo caxcaxa, mindvris gvirila, maxrCobela, Savi isli. fosforiT mdidar niadagebs moiTxoven mxoxavi Wanga, mdelos melakuda, TelisfoTola qafura, mdelos nemsiwvera da sxv. kaliumiT mdidar niadagebisaTvis damaxasiaTebelia saTiTura, qaCali isli, Waobis endronika, sviisebri ionja. im niadagebze, romlebic mcenarisaTvis misawvdomi kaliumis simcires ganicdian, gvxvdeba wiTeli wivana, maxrCoebela, Zigva, yviTelTavTa, Cveulebrivi gobis cxvira da sxv.

**niadagis mJavianobis da tutianobis** mimarT mdelo-saZovrul mcenareebs ramdenamde gansxavavebuli damokidebuleba aqvT, Tumca niadagis reaqcia, iseve rogorc fuZeebiT da sakvebi nivTierebebiT uzrunvelyofa, ar axdens iseT mZlavr gavlenas mdelos balaxnarze, rogorc es saxnav miwebze aRiniSneba.

cnobilia, rom niadagis reaqcia SeiZleba iyos mJave ( pH 6,7-ze naklebi) neitraluri (pH 6,7-7,0-is farglebSi) da tute (pH 7-ze meti). mdelos mcenareulobis calkeuli saxeoebebi niadagis reaqciis mimarT araerTgvarovan damokidebulebas iCenen; mJave niadagebze kargad xarobs swormdgomi Zigva, kordis maxrCobela, kokomJava, oTxfurcela marwyva balaxi, patara xriala, monacrisfro isli da sxv. tute reaqciis mqone niadagebisaTvis damaxasiaTebelia mlaSe glerta, Zirtkbila, Soroqnis cocxi da sxv. maRalyuaTiani, sakvebad Zvirfasi marcvlovani da parkosani balaxebis didi umravlesoba mosavlis maqsimums bunebriv da naTes saTib-saZovrebze iZleva niadagis odnav mJave reaqciis (pH 6,0-6,5) dros, cxadia yvela sxva faqtoris normis farglebSi uzrunvelyofis pirobebSi. am balaxebis sakmarisad maRali mosavlis miReba SeiZleba wylis, mineraluri kvebis elementebis da sxva pirobebis optimaluri parametrebis fonze pH-is ufro farTo farglebis (5,7-7,5) drosac. amiT aris gapirobebuli mJave niadagebze kiris Setanis aucilebloba da efeqturoba. ase magaliTad, ionjis Tivis mosavali mJave niadagebze kiris sxvadasxva normiT SetaniT aseTgvarad icvleboda: pH 5,3 - mosavali 2,7t/ha, pH 0,57\_4,5 t/ha, pH 0,6\_5,9 t/ha, pH 0,65\_6,5 t/ha.

aRsaniSnavia, rom aRmonaceni ufro mgrZnobiarea niadagis reaqciis mimarT, vidre zrdasruli mcenare. amiT aixsneba is faqti, rom kiris Setana gacilebiT ufro efeqturia gamdeloebisas balaxis Tesvis win, vidre Camoyalibebuli balaxnaris mqone bunebriv mdeloze.

tute reqaciis mqone niadagebi, romlebsac mniSvnelovani farTobi ukaviaT gvalvian raionebSi, umTavresad damlaSebuli, bici da bicobi niadagebiT aris warmodgenili. aseT niadagebze gavrcelebulia halofitebi mcenareebi, romlebic eguebian niadagis damlaSebas. saqarTveloSi damlaSebuli niadagebi zamTris saZovrebzea warmodgenili, ZiriTadad uwret da susti wyalwretis dablob-vakeebze (alaznis vake, lakbe, CaTma), daxril vakeebze (eldari, taribana, soRanluRi da sxv.). halofitebidan aq farTod aris warmodgenili mlaSe glerta, Carani, xurxumo, yarRani, ialRuni, avSani, wiTelwvera da mravali sxv.

udabnos da naxevrad udabnos bunebriv sakveb savargulebze, agreTve zRvis, tbebis da mdinareebis napirebze, moZrav (barxanebi) da uZrav qviSrobebze gavrcelebulia mcenareTa gansakuTrebuli jgufi e.w. fsamofitebi. maT aqvT Reroebze ylortebis da damatebiTi fesvebis ganviTarebis unari, axasiaTebT mTavari fesvis intensiuri zrda, datotva, grZeli fesvebi da fesurebi, romlebic swrafad aRweven niadagis datenianebul horizonts da siRrmeSi 4-5 metramde, xolo horizontalurad 10-20 metramde izrdebian. fsamofitebis umravlesobis foToli wvrili, Zlier reducirebulia, zogierT maTgans foToli saerTod ar gaaCnia. saqarTveloSi fsamofitebi gavrcelebuli arian naxevrad udabnoSi, zogierTi tbis, wyalsacavis da mdinaris napirebze. maT miekuTvneba qviSrobis isli, amoburculi isli, frTisebri selini, uZrav qviSrobebze-cimbiruli kapueta, giganturi elimusi, wiTelwvera, avSani da sxv.

**niadagis sahaero reJims**, e.i. niadagSi haeris raodenobasa da Sedgenilobas, rogorc uSualo, aseve arapirdapiri gavlena aqvs sakvebi savargulebis mcenareebze. es ganpirobebulia imiT, rom niadagis haeri mcenareTa umravlesobisaTvis da niadagSi mobinadre organizmebisaTvis Jangbadis ZiriTadi wyaroa, romelic saWiroa agreTve Teslis gaRivebisaTvis. mxedvelobaSi misaRebia isic, rom niadagis haerSi gogirdwyalbadis, naxSirorJangis da zogjer meTanis Semcvelobam SesaZloa miaRwios iseT raodenobas, romelic SeaCerebs, an mTlianad gamoricxavs balaxovani mcenareebis zogierTi saxeobis cxovelmoqmedebas, Teslis gaRivebas, uaryofiTad imoqmedebs baqteriebis ramdenime jgufsa da niadagSi mobinadre cxovelebze. haeris nakleboba niadagSi ganapirobebs agreTve niadagis qimiuri YTvisebebis cvlilebebs. atmosferos haerTan SeadarebiT niadagis haeri ufro mdidaria wylis orTqliT, mniSvnelovnad mets Seicavs naxSirorJangs da ramdenamde naklebs Jangbads.

niadagSi arsebuli haeris raodenoba damokidebulia niadagis forianobasa, forebis moculobasa da wyliT maTi Sevsebis doneze.

anaerobiozis pirobebSi Senelebulia mcenareTa mkvdari nawilebis mineralizacia, ar warmoebs nitrifikacia, naxSirorJangis nacvlad warmoiqmneba meTani, niadagSi arsebuli araorganuli nivTierebebis mineralizaciis Sedegad warmoqmnili sulfatebi gardaiqmnebian gogirdwyalbadad. rkinisa da manganumis Jangebi gadadian zeJangebSi, rasac niadagis galebeba mihyveba, xolo rkinis zeJangs da orvalentian manganums ki toqsikuri Tvisebebi gaaCnia. Jangbadis nakleboba mkveTrad aferxebs fesvis zrdas, aerobuli mikroorganizmebis sicocxlisunarianobas.

saTib-saZovrebze gavrcelebuli balaxebis sxvadasxva saxeoba araerTgvarovan damokidebulebas amJRavnebs niadagis haeraciis mimarT. sakvebad Zvirfasi TiTqmis yvela mcenare mosavlis maqsimums iZleva kargi aeraciis mqone niadagebze. ufro metad momTxovni am mxriv arian fesuriani marcvlovanebi (TeTri namikrefia, mxoxavi Wanga, wiTeli wivana, ufxo Svriela, mdelos melakuda da sxv). amave dros zogierTi balaxi fesvebSi ujredSorisebis mZlavri sistemis ganviTarebis gamo kargad egueba cudad aerirebul tenian niadags. maT miekuTvneba mkvrivbuCqiani marcvlovanebi (Wreli da cxvris wivana, Zigva, lesingis vaciwvera, kewewura, maxrCobela da sxv), agreTve wylis moyvaruli Waobis mcenareebi (lerwami, lelqaSi, leli da sxv).

**topografiuli faqtorebi**

topografiul faqtorebs Soris mdelosnobis praqtikaSi ZiriTadi yuradReba eqceva adgilmdebareobis reliefs da zRvis donidan simaRles. reliefis Taviseburebis gavlena bunebrivi sakvebi savargulis mcenareulobis Sedgenilobasa, saerTo mdgomareobasa Tu produqtiulobaze sakmaod rTuli da mravalmxrivia; igi arsebiTad warmoadgens balaxnarsa da niadagze klimatis uSualo an arapirdapiri moqmedebis anarekls. reliefur faqtorebs mniSvnelovani gavlena aqvT upirveles yovlisa sxvadasxva simaRlis, eqspoziciis da daxrilobis ferdobebis, mdinareTa Walis sxvadasxva nawilis mcenareulobis floristul Semadgenlobasa da sameurneo maCveneblebze, agreTve niadagis meqanikur da qimiur Sedgenilobaze, fiziko-meqanikur Tvisebebze, siTbur da sahaeri reJimze, niadagwarmoqmnis tempsa da xasiaTze. reliefis elementebis gansxvavebuloba gansazRvravs mcenareTa calkeuli Tanasazo-gadoebebis ganawilebas sxvadasxva simaRlis, eqspoziciis da daxrilobis ferdobze. reliefis daxriloba ganapirobebs wylis zedapiruli Camonadenis siZlieres, niadagis Carecxvis e.i. eroziuli procesebis xarisxs, niadagis nawilakebis gadaadgilebas qveviT da deluvialuri nafenis warmoqmnas. cicabo ferdobebze, rogorc wesi, datenianeba mniSvnelovnad mcirea, xolo Camorecxvis intensiuroba gacilebiT Zlieri, vidre damrec da sustad daxril ferdobebze. ferdobis daxrilobis zrda gamoricxavs am farTobebze memindvreobis ganviTarebas da ganapirobebs savargulis mxolod saTib-saZovrul gamoyenebas; Zlier daxril ferdobze Tibvis meqanizaciac gamoricxulia da balaxnaris gaZoveba SesaZlebelia monacvlebuli iyos mxolod mTis Tivis metad Sromatevad xeliT damzadebasTan. mxedvelobaSi misaRebia isic, rom cicabo ferdobebze saZovris sasargeblo farTobi xSirad mniSvnelovnad mcirdeba pirutyvis mier datkepnili bilikebis da erodirebuli miwebis xarjze. reliefis SemaRlebul nawilebSi intensiurad mimdinareobs niadagis, rogorc mineraluri, aseve organuli wvrili nawilakebis gamorecxvis da gamoqarvis procesebi, ris gamoc aq ufro metad xirxatiani, sakvebi nivTierebebiT Raribi, kargi wyal da haer gamtarianobis unaris mqone niadagebia gavrcelebuli. gruntis wylis done Cveulebriv metad dabalia. wyalgamyofebis gaewereba ar aris mkveTrad gamoxatuli, Tumca sakmao siRrmeze vrceldeba. garemo pirobaTa aseTi kompleqsi xels uwyobs tyis ganviTarebas, xolo aq warmodgenil mSrali mdeloebis mosavlianoba sakmaod mcirea.

reliefis dadablebul adgilebze mimdinareobs Camorecxili nayofieri lamisebri nawilakebis dagroveba, ris Sedegadac niadagSi matulobs lamisebri da koloiduri meqanikuri elementebi, xSirad marilebic. gruntis wylis done maRalia, xolo niadagis wyalgamtaroba da aeracia susti. sakvebi nivTierebebiT niadagis zeda horizontebis simdidre da gruntis wylis siaxlove miwis zedapirTan karg pirobebs qmnian mdelos balaxebis ganviTarebisaTvis.

arsebiTi gansxvavebaa sxvadasxva eqspoziciis ferdobebis mcenareulobebs Soris. samxreT eqspoziciis ferdobi, romelic met siTbos Rebulobs, umetesad SedarebiT naklebi mosavlianobis mqone qserofituli balaxovani mcenareulobiT, magram yuaTiani da cxovelebis mier kargad Wamadi balaxnariT xasiaTdeba. dasavleT ferdobze upiratesad mezofiluri mcenareulobaa, igi ufro naleqiania da maRalmosavliani. aRmosavleTis ferdobi xasiaTdeba Zlieri wayinvebiT, xolo mcenareuloba samxreTis ferdis msgavsad, SedarebiT mciremosavliania. Crdilo eqspoziciis ferdobi ramdenamde ufro civia, naklebad ganaTebuli, rac uaryofiTad moqmedebs balaxnaris mosavlianobaze.

zRvis donidan simaRles da reliefis gavlena bunebrivi sakvebi savargulis produqtiulobasa da mdgomareobaze mravalgvari da sakmaod rTulia. faqtobrivad is asaxavs klimatis uSualo da arapirdapir gavlenas.

sakmaod mkveTrad aris gamoxatuli reliefis gavlena mdinaris WalaSic, romlis sxvadasxva nawilis naRruvali wyliT datborvis Sedegad iqmneba datenianebis da aeraciis gansxvavebuli reJimi, sakvebi elementebiT uzrunvelyofis met-naklebi done, rac Tavis mxriv produqtiulobis da yuaTianobis mixedviT araerTgvarovani mcenareuli dajgufebebis warmoqmnas uwyobs xels. ase, magaliTad, sakvebi nivTierebebis da wylis optimaluri reJimis mqone Walis centraluri nawili sakvebad Zvirfas balaxebs ukavia, maSin rodesac Walis terasispira nawilze, sadac gruntis wyali miwis zedapirTan axlos ganlagebuli da xSirad daWaobebulia, mcire kvebiTi Rirebulebis balaxebis dajgufebebi Warboben.

vertikaluri zonebis, agreTve, ferdobis daxrilobis da eqspoziciis mixedviT mcenareulobis ganawileba kargad aris gamosaxuli saqarTvelos bunebriv sakveb savargulebze, romlebic zRvis donidan dabla ganlagebuli niSnulebidan 3200-3400 metris simaRlemdea gavrcelebuli.

**bioturi faqtorebi**

biotur ekologiur faqtorebs didi mniSvneloba aqvT im rTuli damokidebulebebis CamoyalibebaSi, romelic gansazRvruli garemo pirobebis zemoqmedebiT iqmneba mcenareul da cxovelur organizmebs Soris.

yoveli mcenare, romelic garkveul teritoriaze xarobs da maSasadame aq ganviTarebuli ekosistemis nawils warmoadgens, mudmiv urTierTmoqmdebaSia am ekosistemaSi Semaval sxva mcenareebTan da cocxal organizmebTan. aseTi urTierTmoqmedebis Sedegia garkveuli da sxvadasxva xarisxiT gamosaxuli urTierTgavlena, romelsac zogjer dadebiTi, sxva SemTxvevebSi ki uaryofiTi xasiaTi aqvs. dadebiT biotur faqtors miekuTvneba, magaliTad, ekologiuri urTierToba mcenaresa da cxovelebs Soris, romelTa Sedegad xeli ewyoba damtvervas da Teslis gavrcelebas, mcenareTa simbiozs mikroorganizmebTan, zrdasruli mcenareebis mier axalmozardis dacvas radiaciisagan, gadametxurebis an gadacivebisagan, mikroorganizmebis mier niadagSi arsebul mcenareTa da cxovelTa mkvdari anarCenis daSlas da a.S; fesvebis mJave gamonayofs unari aqvs gadaiyvanos Zneladxsnadi nivTierebebi sxva mcenareTaTvis advilad misawvdom formebSi. SemzRudavi da uaryofiTi moqmedebis biotur faqtorebs Soris aRsaniSnavia mcenareTa konkurencia sakvebi nivTirebebis, sinaTlisa da wyalisaTvis, gverdze mozardi mcenareTa daTrgunva (zogjer ki piriqiT zrdis stimulireba) im fiziologiurad aqtiuri da mqrolavi nivTierebebiT, romlebsac gamoyofen fesvebi. pirdapiri uaryofiTi moqmedebis nimuSs warmoadgens parazitizmi, e.i. mcenareTa fesvebsa da Reroebze paraziti (abreSuma, keleptara) da naxevradparaziti (sanTela, satilia, kordiskbila) mcenareebis mier patroni mcenaris mza organuli nivTierebebiT kveba. gacilebiT ufro farTodaa gavrcelebuli mdeloebze paraziti sokoebi, romlebic azianeben balaxis vegetatiur (Janga sokoebi) da generatiul (gudafSutebi, Wvavis rqa) organoebs. paraziti sokoebiT sakvebi balaxebis dazianebis xarisxi TandaTan matulobs savegetacio periodis manZilze,

amasTan igi ufro intensiuria agvistos balaxnarSi, gansakuTrebiT ki saTibebze.

mdelos balaxebze moqmed biotur faqtorebidan aRsaniSnavia is mravalmxrivi zegavlena, romelsac ganapirobeben mdelos biocenozebSi Semavali heterotrofebi, e.i. organul nivTierebebiT mkvebavi organizmebi (baqteriebi, sokoebi, cxovelebi, yvavilovani parazitebi).

mdelos biocenozebSi warmodgenil baqteriebs Soris (fito-parazitebi, simbiontebi, saprofitebi da sxva), upiratesi mniSvneloba aqvT im baqteriebs, romelTa saSualebiT swarmoebs atmosferuli azotis fiqsacia da mkvdari organizmebis (mcenareeebis, cxovelebis) daSla da mineralizacia. es baqteriebi im organizmebis ZiriTadi jgufis warmoadgenlebia, romlebic ganapirobeben azotis Sidabiocenozur cikls. es cikli moicavs Semdeg etapebs: a) atmosferuli azotis fiqsacia; b) azotSemcveli SenaerTebis daSla da amoniumis warmoqmna (amonifikacia); g) amoniumis gardaqmna nitritebad da nitratebad (nitrifikacia); d) amoniumis da nitratebis moxmareba mcenareebis da niadagSi arsebuli organmizmebis mier, xolo maTi kvdomis Semdgom isev ciklSi CarTva.

sokoebs Soris, romlebic dakavSirebulni arian fitocenozis SemadgenlobaSi Semaval mcenareebTan, aRsaniSnavia Semdegi ZiriTadi funqcionaluri jgufebi: a) paraziti sokoebi, romelTa Sesaxeb zemoT iyo moxsenebuli; b) mikorizuli sokoebi da g) saprofituli sokoebi.

mikoriza e.i. umaRlesi mcenaris fesvisa da sokos miceliumis urTierT sasargeblo Tanacxovreba (simbiozi), axasiaTebs saTib-saZovrebze gavrcelebul mcenareTa TiTqmis yvela gvaris warmomadgenlebs. gamonaklisia islisebrTa, WilisebrTa, mixakisebrTa, jvarosanTa, nacarqaTamasebrTa ojaxTa saxeobebi, romlebsac mikoriza an ar gaaCniaT, an sustad gamoxatuli axasiaTebT. aRsaniSnavia isic, rom mikoriza ramdenamde ufro susti aqvT qserofilur marcvlovanebs, xolo sul ar gaaCnia Warbtenian adgilebze mobinadre hidrofilur marcvlovanebs.

bolo aTwleulebis gamokvlvebma ufro naTelyo mikosimbio-trofiis arsi da buneba. mikorizis Sedegad sokos hipebis mZlavri ganviTarebis gamo diddeba fesvis STanTqmiTi zedapiri da matulobs wyalSi gaxsnili sakvebi nivTierebebis mcenareSi SeRweva. magaliTad, dadgenilia mikorizis dadebiTi roli fosforiT, kaliumiT, TuTiiT, spilenZiT da zogierTi sxva elementiT mcenaris moTxovnilebebis uzrunvelyofaSi. Tavis mxriv mcenareebi akmayofileben sokoebis saWiroebas energetikuli masalebiT, ZiriTadad naxSirwylebiT.

saprofituli sokoebi baqteriebTan erTad monawileoben gamxmari mcenareebis da mkvdari cxovelebis daSlasa da mineralizaciaSi, agreTve humusis warmoqmnaSi. amasTan erTad isini gamoyofen niadagSi Tavis metabolitebs (ujredSi, qsovilebsa da organoebSi nivTierebaTa cvlis procesSi warmoqmnil nivTierebebs), maT Soris antibiotikebs, riTac moqmedeben niadagis biokomponentebis Sedgenilobaze. gansakuTrebiT didia maTi roli ujredisis da ligninis daSlaSi, myari struqturis CamoyalibebaSi, niadagSi mobinadre cxoveluri organizmebis (nematodebi, umartivesni da sxva) kvebaSi.

cxovelTa samyaro bunebriv saTib-saZovrebze warmodgenilia ZuZumwovarTa, reptiliebis, sxvadasxva Wiebis, mwerebis da sxvaTa mravali saxeobiT.

dadginda, rom saxnavi miwebis, xangrZlivi sargeblobis naTesi balaxnaris da bunebrivi sakvebi savargulebis niadagebSi mobinadre cxoveluri organizmebis saxeobrivi Sedgeniloba arsebiTad ar gansxvavdeba erTmaneTisagan, magram maTi raodenoba mniSvnelovnad ufro metia, xolo cxovelmoqmedeba gacilebiT aqtiuria bunebriv sakveb savargulebze, vidre saxnav farTobebze, sadac moxvnis Sedegad adgili aqvs am maCveneblebis mkveTr cvlilebebs. garda amisa balaxnaris arseboba anelebs amindis cvlilebebis uaryofiT gavlenas, ganapirobebs sakvebi maragis da TavSesafaris arsebobas. meores mxriv, mdeloebze cocxali organizmebi binadroben niadagis ufro mcire simZlavris fenaSi, vidre organuli sasuqiT ganoyierebul da gafxvierebul saxnav miwebze. aRsaniSnavia isic, rom mdelos niadagebze saxnavTan SedarebiT, ufro metia anaerobuli mikrorganizmebi aerobulTan SedarebiT. g. miuleris monacemebiT 1 ha saxnavze aRiricxeboda 0,25 mln miwis Wiayela saerTo woniT 0,05 – 0,131 t/ha, xolo saZovarze es maCveneblebi Sesabamisad Seadgendnen 0,5 – 1,575 mln da 1,15 – 1,68 t/ha.

cnobilia, rom fesvTa sistemis siZliere da aqtiuri moqmedeba mcenaris miwiszeda nawilis mZlavri ganviTarebis erT-erTi mTavari pirobaa. Tavis mxriv fesvebis zrda da fesvTa sistemis efeeqtianoba damokidebulia miwiszeda nawilis asimilaciuri unaris da sxva faqtorebis garda, niadagis karg haergamtarianobaze, ris winamZRvrebs qmnian niadagSi mobinadre organizmebi, pirvel rigSi cxovelebi. maTi sicocxlisunarianoba da normaluri cxovelmoqmedeba, rogorc ukve aRvniSneT, bevrad aris damokidebuli baqteriebis, sokoebis da sxva organizmebis winaswar Catarebul muSaobaze. amgvarad, organuli nivTierebebis daSla, iq arsebuli sakvebi nivTierebebis mcenarisaTvis SesaTvisebel formebSi gadayvana, mcenareuli da cxoveluri warmoSobis anarCenebis daqucmaceba da niadagis myari, koStovani struqturis Seqmna, niadagSi wylis SeRwevis da fesvebis ganviTarebisaTvis Sesabamisi pirobebis Seqmna (xvrelebi, napralebi) – ai arasruli nusxa yovelive imisa, rasac uzrunvelyofs mdelos niadagebis mikroflora da fauna, romlebic fesvebTan da garemosTan kavSirSi, bioturi faqtorebis urTierTmoqmedebis safuZvelze uaRresad rTul, mravalkomponentian organizms warmoqmnian da ganapirobeben mis normalur funqcionirebas.

mdelos mcenareebze cxovelebis uSualo zemoqmedeba gamoixateba meqanikur dazianebaSi, mRrnelebis mier amoTxrili miwiT maT gadafarvaSi, CliqebiT dazianebaSi, eqskrementebis gavlenaSi. cxovelTa arapirdapiri moqmedeba asaxvas hpovebs upirveles yovlisa niadagis kvebiT, sahaero da wylis reJimis SecvlaSi. metad didia cxovelTa roli balaxovan mcenareebSi virusuli, sokovani da baqterialuri infeqciebis gavrcelebaSi. amis erTerTi magaliTia parazituli sokoebis balaxebis fesvebSi SeRweva da farTo gavrceleba nematodebis mier gakeTebuli xvrelebiT. ikvebebian ra mcenaris miwiszeda da miwisqveSa nawilebiT cxovelebi amcireben maT produqtiulobas. magram Tu fitofagebis e.i. im cxovelebis raodenoba, romlebic mxolod mcenareebiT ikvebebian, optimalur dones ar aRemateba, maSin balaxnaris saerTo produqtiuloba ar mcirdeba. didi zianis motana SeuZlia sxva qveynebidan da kontinentebidan Semoyvanil mwerebs, Tu maTTvis axal adgilsamyofelSi ar aris is mavneblebi da daavadebebi, romlebic regulacias gaukeTebs maT ricxovnebas.

bunebrivi savargulebis mcenareuli Tanasazogadoebis cxovelmoqmedebaSi gansakuTrebuli mniSvneloba aqvT uxerxemloebs, pirvel rigSi wvimis Wiayelebs, enxitreidebs (wvrili, 5-10 mm sigrZis Wiebi), moluskebs, nematodebs, umartivesnebs (amebebi, infuzoriebi da sxva), fexsasrianebs (mwerebi, obobebi, tkipebi). maT Soris pirvel rigSi aRsaniSnavia is dadebiTi gavlena, romelic wvimis Wiayelebis cxovelmoqmedebas mohyveba. miuxedevada imisa, rom mdelos cenozebSi ufro xSirad mxolod 5 gvaris wvimis Wiayelaa warmodgenili, maTi biomasis xvedriTi wili am niadagebis uxerxemloTa mTeli biomasis 95%-mde aRwevs. wvimis Wiayelebis raodenoba metad did farglebSi meryeobs mdelos tipis da adgilsamyofelis bunebrivi pirobebisagan, pirvel rigSi tenianobis da niadagis nayofierebisagan damokidebiT – 10-dan zogjer 1000 egzemplaramde erT m2-ze. wvimis Wiayela ylapavs da amuSavebs organul nivTierebebTan erTad didi raodenobis mineralur nawilebs, gamoyofs niadagSi an mis zedapirze eqskrementebs (kaprolitebs), romlebic warmoadgenen wyalgamZle struqturis mqone niadagur agregatebs. inglisSi warmoebeuli dakvirvebebiT wvimis Wiebi gamoyofen niadagis zedapirze 1,0-2,0 t/ha eqskrementebs, romlebic gacilebiT ufro mdidaria sakvebiT garemomcvlel niadagTan SedarebiT: 5 jer meti nitratuli azotiT, 11 jer meti gacvliTi kaliumiT, 7 jer meti misawvdomi P2O5-iT. inglisSi Catarebuli dakvirvebebiT yovelwliurad mdelos niadagis zedapirze grovdeboda 61,5 t/ha, niadagSi ki 29 t/ha eqskrementebi, sxvagan Sesabamisad, 27,5 da 21,5 t/ha, xolo SedarebiT axalgazrda, 7 wlis winaT naTesi balaxnaris niadagSi 5,5 da 51,5 t/ha. amrigad, wvimis Wiayelebis moqmedebis Sedegad niadagis zeda, organuli nivTierebebis Semcveli fena iZens myar koStovan struqturas, mdidrdeba mcenarisaTvis saWiro mineraluri kvebis elementebiT, keTdeba mravali xvreli, riTac umjobesdeba niadagis wylis da sahaero reJimi da saboloo jamSi mniSvnelovnad diddeba balaxnaris produqtiuloba. ase, magaliTad, axal zelandiaSi Catarebuli cdebis mixedviT mdelos cenozSi erT-erTi saxeobis Wiayelebis SetaniT, balaxnaris mosavali 8 wlis Semdeg gaddidda 10,3-dan 18,0 t/ha-mde.

**enxitreidebi** – 5-10 mm sigrZis Wiebi – warmoadgenen, saprofitebs da ikvebebian mcenareTa mkvdari organoebiT. nawilobriv isini mtaceblebic arian da ikvebebian im nematodebiT, romlebic mcenareTa fesvebs azianeben. enxitreidebis raodenoba heqtarze 20, zogjer ki 120 aTas aRwevs, xolo masis wona meryeobs 2-dan 50 g-mde erT m2. maT didi mniSvneloba aqvT miwisqveSa mkvdari organoebis mineralizaciaSi.

**nematodebi, anu mrgvali Wiebi**, sigrZeSi 8 m aRweven da farTodd arian gavrcelebulebi mdeloebze. kvebis tipis mixedviT arCeven baqterio, miko da fitofagebs, mtaceblebs, romlebic ikvebebian umartivesTa warmomadgenlebiT da sxva nematodebiT. mdelos mcenareebs mniSvnelovan zarals ayeneben nematodebi – fitofagebi. isini arTmeven maT energias da sakveb nivTierebebs da rac mTavaria, xels uwyoben fesvebSi sokovani da baqterialuri infeqciebis SeWras. nematodebis moqmedebis Sedegad mkveTrad mcirdeba Zvirfasi parkosani da marcvlovani balaxebis mosavali.

mravalmxrivi da araerTgvarovania **mwerebis** gavlena mdelos biocenozis cxovelmoqmedebaze. dadebiTi faqtorebidan xazi unda gaesvas im mwerebis rols, romlebic neqtars da mtvers agroveben da xels uwyoben mravali mcenaris, m.S. sakvebad Zvirfasi balaxis damtvervas da Teslis mosavlis gadidebas. warmatebiT SeiZleba gamoyenebuli iqnas mwerebis zogierTi saxeoba mdeloebze gavrcelebuli mavne da Sxamiani mcenaris winaaRmdeg. magaliTad, Rolos foTolWamia SesaZlebelia gamoyenebuli iqnas Cveulebrivi Rolos mospobis mizniT. meores mxriv aucilebelia brZola, m.S. insekticidebiT, mwerebis im saxeobebis winaaRmdeg, romlebic mudmivad an periodulad amcireben balaxnaris saerTo mosavals an masSi Zvirfasi sakvebi balaxebis monawileobas.

**mwerebis monawileobas** mdelos biocenozis funqcionirebaSi da maTTan dakavSirebul bioturi faqtorebis gavlenas balaxnaris produqtiulobasa da sicocxlisunarianobaSi qvemoT CamoTvlili dadebiTi mniSvnelobac aqvs: a) mwerebi –zoofagebi zRudaven fitofagi mwerebis gavrcelebas; b) kiprofagi – mwerebi, romlebic nakeliT ikvebebian da wvimis WiayelebTan erTad xels uwyoben pirutyvis eqskrementebis mineralizacias. uaryofiT faqtorebad miCneuli unda iyvnen: a) bzualebi, romlebic wvimis Wiayelebs Wamen da b) sisxlmwovi mwerebi (bora, mawuxela da sxva), romlebic iwveven pirutyvis produqtiulobis Semcirebas.

farTod aris warmodgenili mdeloebze WianWvelebi, romelTa cxovelmoqmedeba mravlamxrivia da sxvadasxvagvarad moqmedebs balaxnaris produqtiulobaze. WianWvelebis bude daserilia vertikaluri xvrelebiT, ris gamoc iq xelsayreli sahaero, siTburi da wyalgamtari pirobebi iqmneba saprofituli baqteriebis da sokoebis ganviTarebisaTvis. WianWvelebi ufro metad warmodgenilia eqstensiurad gamoyenebul saZovrebze. saTibebze maTi budeebi aferxebs Tibvis meqanizacias.

mdelos mcenareulobaze moqmed biotur faqtorebs Soris aRsaniSnavia **mRrnelebis,** gansakuTrebiT ki TagvisnairTa cxovelmoqmedebis gavlena saTib-saZovrebis sameurneo mdgomareobaze. Tagvisnairi mRrnelebi ikvebebian mcenaris miwiszeda organoebiT (Rero, foToli, yvavilebi, Tesli), rac cxadia ramdenamde akninebs balaxnars, gansakuTrebiT soroebis mimdebare farTobze. mniSvnelovnad didia zarali mRrnelebis mier mcenaris miwisqveSa organoebiT kvebisas, radgan maTze ganviTarebuli ganaxlebis kvirtebis mospobis Sedegad mcenaris kvdoma mohyveba xolme. magram gansakuTrebiT bevri mcenare iRupeba mRrnelebis mier soroebis da xvrelebis gaTxrisas. CrdiloeT kavkasiis subalpebSi Catarebuli dakvirvebebiT mRrnelebis masiuri gavrcelebis wlebSi mcenareTa saxeobebis mxolod mcire raodenoba daiRupa sxvadasxva organos uSualod SeWmis Sedegad, maSin rodesac soros da xvrelis gaTxris dros gaxma gacilebiT ufro meti saxeobis individebi. miuxedavad imisa, rom maRalproduqtiul da intensiurad gamoyenebul saZovrebze mRernelebis ricxvi mkveTrad mcirdeba, maT winaaRmdeg brZola balaxnaris produqtiulobis gadidebis RonisZiebaTa kompleqsis aucilebel elementad unda miviCnioT.

**anTropogenuri faqtorebi**

bunebrivi sakvebi savargulebis balaxnaris Sedgeniloba, struqtura, sameurneo mdgomareoba da produqtiuloba, mcenareTa zrda da ganviTareba farTo farglebSi cvalebadobs adamianis sameurneo moqmedebis Sedegad (balaxnaris gaTibva, gaZoveba, sasuqebis Setana, morwyva, kulturteqnikuri samuSaoebi, sarevelebis winaaRmdeg brZola, Zireuli gaumjobeseba, daSroba da sxva). es cvlilebebi SeiZleba iyos SemTxveviTi, ufro xSirad ki isini gamowveulia balaxnaris gamoyenebis xasiaTsa da vadebSi arsebuli gansxvavebebiT, agreTve gaumjobesebis calkeuli RonisZiebebis epizodurad CatarebiT. im SemTxvevebSi, rodesac adgili aqvs saTib-saZovrebis gaumjobesebis an gamoyenebis RonisZiebaTa sistemis ganxorcielebas (saZovarbrunva, saTibbrunva, ganoyirebis sistema) anTropogenuri faqtorebis moqmedeba regularuli, cikluri xdeba. am faqtorebs Soris ufro Zireul cvlilebebs ganapirobebs naTesi balaxnaris Seqmna, morwyva da daSroba. mniSvnelovani gavlena aqvs mcenareuli safaris floristur Semadgenlobasa, balaxnaris zrdasa da ganviTarebaze rigi agroteqnikuri RonisZiebis Catarebas (sarevelebis winaaRmdeg brZola, sasuqebis Setana, balaxebis SeTesva, sahaero reJimis gaumjobeseba da sxva). Zireuli gaumjobesebis garda, rodesac mTlianad ispoba arsebuli bunebrivi balaxnari da igi naTesi balaxebiT icvleba, saTib-saZovrebis mcenareulobaze adamianis zemoqmedebis sxvadasxva formebs Soris farTo gavrceleba da mniSvneloba aqvT pirutyvis gaZovebas, gaTibvas da sasuqebis Setanas.

anTropogenur, ufro sworad ki anTropozoogenur faqtors miekuTvneba balaxnaris pirutyviT gaZoveba. imisgan damokidebiT, Tu rogor swarmoebs Zoveba, mas SeuZlia ganapirobos saZovris sameurneo mdgomareobis gauareseba, zogjer mTlianad gaveranebamde, anda piriqiT, racionaluri Zovebis da gaumjobesebis RonisZiebaTa gonivruli SeTanwyobis fonze, misi produqtiulobis mniSvnelovani gadideba. pirutyvis Zoveba gavlenas axdens saZovris biocenozze sakvebi mcenareebis miwiszeda organoebis mokvnetiT, mcenareTa da niadagis CliqebiT datkepniT da eqskrementebis gamoyofiT. am faqtorebis gavlena saZovris mcenareebze swarmoebs uSualod an arapirdapirad – zrda-ganviTarebis pirobebze zemoqmedebiT. maTi erToblivi gavlena biogeocenozze mniSvnelovan farglebSi meryeobs saZovris tipis (niadagi, mcenareuloba, datenianebis pirobebi da sxva), saZovarze myofi pirutyvis saxis, Zovebis formis (Tavisufali, nakveTmorigeobiTi, porciuli), saZovris erTeul farTobze gasaZovi pirutyvis raodenobis (mxedvelobaSia misaRebi rogorc “datvirTva” – e.i. pirutyvis raodenoba farTobis erTeulze saZovrul sezonis manZilze, aseve “pirutyvis simWidrove” – e.i. saZovris farTobis erTeulze erTdroulad myofi pirutyvis raodenoba), meterologiuri pirobebis da sxva faqtorebisagan damokidebiT. Zoveba upirveles yovlisa uaryofiTad moqmedebs tenian niadagze, cvlis mis sahaero da wylis reJims, iwvevs mis daWaobebas an gamoSrobas, xolo velis, naxevrad udabnosa da udabnos zonaSi damarilianebasac. araracionaluri Zovebis Sedegad icvleba agreTve balaxnaris saxeobrivi Sedgeniloba, TandaTan mcirdeba da ispoba sakvebad ufro Zvirfasi maRlari balaxebi, romelTa adgils ikavebs dablari an erTwlovani, ZiriTadad garTxmuli balaxebi. amgvarad, saerTo jamSi, araracionaluri Zoveba amcirebs balaxnarSi monawile saxeobebis ricxvs da xels uwyobs Zovebisadmi gamZle zogierTi saxeobis balaxis ganviTarebas.

eqskrementebis gavlena mcenareze da niadagze damokidebulia saZovarze myofi pirutyvis suladobaze, saxeobaze, asakze, rac saboloo jamSi ganapirobebs Txevadi da mkvrivi eqskrementebis raodenobas, qimiur Semadgenlobas, fizikur mdgomareobas, agreTve maT formasa da niadagis zedapirze ganawilebis Taviseburebas. eqskrementebTan erTad niadags ubrundeba mniSvnelovani nawili mineraluri kvebis im elementebisa, romlebsac pirutyvis mier gaZovili balaxi Seicavda da romelTa raodenoba damokidebulia Zovebis xangrZlivobaze, pirutyvis saxeobaze da saZovris gamoyenebis sistemaze. niadagis zedapirze eqskrementebTan erTad azotiT mdidari organuli nivTierebebis Setana, romelic advilad mineralizirdeba, mniSvnelovnad amaRlebs niadagis mikrobiologiur aqtivobas, xels uwyobs wvimis Wiebis gamravlebas da cxovelmoqmedebas. amitom aris, rom saZovris niadagi, rogorc wesi, ufro mdidaria mcenarisaTvis misawvdomi mineraluri kvebis elementebiT, vidre saTibis. cxadia, rom eqskrementebis dadebiT gavlenas adgili aqvs mxolod im SemTxvevaSi, rodesac daculia racionaluri Zovebis moTxovnebi da ar xdeba tenian niadagze pirutyvis Zovebis Sedegad zedapiris datkepvna da deformacia. naTelia isic, rom racionaluri Zovebis organizaciis fonze rac ufro didia saZovris produqtiuloba, miT ufro meti raodenobis pirutyvis gaZovebaa SesaZlebeli drois erTeulSi am nakveTze; es ki, sxva Tanabar pirobebSi, ganapirobebs niadagis zedapirze ufro meti eqskrementebis dagrovebas da balaxnaris produqtiulobis gadidebas.

Tibvis uSulao gavlenis Sedegad pirvel rigSi swrafad irRveva balaxnaris sezonuri vegetaciis normaluri riTmi, m.S. samarago sayuaTo nivTierebebis dagrovebis msvleloba, mkveTrad mcirdeba TesliT gamravleba, xeli ewyoba im saxeobebis gavrcelebasa da momZlavrebas, romlebic xasiaTdebian defoliaciis Semdeg kvlavwamozrdis kargi unariT. Tibvis arapirdapiri gavlena gamoixateba imaSi, rom mosavlaTan erTad gaitaneba azoti da nacris elementebi, rac aRaribebs niadags am nivTierebebis mcenarisaTvis misawvdomi formebiT; niadagis zedapirze mzis sxivebis ufro ukeTesi SeRwevis gamo mcirdeba miwispira haeris tenianoba da matulobs misi temperatura, mkveTrad klebulobs mkvdari narCenis dagroveba. yovelive es ganapirobebs balaxnaridan tenismoyvaruli maRlari mcenareebis amovardnas da dablari, miwispira SefoTvlis mqone balaxebis gavrcelebas. amasTan erTad aorTqlebis gadidebisa da mkvdari safaris daugrovelobis Sedegad niadagi ufro mSrali da Tbili xdeba.

uaryofiTad moqmedebs gaTibva agreTve balaxovani cenozebis zookomponentebze (mwerebze, mRrnelebze, wvimis Wiebze da a.S.). uZrav mdgomareobaSi myofi maTi nawili – magaliTad, Wuprebi, ispoba an ziandeba uSualod gaTibvisas, nawili ki gaitaneba mosavalTan erTad. balaxovan mcenareTa generatiuli organoebiT mkvebavi mwerebi gaTibvis Semdeg SimSilisgan ixoceba, xolo safars moklebuli mwerebi, Wiebi, moluskebi, xSirad mRrnelebic, Tibvis dros mofrenili mravali frinvelis nadavli xdeba. balaxnaris gaTibva yovelwliurad daaxloebiT erTidaigive dros ganapirobebs imas, rom mdelos biocenozSi TandaTanobiT dominantobas iwyeben mcenareTa da cxovelTa is saxeobebi, romlebic mravldeba balaxnaris gaTibvamde an gaTibvis Semdeg.

gaTibvis zemoqmedeba mdelos biogeocenozze mniSvnelovan wilad aris damokidebuli Tibvis vadebsa da sixSireze, balaxis moWris simaRleze, balaxnaris movla-gaumjobesebaze da a.S.

**konkurentunariani kulturebi**

konkurentunarian kulturebs zogjer CamxSoblebs uwodeben. es mcenareebi inviTareben did savegetacio masas, romlis saSualebiTac warmatebiT aferxeben sarevlebis ganviTarebas, arTmeven sinaTlis miRebis saSualebas da Crdilavs maT, iyeneben didi raodenobis wyals da sakveb nivTierebebs, zogjer ise zRudaven maT, rom isini veRar aRweven sami ZiriTadi faqtoris gamoyenebas. ZiriTadad CamxSob kulturebs miakuTvneben fetvs, sudanur balaxs, TeTr ZiZos, mzesumziras, rafss, ionjas, ZiZos, samyuras, kanafs, miwavaSlas, sasilose siminds, ZaZas da sxv. kulturis SerCeva damokidebulia garemo pirobebze, niadagis tipze, klimatze da sarevlebis saxeobebze.

sarevlebis mimarT konkurentunarianobiT sxva kulturebisagan gamoirCeva ionja, romelic xasiaTdeba mZlavri fesvTa sistemiTa da Zlier ganviTarebul miwiszeda organoebiT, amasTan am ukanasknelis xSiri gaTibvisas iTibeba ra sarevlebic da veRar aswreben Teslebis momwifebas da maTi ricxovnoba da mavneoba mcirdeba. es gansakuTrebiT efeqturia maSin, rodesac ionjas mSral mwvane sakvebad\_Tivis fqvilis saxiT iyeneben. gaTibvis Semdeg ionja ufro swrafad iwyebs zrda\_ganviTarebas, vidre sarevela mcenareebi. mindvris narTan, RiWasTan SedarebiT gazafxulze ionja SedarebiT adre iwyebs ganviTarebas, rac efeqturia maTTan brZolis RonisZiebebis TvalsazrisiT, Tumca zogierTi sarevela ganviTarebas ufro adre iwyebs, vidre ionja, maT miekuTvnebian mxoxavi Wanga, rZiana da sxv. amitom aseTi RonisZiebebis gatareba (ionjis gamoyeneba) maTTan brZolisas naklebad efeqturia.

arsebobs cnobebi imis Sesaxebac, rom konkretul klimatur pirobebSi mimarTaven sagazafxulo xorbalSi selis SeTesvas, romlis upiratesoba is aris, rom aseTi naTesis dros ferxdeba sarevela mcenareebis ganviTareba. Sereuli naTesebi SeiZleba gamoviyenoT iq, sadac selis sufTa naTesis gamoyeneba SeuZlebelia mindvris Zlieri dasarevlianebis gamo. amasTan Sereuli naTesebi naklebefeqturia iseTi mravalwlovani sarevlebis mimarT, rogoricaa mindvris nari, RiWa, mxoxavi Wanga, Tumc es procesi efeqturia erTwlovani sarevlebis RiRilos, jijlayas, nacarqaTamas, mwvane Zurwas da sxvebis winaaRmdeg.

**mcenareuli toqsinebi mcenareTa konkurenciis faqtori**

ZvelTaganve cnobili iyo, rom zogierTi mcenare gamoyofs toqsikur nivTierebebs, romlebic azianeben mis gverdiT myof sxva saxeobis mcenareebs. jer kidev Cvens eramde daaxloebiT 285 wels Teofraste wignSi “gamokvlevebi mcenareebis Sesaxeb” aRniSnavda, rom muxudo ar ajansaRebs niadags, rogorc sxva parkosnebi, piriqiT “fitavs” mas, arTmevs mas sakveb nivTierebebs, Tumca “is” anadgurebs sarevlebs pirvel rigSi ki kurosTavs”. axali welTaRricxvis pirvel aswleulSi plini me\_17 wignSi “bunebismetyveleba” werda, rom muxudo, qeri, cercvela “fitavs” saxnav miwebs; niadagis gamofitvas iwvevs seli, Svria, yayaCo da sxva mcenareebic.

imave wignSi plini aRniSnavs, rom Cveulebrivi kaklis xis Crdili “mZime, autaneli da mavnea adamianisaTvis Tavis tkivilis TvalsazrisiT, aseve mis irgvliv Tan imasac aRniSnavs, rom “muryanis Crdili mWidro da sqelia, magram mcenareebis zrda\_ganviTarebas xels ar uSlis”, plini amis safuZvelze akeTebs daskvnas “TiToeuli mcenarisaTvis Crdili an marCenalia an dedinacvali, rac Seexeba kaklis xis, fiWvis, soWis, naZvis Crdils, is mavne da momSxamavia yvela imisaTvis, romelsac exeba da kavSirSia”. plini “Crdils” ar xmarobs ara marto rogorc Crdils, aramed igi mas farTo gagebiT iyenebs, masSi gulisxmobs im qimiur SenaerTebis toqsinebs, romlebic iwveven mcenareebis dazianebas. toqsinebis gamoyofis gamo mcenareebis buneba gansxvavebulia. zogjer isini konkurencias uweven da zians ayeneben suniT an gamoyofili wveniT mezoblad myof mcenareebs, ase magaliTad dafna da boloki mavnea vazisaTvis, vazs ar uyvars kombosto da sxva bostneuli, Txili, am mcenareebis axlos dgomis SemTxvevaSi vazi susti da avadmyofuria, yvelaze ufro momSxamavia vazis mimarT parkosanTa an cercvis CenCo da sxv.

mcenareebis mier gamoyofili toqsinebis\_toqsikuri nivTierebebis mcenareebze moqmedebis axsna SesaZlebeli Seiqmna mecnierebis mier Catarebuli qromatografiuli da biologiuri cdebis Sedegad, kvleviT daadastures, rom mcenaris foTlebidan, fesvebidan gamoyofili toqsinebi monawileoben mcenareTa konkurenciaSi.

batlurma daadgina, rom ionjis fesvebi sakveb xsnarSi gamoyofen azotovan nivTierebebs, rademaxeri ki miuTiTebs imis Taobaze, rom mezoblad mdgom mcenareebSi xdeba nivTierebebis urTierT gacvla, martini da rademaxeri aRniSnaven, rom rodesac Svriis fesvi 1\_2 sm sigrZes miaRweven cocxali ujredidan gamoiyofa skopolentini da glikozidi, maTTan erTad leicini, valini, ð \_aminomastaminis mJava, glukoza da fruqtoza, romelic gansazRvres qromatografiis gamoyenebiT, gamoyofa intensiurad ganxorcielda daqucmacebuli, vidre saRi fesvebidan. Svriam 38%-iT Seamcira mindvris mdogvis zrda, Wvavma aqtiurad imoqmeda astris zrda\_ganviTarebaze, vidre xorbalma. Seswavlili iqna mxoxavi Wangas konkurentunarianoba, am SemTxvevaSi toqsikuria fesvTa sistemidan gamoyofili toqsinebi, fesurebidan da fesvebidan gamowelilma nivTierebebma uaryofiTad imoqmeda qeris, xorblis, kombostos, pamidoris naTesebze, aseve mxoxavi Wangas cocxali fesvebidan axlos myof turnefsis rafsze. sxvadasxva kulturebis Teslis aRmocenebis unars aferxebs xvarTqlas da mindvris naris wyalgamonawuri. rZianas foTlebsa da Wangas fesurebis gamonawurma SeaCera xorblisa da bardas aRmonacenis zrda.

aq motanili informacia saSualebas GgvaZlevs warmoedgina viqonioT mcenareul toqsinebze rogorc mcenareTa konkurenciis erT-erT faqtorze.

**mcenareebis konkurentunarianoba**

mcenareebis urTierTkonkurencia (erTi saxeobis konkurencia meoris mimarT) Semdegi niSnebiTaa gamoxatuli: araxelsayrel pirobebSi Teslebis maRali aRmocenebis unari, aRmocenebis fazaSi foTlebisa da fesvTa sistemis swrafi ganviTareba rogorc niadagis zeda, ise qveda fenebSi. Seswavlilia Svriukas, mindvris mdogvis, gongolas, quTquTas, naris, jijlayas, wiwmatelas, kombosturas, Citis birkas, WeWvelas, xorblis sxvadasxva jiSebis, sagazafxulo Wvavis, Svriis, selis urTierTkonkurencia. saxeobaTaSoris konkurenciis gamoricxvis mizniT kulturuli da sarevela mcenareebi ise ganlagdes rom rigebs Soris sakmaod didi farTobi iyo datovebuli, amasTan calkeuli saxeobisa da jiSis mcenareebs aRzrdisaTvis Seuqmnes xelayreli pirobebi kvebis are da ganaTebuloba, meore SemTxvevaSi\_meore variantSi ki kulturuli da sarevela mcenare konkurenciis pirobebSi aRzardes. mcenaris zrdis maCveneblis Sesafaseblad gamoyenebuli iyo miwiszeda organoebis mSrali masis wona.

eqsperimentma uCvena, rom cdaSi myofi kulturuli mcenareebi, erTmaneTisagan mkveTrad gansxvavdebian sarevelebis mimarT konkurenciis TvalsazrisiT. am mxriv gamoirCeva qeri, romelmac gamoamJRavna sarevelebis aqtiurad daTrgunvis unari, mas ramdenadme CamorCa sagazafxulo Wvavi da xorbali. praqtikulad yvela kulturulma mcenarem SezRuda sarevela mcenareebis zrda\_ganviTareba. konkurenciis unaris Sesafaseblad dakvirvebebi mimdinareobda saasimilacio zedapirze da bageebis ricxvze mcenaris 1sm2-ze, gamovlinda, rom aRmocenebidan 5 dRis Semdeg kulturuli mcenareebis saasimilacio farTobi da bageebis raodenoba gacilebiT meti iyo, vidre sarevela mcenareebze, gamonakliss mindvris mdogvi warmoadgenda, yvavilobis periodSi ki mdgomareoba Seicvala, kerZod sarevela mcenareebi saasimilacio farTobiT da bageebis ricxovnobiT mniSvnelovnad aWarbebda kulturul mcenareebs. SeiZleba davaskvnaT, rom kulturuli marcvlovani mcenareebi sarevlebs konkurencias uweven da Cagraven vegetaciis adreul periodSi-sawyis fazaSi, xolo gadarCenili sarevlebi kulturul marcvlovnebSi gvevlinebian rogorc seriozuli konkurentebi.

kvlevis Sedegebi miuTiTeben, rom niadagSi mcire tenianobis pirobebSi marcvleuli kulturis Teslebi megobrulad da ufro adre aRmocendebian sarevelebTan SedarebiT, teniT uzrunvelyofis SemTxvevaSi ki jijlayas, cercvelas, jvaryvavilovanTa sarevlebis Teslebi iseve swrafad aRmocendebian, rogorc kulturuli marcvlovnebisa, Tumca arc Tu ise megobrulad.

sazRvargareTeli mecnierebis (pavliCenko, xarringtoni) mier sakmaod rTuli da Sromatevadi samuSao iqna Catarebuli, romelic mcenareebis fesvTa sistemaze dakvirveba-Seswavlas iTvaliswinebda, miuxedavad sirTulisa eqsperimentebi sakmaod zustadaa Catarebuli. eqsperimenti iTvaliswinebda niadagis monoliTis frTxilad amoRebas-amoWras, Sesabamisad rezervuarSi Zalian frTxilad fesvTa sistemis wyliT garecxvas, rezervuarebSive gazomvebis Catarebas, gaSrobasa da fotografirebas, eqsperimentma uCvena, rom marcvleuli kulturebisa da sarevela mcenareebis fesvTa sistema zrdis TaviseburebebiT erTmaneTisagan gansxvavebulia, aRmonacenis gamoCenidan 5 dRis Semdeg marcveulis fesvTa sistema sWarbobda sarevelebisas, 21 dRis Semdeg ki mindvris mdogvis fesvTa sistema ganviTarebiT sWarbobda danarCenebs, qerze SedarebiT meti pirveladi fesvebis ganviTareba aRiniSna, qeris da Wvavis fesvebi niadagi zeda fenaSi aRiniSna, Svriis, xorblisa da Svriukas fesvTa sistema SedarebiT ufro Rrmad ganviTarda, xolo Svriukam marcvleul kulturebTan SedarebiT fesvTa sistemis didi masa ganiviTara, amasTan fesvTa sistema nel-nela viTardeboda, rac aRmocenebis fazaSi mis sust konkurentunarianobaze miuTiTebda.

Seswavlilia marcvleul kulturebsa da erTwlovan sarevlebs Soris urTierTkonkurenciis maCveneblebi; eqsperimentebma daadastures, rom konkurenciis intensivoba damokidebulia mcenareebis Taviseburebebze. zogjer konkurencia gamoixateba kulturuli mcenaris (qeri) produqtiuli Reroebis, ylortebis SemcirebiT, kerZod Tu qeris naTesSi sarevela bolokuraa mcirdeba ara marto ylorti da Rero, aramed mcirdeba TavTavis sididec, analogiuri konkurencia aRiniSneba bolokurasa da Svriis Sorisac, am SemTxvevaSi mcirdeba ylortebiT ricxovnoba da sagvelebis sidide. arsebobs monacemebi imis Sesaxebac, rom sarevlebi marcvleulSi amcireben kaliumis, azotis raodenobas, magram ar moqmedeben fosforis raodenobaze. marcvleulSi azotovani sasuqebis gamoyeneba mcenareSi zrdis azotisa da kaliumis Semcvelobas da ramdenadme Seamcira sarevlebis konkurentunarianoba.

soiasa da sarevlebis konkurentunarianobis Seswavlis mizniT gamoyenebuli iyo bunebrivad da xelovnurad dasarevlianebuli danayofebi, sadac Seswavlili iqna sarevela mcenareebis konkurencia soias mimarT misi ganviTarebis sxvadasxva fazaSi. konkurencia maqsimums aRwevs normaluri tenianobis pirobebSi, rodesac sarevlebi inteniurad izrdebian, es SesamCnevia parkebis gamonakvisas mis momwifebamde. soias dgomis sixSire moqmedebs konkurenciis unarze, kerZod rodesac 1m2-ze 30\_36 mcenarea, s Zlier ganicdis konkurencias sarevlebis mxridan, xolo rodesac 1m2-ze 49 mcenarea, konkurencia mcirdeba. Tumca ZurwaTi dasarevlianeba konkurencias uwevs siminds, wylisa da sakvebi nivTierebebiT uzrunvelyofis SemTxvevaSi konkurencia mcirdeba.

Cvens pirobebSi (imereTi) xSirad minaxavs simindSi SeTesili soias SemTxvevaSi konkurencia sarevlebis mimarT, nakveTi TiTqmis Tavisufali iyo erTwlovani da sxva sarevela mcenareebisagan, erTi sityviT simindi da soia konkurencias uwevs sxvadasxva saxeobebis sarevlebs.

saintereso monacemebi arsebobs bostneuli kulturebisa da sarevela mcenareebis urTierTkonkurenciis Sesaxeb; sarevela mcenareebi bostneulis mimarT kunkurencias upiratesad savegetacio periodis dasawyisSi amJRavnebs, kerZod 15% dasarevlianebis SemTxvevaSi mosavali sagrZnoblad mcirdeba. konkurencia upiratesad aRmocenebidan pirveli oTxi kviris ganmavlobaSi mJavndeba. naTesSi sarevlebis arseboba aferxebs xaxvisa da Warxlis zrdas. Warxalma daZlia sarevelebis mavne moqmedeba vegetaciis dasawyisSi gamargvlisas. bostneulis daCagvrisa da mosavlis Semcirebis erT-erT mizezs sarevlebisgan daCrdilva warmoadgens, romlis drosac ganaTebulobis intensivoba daaxloebiT 85%-iT mcirdeba.

ganakuTrebuli yuradReba daeTmo bostneul kulturebisa da sarevela mcenareebs Soris konkurenciis Seswavlas. am mizniT cdebi tardeboda sxvadasxva siganis rigTSorisebSi, gameCxereba tardeboda erTeul farTobze mkacrad gansazRvruli raodenobis datovebiT. erTeul farTobze sarevlebis raodenoba ukuproporciuli iyo rigTaSorisis siganesTan. cdebma daadgina, rom sarevlebma ar imoqmedes stafilos mosavalze, Tumca sarevlebis raodenoba icvleboda rigTaSorisebis siganis Sesabamisad, sarevlebis raodenoba 30sm-dan rigTaSorisSi 2-jer meti 60 sm-ian rigTaSorisTan SedarebiT, Sesabamisad maTi wona 60 sm-ian rigTaSorisebSi arsebuli sarevlebis wonis naxevars Seadgenda. cdebi sam variantad tardeboda: pirveli varianti iTvaliswinebda aRmocenebamde sarevlebis ganadgurebas; meore-kultivacia rigTaSorisebSi sarevlebis datovebiT; mesame ki iTvaliswinebda kultivacias, xeliT margvlas Warxlis rigTaSorisebSi sarevlebis viwro zolis datovebiT. sarevelebma Seamcires foCebis, saerTod yvela da sasaqonlo fesvebis wona. mesame variantSi miRebuli mosavali meti iyo meore variantze, sarevlebis konkurencia rigebSi ufro metad gamomJRavnda, vidre rigTaSorisebSi. bostneuli kulturebis mimarT sxvadasxva sarevlebis konkurencia mJRavndeboda sakvebi nivTierebebiT uzrunvelyofaSi. Mecnieruli gamokvlevebiT dadginda, rom erTwlovanma Tivaqasram ar Seamcira stafilos wona, TavyviTelam ki sagrZnoblad Seamcira foCebisa da fesvebis wona. xaxvisa da sufris WarxlisaTvis mniSvnelovani margvlis drouli Catarebaa, pirveli margvlis dagvianeba mniSvnelovnad amcirebs sasaqonlo produqcias. stafiloSi sarevlebis gvianma SeTesvam Seamcira maTi konkurentunarianoba, stafilosTan erTad SeTesvam stafilos mosavali 60,7g, erTi kviriT gvianma SeTesvam-106,3g, ori kviriT gvian SeTesvisas ki mosavalma 126,3 Seadgina.

unda aRiniSnos rom mcenareebis konkurentunarianoba gamoixateba sakvebi nivTierebis, sinaTlis, wylisa da sxva maCveneblebSi.

**N kulturaTa saarsebo**

**pirobebi da maTi regulireba**

mcenaris normaluri zrdisa da ganviTarebisaTvis saWiroa oTxi aucilebeli faqtori, rac SeiZleba gaiyos or ZiriTad jgufad: 1. kosmiuri anu energetikuli faqtorebi, romlebsac miekuTvneba sinaTle da siTbo; 2. ma-terikuli, rogoricaa\_wyali, sakvebi da haeri. amgvarad, mcenaris saarsebo pi-robebia \_ sinaTle, siTbo, wyali, sakvebi da haeri. garda aRniSnulisa, mcenaris normaluri zrdisa da ganviTarebisaTvis (imisaTvis, rom man daagrovos organuli masa da mogvces STamomavloba) didi mniSvneloba eniWeba im garemo pirobebs, romelSic mcenares uxdeba cxovelmyofeloba (sicocxle da moqmedeba masze), romelic cnobilia sasicocxlo pirobebis saxelwodebiT.

mcenarisaTvis sasicocxlo garemo pirobebi SeiZleba davyoT sam ZiriTad jgufad: 1. niadagobrivi (saxnavi fena, niadagis agebuleba, struqtura, reaqcia da sxva); 2. fitologiuri (sarevelebis, mavneblebis da daavadebebis uaryofiTi moqmedeba); 3. agrotenikuri (saxnavi fenis damuSavebis da mcenaris movliTi samuSaoebis xarisxi).

**sinaTle.** sinaTles mcenaris sicocxlisaTvis didi mniSvneloba eniWeba da igi ZiriTad faqtorTa ricxvs miekuTvneba. mwvane mcenaris organuli masis warmoqmna dakavSirebulia sinaTlis faqtorTan. sxvadasxva mcenare sinaTles sxvadasxva moTxovnebs uyenebs, saerTod da ganviTarebis fazebis mixedviTac. am niSniT mcenareebi or jgufad iyofa. pirveli \_ mcenareebi, romlebic Tavisi zrda\_ganviTarebisaTvis sinaTlis met raodenobas moiTxovs, sinaTlis moyvarulebi arian da grZeli dRis mcenareebis saxeliT arian cnobili; meore jgufs miekuTvneba mcenareebi, romlebic sinaTlis naklebi momTxovnebi arian, maT mokle dRis mcenareebi ewodebaT.

grZeli dRis mcenareTa jgufs miekuTvneba \_ xorbali, Wvavi, qeri, Svria, barda, mdogvi, samyura, mzesumzira, romlebic zrda\_ganviTarebisaTvis gansakuTrebiT xangrZliv ganaTebas moiTxoven yvavilobis fazamde. simindi, fetvi, brinji, kartofili, soia, bamba da sxva kargad viTardebian mokle dRis pirobebSi, kerZod samxreTis pirobebSi da mokle dRis mcenareebad iwodebian. arian iseTi mcenareebic (wiwibura, Tambaqo) romlebzedac ganaTebis xangrZlivoba naklebad moqmedebs. bunebaSi gvxvdeba agreTve iseTi mcenareebic, romlebic Crdilis pirobebs sakmaod kargad eguebian, magaliTad SroSana. igi Crdilis pirobebSic ki sakmaod kargad viTardeba da izrdeba, maszed intensiuri ganaTeba damRupveladac ki moqmedebs.

**siTbo.** mcenareebi siTbos ganviTarebis fazebis mixedviT sxvadasxva moTxovnebs uyeneben. erTi ki udaoa, kulturuli mcenareebi Tavisi zrdisa da ganviTarebisaTvis dadebiTi temperaturis mcire (1-2 da 40-500) intervals moiTxovs. mcenare ganviTarebis sxvadasxva fazaSi, rogorc sinaTlis, ise siTbos mimarT sxvadasxva moTxovnebs ayenebs.

gaRiveba-aRmocenebis fazaSi siTbos moTxovnilebis mixedviT mcenareebi SeiZleba sam ZiriTad jgufad daiyos: 1. naklebad momTxovni \_ xorbali, qeri, Wvavi, Svria, cercvela, ugrexeli, muxudo, mdogvi, mzesumzira da sxva; am jgufis mcenareebis Tesli 50C dabal temperaturaze Rivdebian da axalgazrda aRmonaceni -5-60C yinvasac uZlebs. 2. saSualod momTxovni mcenareebis jgufs miekuTvneba wiwibura, cercvi, xanWkola. maTi Tesli gaRivebas iwyebs maSin, rodesac niadagis temperatura 7-80C miaRwevs da axalgazrda aRmonaceni -3-40C yinvebs uZlebs. 3. momTxovni kulturebia \_ fetvi, simindi, sorgo, lobio, soia da sxva. maTi Tesli gaRvivebas iwyebs 10-120 C temperaturis pirobebSi, xolo aRmonaceni mokle drois ganmavlobaSic ki ver uZlebs dabal temperaturas.

aRmocenebis Semdeg sxvadasxva mcenare gansxvavebul pirobebs uyenebs siTbos. magaliTad qeri da barda energiulad izrdeba 15-180C temperaturaze, fetvi da lobio 22-250 C da a.S.

niadagis temperaturas mniSvnelovani roli eniWeba mcenareTa kvebis saqmeSi. SedarebiT Tbil niadagSi arsebul tenSi sakvebi nivTierebebi intensiurad ixsneba da mcenarec fesvebis saSualebiT kargad iTvisebs mas, xolo civ pirobebSi es procesebi sagrZnoblad Senelebulia. samagierod Zlier gamTbar niadagSi sagrZnoblad izrdeba wylis aorTqleba, gamomdinare aqedan niadagSi mcirdeba teni. xSir SeTxvevaSi iwyeba e.w gvalva da mcenare ver iRebs sakmaris sakveb nivTierebebs. aRsaniSnavia isic, rom Zlier gamTbari niadagidan sxvadasxva mcenares sakvebi nivTierebebis SeTvisebis sxvadasxva unari aqvs. amitom aris, rom mcenareebi xasiaTdebian gvalvisadmi gamZleobis sxvadasxva unariT.

**wyali.** mcenareebi vegetaciis periodSi wylis did raodenobas moiTxovs. cnobilia, rom Wvavi romlis marcvlis mosavali heqtarze 45 c-s udris, moiTxovs 1600 litr wyals. simindisa da mzesumziras erTi mcenare vegetaciis ganmavlobaSi moixmars 200 litr wyals da Tu viangariSebT, rom 1 ha-ze 40 000 mcenarea moTavsebuli 1 ha-ze saWiroa 8 000 tona wyali da a.S.

rogorc vxedavT, sxvadasxva mcenare vegetaciis ganmavlobaSi wylis sxadasxva raodenobas moixmars. wylis im raodenobas, romelic saWiroa erTi erTeuli mSrali nivTierebis Sesaqmnelad **transpiraciis** koeficienti ewodeba.

mcenareTa mixedviT transpiraciis koeficienti sxvadasxvaa, magaliTad, Wvavis transpiraciis koeficienti meryeobs 377–dan 724 farglebSi, Svriis\_ 401–665, ionjis\_ 520-1354 da a.S.

rogorc Cans, wyalze moTxovna sxvadasxva mcenareebs sxvadasxva aqvs. ufro metic, erTi da igive mcenaris wyalze moTxovna icvleba niadagobrivi da klimaturi pirobebisa da ganviTarebis fazebis mixedviTac. magaliTad, Tav-Tavian pureulebs wylis maqsimaluri raodenoba esaWiroebaT aRereba\_ daTavTavebis fazebSi. sxva kulturebTan SedarebiT parkosnebi, teqnikuri kulturebi, Zirxvenebi da sxva kulturebi moiTxoven didi raodenobiT wyals. magaliTad, bardas Tesli gaRivebisaTvis moiTxovs Teslis wonis 1,5 jer met wyals, xolo marcvlovanTa Tesli ki Teslis wonis 20-60%.

**sakvebi nivTierebebi.** mcenare sakvebs iRebs niadagidan da atmosferodan. cnobilia, rom mcenaris Semadgenlobis 70-85% wyalze modis, xolo mSral nivTierebaze mxolod 15-30%. mSrali nivTiereba Sedgeba naxSirbadisagan, Jangbadisagan, wyalbadisagan, azotisagan da nacris elementebisagan. nacarSi didi raodnobiT gvxvdeba fosfori, kalciumi, kaliumi, xolo mcire raodenobiT rkina, gogirdi, manganumi, bori, spilenZi, marganeci, alumini, TuTia, kobalti da a.S.

mcenare naxSirbads iRebs haeridan, xolo danarCen elementebs niadagidan, wyalSi gaxsnili saxiT. azoti da nacris elementebi niadagSi gvxvdeba organuli nivTierebis saxiT, romelic mcenarisaTvis miuwvdomelia. niadagis organuli nivTiereba mcenaresaTvis gamosayenebel formaSi gardaiqmneba niadagis baqteriebis, sokoebis da sxva mikroorganizmebis zemoqmedebiT. organuli nivTierebebis gardaqmnis process mineralur marilebad **mineralizacia** ewodeba.

amrigad, mcenaris normaluri zrda\_ganviTarebisaTvis da maRali mosavlis misaRebad aucilebelia azoti, fosfori, kaliumi **(makroelementebi**), kalciumi, rkina, manganumi, bori da sxva (**mikroelementebi**).

**haeri.** haeri erT-erTi ZiriTadi elementia mcenarisa da niadagSi arsebuli cocxali mikroorganizmebis normaluri cxovelmyofelobisaTvis, rogorc Jangbadis da naxSirorJangis wyaro.

atmosferos haerSi Jangbadis Semcveloba saSualod 21% udris, xolo naxSirJangisa 0,03%. rac Seexeba niadagSi arsebul haers, masSi Jangbadis radeodenoba SedarebiT mcirea, xolo naxSirJangisa ki gacilebiT maRalia da zog SemTxvevaSi aRwevs 10-15%. cnobilia, rom niadagis haerSi Jangbadis raodenoba 7-12% raodenobiT normalurad uzrunvelyofs kulturul mcenareTa normalur sunTqvas, xels uwyobs sakveb nivTierebaTa SeTvisebis maRal unars da Sesabamisad maT energiul zrdas. mZime Tixnarebisa da dabali haeraciis unaris mqone niadagebSi, niadagis haerSi Jangbadis raodenoba 1-2% ar aRemateba, rac iwvevs mcenaris fesvTa sistemis dakninebas da sakveb nivTierebaTa SeTvisebis dabal unars, Sesabamisad mcenare sagrZnoblad amcirebs vegetatiuri nawilebis zrdas. niadagSi haeraciis Semcireba da Warbi wylis raodenoba xels uwyobs CO2 dagrovebas, es ki Tavis mxriv maRla wevs niadagis mJavianobas, amcirebs niadagis agregatebis mdgradobas wylis zemoqmedebis mimarT da sxva.

rogorc vxedavT, mcenaris yvela sasicocxlo faqtorebi erTmniSvnelovania mcenaris normaluri zrda-ganviTarebisaTvis.

**niadagis reaqcia.** niadagebi qimiuri reaqciis mixedviT iyofa mJave, neitralur da tute reaqciis niadagebad. marTalia niadagis reaqcia ar miekuTvneba mcenaris sasicocxlo pirobebis aucilebel elements, magram igi metad did rols asrulebs mcenaris sasicocxlo pirobebis normalurad warmarTvis, niadagis nayofierebis, mcenareTa zrda-ganviTarebisa da produqciis xarisxis gaumjobesebis TvalsazrisiT. saqme imaSia, rom yoveli mcenare moiTxovs niadagis reaqciis gansazRvrul pirobas. ase, magaliTad, lurji ionja, Saqris Warxali da sxva mravali sruliad ver egueba mJave niadagebs; xorbali, qeri, wiTeli samyura, simindi, barda kargad egueba sustad mJave da neitraluri reaqciis niadagebs; Wvavi, Svria, cercvela, xanWkola da sxva kulturebi SedarebiT kargad viTardebian mJave niadagebze. gamomdinare aqedan udaoa, rom yvela Rone unda vixmaroT raTa maRali mosavalis misaRebad mcenares SevuqmnaT zemoT CamoTvlili sasicocxlo pirobebis optimaluri mdgomareoba. amasTanave unda vizrunoT imaze, rom niadagi pasuxobdes mcenaris moTxovnebs, iZleodes uxv da ekologiurad saimedo mosavals. sasicocxlo pirobebis regulireba met-naklebad, magram sruliad SesaZlebelia da misaRwevia im mecnieruli gamokvlevebis safuZvelze, romlebsac awarmoebdnen da dResac awarmoeben dargobrivi samecniero-kvleviTi dawesebulebebi.

**niadagSi sakveb saSualebaTa**

**regulirebis xerxebi**E

**wylis reJimi.** niadagSi wylis raodenoba wlis nebismier periodSi damokidebulia garemo pirobebis mraval faqtorze: niadagis saxeobaze, reliefze, temperaturaze, qarebis qrolvis sixSireze da simZlavreze, naleqebis raodenobaze da saerTod miwodebis wyaroebze.

niadagSi, Warbi tenis pirobebSi, seriozul sakiTxad iTvleba masSi wylis optimaluri raodenobis SenarCuneba, rasac ZiriTadaT aRweven melioraciuli da agroteqnikuri RonsZiebebis gatarebiT. saxeldobr, niadagis drenirebiT (sawreti arxebis mowyobiT) da niadagis damuSavebis Sesaferisi sistemis gamoyenebiT. amasTanave, yoveli RonisZieba unda emsaxurebodes zedmeti wylis swrafad mocilebas.

sruliad sawinaaRmdego suraTia gvalvian pirobebSi. aq yoveli RonisZieba mimarTuli unda iyos iqeTken, rom rac SeiZleb meti teni davagrovoT niadagSi. aRniSnulis yvelaze ufro realuri saSualebaa rwyva, magram rwyvasTan erTad unda ganvaxorcieloT is agroteqnikuri RonisZiebebi, romlebic saSualebas mogcems sakamod didi xnis periodSi saxnav fenaSi SenarCunebeli iqnes wylis maqsimaluri raodenoba. urwyavi miwaTmoqmedebis pirobebSi ki ZiriTad amocanas warmoadgens mosuli naleqebis niadagSi maqsimalurad SenarCuneba agroteqnikuri xerxebis gamoyenebiT.

gvalvian urwyav pirobebSi, zamTarSi Tovlis saxiT mosuli naleqebis SesanarCuneblad, mimarTaven Tovlis safaris Rvareulebad-mwkrivebad Segrovebas da datkepvnas, rac xels uwyobs Tovlis dnobis periodSi saxnav fenaSi wylis maqsimalurad SenarCunebas. cnobilia, rom respublikis umetes raionebSi, gazafxul-zafxulSi, wvimis saxiT mosuli naleqi kokispirul xasiaTs atarebs da wylis did nawils saxnavi feni ver iTvisebs, amitom aucilebelia SevqmnaT niadagis iseTi mdgomareoba, rac uzrunvelyofs mosuli naleqis saxnav fenSi maqsimalurad dagrovebas. amasTanave metad mniSvnelovania niadagis ZiriTadi da Tesviswina damuSavebisa da naTesebis movlis RonisZiebebi ganxorcieldes agroteqnologiiT gaTvaliswinebul optimalur vadebSi da xarisxianad. xSiri da Zlieri qarebis zonaSi wylis SenarCunebis metad efeqturi RonisZiebaa mindorsacavi tyis zolebis mowyoba, rac sagrZnoblad amcirebs niadagebis qarul erozias**,** tenis danakargebs da dadebiTad moqmedebs sasoflo-sameurneo kulturebis mosavlianobaze.

ferdob adgilebSi, nadagSi tenis SenarCunebisa da mosuli naleqebis uaryofiTi Sedegebis (eroziis) Tavidan asacileblad, yvela zemoaRniSnul RonisZiebebs emateba mosuli naleqebis Sekavebis metad efeqturi xerxi \_ ferdobebis gardi-gardmo xvna.

zemoaRniSnuli yvela agroteqnikuri RonisZiebis gamoyeneba gvaZlevs saSualebas niadagSi SevinarCunoT saWiro raodenobis teni da xeli SeuwyoT mcenares racionalurad iqnes igi gamoyenebuli.

**haeris reJimi.** niadagis haeris reJimi mWidrod aris dakavSirebuli wylis reJimTan. rogorc wyali, ise haeri moTavsebulia niadagis forebSi, amitom isini iTvlebian antagonistebad. maTi antagonizmi mkveTrad gamoixateba niadagis Warbi tenis an Warbi simSralis pirobebSi. niadagSi haeris regulacia (optimaluri raodenobis SenarCuneba), saWiroa yvela niadagur-klimatur pirobebSi, gansakuTrebiT ki mZime meqanikuri Sedgenilobis, arastruqturul niadagebisa da sarwyav pirobebSi. niadagSi haeris regulaciis mizniT gamoiyeneba TiTqmis yvela is xerxi, riTac vaxdenT wylis reJimis regulacias. am TvalsazrisiT pirvel rigSi unda gamoviyenoT niadagis fizikuri da fiziko-qimiuri Tvisebebis gaumjobesebis agroteqnikuri xerxi.

niadagis Warbi tenis pirobebSi haeris reJimis mosawesrigeblad saWiroa mivmarToT saxnavi fenis drenaJs, xSir da Rrma xvnas beltis amobrunebiT; msubuq niadagebze unda veridoT saxnavi fenis xSir meqanikur damuSavebas da a.S.

**siTbos reJimi.** rogorc zemoT avRniSneT, sinaTle da siTbo kosmiur faqtorebs miekuTvneba, maT soflis meurnebaSi mzis energiis saxiT viyenebT. mcenaris zrda-ganviTarebis fazebis mixedviT aRniSnul sasicocxlo faqtorebs mcenare sxvadasxva odenobiT moiTxovs. gamomdinare aqedan, maT racionalurad da optimalur vadebSi gamoyenebas didi mniSvneloba eniWeba. miuxedavad aRniSnulisa, maTi regulirebis efeqturi xerxebi soflis meurneobaSi jer ar gagvaCnia, magram SesaZlebelia misi ramdenadme regulireba. pirveli da umniSvnelovanesi xerxia Sesaferisi kulturebisa da jiSebis SerCeva sxvadasxva bunebrivi pirobebisa da reliefis gaTvaliswinebiT. dadgenilia, rom araswori zedapiris mqone naxnavi ufro adre Tbeba gazafxulze, vidre swori zedapiris mqone niadagi. mTlianad moTesili kulturebis qveS niadagi zafxulis ganmavlobaSi SedarebiT grilia, vidre saToxni kulturebis SemTxvevaSi; msubuqi da naklebteniani niadagi Cqara Tbeba, vidre teniani da mZime meqanikuri Sedgenilobis niadagi da a.S.

zemoaRniSnuli Tvisebis gaTvaliswinebiT mTlianad Tu ara nawilobriv mainc SegviZlia vmarToT sasargeblo mimarTulebiT niadagis Tburi reJimi.

**sakvebis reJimi.** siTbos reJimisagan gansxvavebiT niadagis kvebiTi reJimis regulireba farTo masStabiTaa SesaZlebeli. niadagis am Tvisebas udidesi mniSvneloba eniWeba uxvi da xarisxiani mosavlis miRebis saqmeSi, igi dReisaTvis pirveli rigis amocanadaa miCneuli. rogorc cnobilia, sxvadasxva niadagebi sxvadasxva raodenobiT Seicavs mcenarisaTvis saWiro sakveb elementebs.

Rarib niadagebSic ki, rogoricaa eweri niadagebi, saerTo azotis, fosforisa da kaliumis Semcveloba sagrZnoblad maRalia, rom araferi vTqvaT Savmiwebze, magram maTi saerTo raodenobis mcire nawili, mxolod SesaTvisebel formaSi myofi, gamoiyeneba mcenaris mier.

cnobilia, rom erTi da igive kulturis Tesva xangrZlivi drois ganmavlobaSi erTi da igive adgilze, niadagis ganoyierebis gareSe, an Znelad SesaTvisebel formaSi myofi elementebis advilad SesaTvisebel formaSi gadayvanis gareSe, iwvevs mosavlianobis mkveTrad Semcirebas. amasTanave sakvebi nivTierebebis mizanSewonili xarjva, srulad da efeqturad gamoyeneba miwaTqmoqmedebis pirveli rigis amocanas warmoadgens.

Znelad xsnadi sakvebi nivTierebebis advilad xsnad SesaTvisebel formaSi gadayvanas, nawilobriv TviT mcenare, fesvebis meSveobiT gamoyofili organuli mJavebis saSualebiT axerxebs, magram am saqmes ZiriTadaT niadagSi arsebuli mokroorganizmebi asruleben. cnobilia, rom Znelad xsnadi sakvebi elementebi Sedis niadagis organul nawilSi, xolo mikroorganizmebi maTi moqmedebis Sedegad iwvevs am elementebis daSlas – mineralizacias da sakvebi elementebis advilad SesaTvisebel formaSi gadayvanas. amitom, niadagis damuSavebis erT-erT mizans mikroorganizmebis cxovelmyofelobis gaaq-tiurebac warmoadgens. garda aRniSnulisa, mcenaris sakvebi elemetebiT uzrunvelyofis regulireba unda moxdes organuli da mineraluri sasuqebis gamoyenebiT (xelovnurad SetaniT).

rogorc vxedavT, mcenareTa sasicocxlo faqtorebi erTmaneTTan mWidro kavSirSi imyofebian da maTi gonivruli marTva (sasurveli mimarTulebiT warmarTva) sxvadasxva RonisZiebebis kompleqsuri gatarebiT xorcieldeba, riTac iqmneba sruli piroba niadagis nayofierebis SenarCunebisa da amaRlebisaTvis.

**sarevela mcenareebi da niadagi**

sarevela mcenareebisa da niadagebis urTierTkavSiris Sesaswavlad araerTi kvlevaa Catarebuli, iyo imis cdac, rom sarevela mcenareebis saxeobebis maxasiaTeblis mixedviT daedginaT niadagis tipi, xarisxi da fizikur-qimiuri Tvisebebi. am SemTxvevaSi mxedvelobaSi miiRes sarevlebis zrda-ganviTareba, saxeobrivi Sedgeniloba, Tumc arc Tu ise didi raodenobis sarevelebis saxeobebi dakavSirebulia gansazRvruli tipis niadagebTan. zogierTi saxeobis sarevela mcenareebi SeiZleba Segvxvdes gansxvavebuli tipis niadagebze, niadagebze, romlebic erTmaneTisagan gansxvavdebian fizikur-qimiuri TvisebebiT, tenis SemcvelobiT, ares reaqciiTac ki. sarevelebisaTvis damaxasiaTebeli aris garemos cvlilebebisadmi kargi Seguebulobis unari. aris sarevelebi, romelTa saxeobebi TiTqmis erTnairadaa gavrcelebuli yvela tipis niadagebze. aseT sarevelebs miekuTvnebian: namikrefia (Agrosxis spp.), yanis Wleqi (Polygonum Convolvulus), Cveulebrivi maTitela (Polygonum aviculare), nacarqaTama (Chenopodium album), Wiota (Agrostema gitlogo), JunJruki ( StellarŻa media), wiwilkuras (Cerastium vulgatum), wiwmatura (Capsella bursa-cartoris), boloka (Raphanus raphanistrum), marwyva-balaxa (Polentilla anserïna), rZiana (Euphobia peplus), kesanescisana (Myosotis arvensis), mravalZarRva (Plantago lanceolata), mindvris nari (Cirsium arvense), TavyviTela (Senocio vulgaris) da sxv.

literaturaSi sakmaod mravlad moipoveba monacemebi sarevela mcenareebsa da niadagis ares reaqcias Soris damokidebulebis Sesaxeb. cnobilia sarevelebis gansakuTrebuli e.w. “tute” mcenareebi, romlebic ZiriTadad damlaSebul niadagebze izrdebian.

udabnoebsa da naxevradudabnoebisaTvis damaxasiaTebelia Semdegi sarevela mcenareebis wiTelwvera, yviTeli cocxi, spergula da sxv. amave klimatur pirobebSi gvxvdeba saxeobebi, romlebic ver eguebian damlaSebul niadagebs, maT miekuTvnebian RiWa, balba, yviTeli (samkurnalo) ZiZo, mravalZarRva, glerta, cxeniskuda da sxv. Zurwas aqvs unari gavrceldes iseT niadagebze, sadac gruntis wylebi sxvadasxva siRrmezea, Tumca mis mier gamowveuli dasarevlianebis xarisxi da sxvadasxva mcenareebis konkurentunarianobazea damokidebuli. Cveulebriv Tvlian, rom nakveTSi Warbi raodenobis RiRilos arseboba niadagis mokirianebis aucileblobaze miuTiTebs. cnobilia, rom Rolo kargad viTardeba kiriT Rarib niadagebze, mis sawinaaRmdegod ki mokirianebas urCeven. mis zrda\_ganviTarebas xels uwyobs isic, rom aseT niadagebze ver izrdebian Rolosadmi konkurentunariani mcenareebi. kiris, rogorc RolosTan brZolis saSualebebis ZiriTadi Rirseba imaSi mdgomareobs, rom igi qmnis iseT qimiur da fizikur pirobebs, romlebic xels uwyobs Rolos mimarT konkurentunariani mcenareebis ganviTarebas. Rolo kargad viTardeba niadagebze, romlis pH 7-is tolia, SezRudulia iseT pirobebSi, rodesac pH oTxs udris.

arsebobs monacemebi imis Sesaxeb, rom niadagis mJavianoba aferxebs zogierTi sarevelas ganviTarebas, kerZod gogirdmJava amoniumis gamoyenebisas izrdeba ra niadagis mJavianoba, iseTi sarevelebi rogoricaa mravalZarRva da babuawvera (burbuSela) iCagrebian, piriqiT tute reaqciis sasuqebis gamoyeneba stimuls aZlevs aRniSnuli sarevelebis ganviTarebas. mJave sasuqebis maRali dozebi aferxebs ionjis, Tivaqasras, magram dadebiTad moqmedeben namikrefias ganviTarebaze. sxvadasxva wlebis manZilze saZovrebze erTi da igive sasuqebis an maTi narevebis gamoyeneba, xels uwyoben specifikuri floris Camoyalibebas, amitom aseTi sasuqebi gamoyenebuli unda iqnas niadaguri pirobebis gaTvaliswinebiT.

zemoaRniSnulidan gamomdinare sarevela mcenareebis umravlesoba ar warmoadgenen niadagis reaqciis indikatorebs, romlebzec isini izrdebian da ar iZlevian maTi sameurneo Rirsebebis Sefasebis saSualebas. zogierTi saxeobebi (magaliTad Rolo) xSirad miuTiTebs niadagis mJavianobaze, kargad izrdeba neitraluri reaqciis niadagebzec. mcenareebis aseTi Tanacxovreba SeiZleba iyos niadaguri pirobebis sarwmuno maCvenebeli. arsebobs monacemebi romlis Tanaxmadac Rolos, spergulas, mindvris gvirilas, WinWris, wiapis Tanacxovreba miuTiTebs msubuq silnar, kiriT Rarib niadagebze, sarevelebis narevebi-melakuda, Tagvikuda, mravalZarRva, yanis baia, viristerfa, mxoxavi Wanga Cveulebrivad Tixnar niadagebTanaa dakavSirebuli. zogjer amtkiceben, rom niadagi romelic ganapirobebs sarevelebis laRad zrdas kulturuli mcenareebis movla-moyvanisaTvis SesaniSnav garemos qmnis, Tavis mxriv sarevelebis siWarbe miuTiTebs imaze, rom niadagi uzrunvelyofili aris sakvebi nivTierebebiT. erT SemTxvevaSi es mosazreba SeiZleba sarwmun iyos, meoreSi ki ara. sarevela mcenareebis sixSire yovelTvis ar ganisazRvreba niadagis fizikur-qimiuri TvisebebiT, aramed aq sxva faqtorebic moqmedebs, kerZod aRniSnuli zonisaTvis miwaTmoqmedebis ganviTarebis istoria, dasarevlianebis wyaros siaxlove, niadagSi sarevela mcenareebis Teslebis maragi, wylis arseboba da mocemuli sezonisaTvis mcenareebis ganviTarebis pirobebi, gansakuTrebuli mniSvneloba aqvs kulturis Sesabamisobas niadagur-klimatur pirobebTan. damlaSebuli niadagebis amtani sarevela mcenareebis laRma zrda-ganviTarebam SeiZleba mianiSnos imaze, rom niadagi gamosayenebelia Saqris Warxlis movla-moyvanisaTvis, xolo simindisa da sxva marcvleulis Tesva aseT niadagebze ar aris mizanSewonili. aseTi magaliTebis moyvana mravlad SeiZleba, Tumca esec naTel warmodgenas gviqmnis imis Taobaze rogori damokidebuleba arsebobs niadagur pirobebsa da sarevla mcenareebis ganviTarebas Soris.

**kulturuli mcenareebisa da sarevelebis**

**urTerTdamokidebuleba.**

mravalricxovanma gamokvlevebma da mindvris dakvirvebebma uCvena, rom calkeul kulturebs Tan sdevs specifikuri sarevelebi. magaliTad marcvleuls, ionjas da sxva sakveb kulturebs, mdeloebs, baRebs, venaxebs maTTvis damaxasiaTebeli sarevelebi asarevlianeben. kulturuli mcenareebis naTesebSi ama Tu im saxeobis sarevlebis Warbi an piriqiT susti gavrceleba ZiriTadad kulturuli mcenaris konkurenciis xarisxiT ganisazRvreba, romelsac kulturuli mcenare avlens sarevelebis mimarT. sarevelas konkurenciis unari kulturuli mcenaris mimarT damokidebulia mis agebulebaze, formaze, Teslis advilad gaRivebis unarze, aRmocenebis zrdis energiaze, fesvTa sistemisa da miwiszeda organoebis agebulebaze, mis xasiaTze. garda amisa konkurencia, specifikuri sarevelebis stimulacia an daTrgunva SeiZleba gamoiwvios kulturuli mcenareebis movla-moyvanis agroteqnikam, gamoyenebulma Teslbrunvam da sxva pirobebma. kvleviT dadgenilia, rom sarevlebis zogierTi saxeoba upiratesobas aniWebs xorbalsa da qeris naTesebs, maTi kavSiri ganpirobebulia damuSavebis meTodiT da ara romelime kulturuli mcenaris moqmedebiT sarevlebze. magaliTad, sarevela marmuWi gxvdeba xorblis naTesebSi Tumca qeris naTesSi ar aris gavrcelebuli an SezRudulia misi gavrceleba. ismis kiTxva ra aris mizezi? aq pasuxi erTia-xorbali saSemodgomoa, qeri sagazafxulo, marmuWis Tesli Rivdeba SemodgomiT da zamTarSi, misi aRmonacenic xorbalTan erTad izrdeba da iCagreba, meore SemTxvevaSi qeri iTeseba aneulze gazafxulze, niadagSi rCeba zamTris ganmavlobaSi, zamTris dabali temperaturis gavleniT marmuWis aRmonacenis umravlesoba iRupeba, konkurenciis TvalsazrisiT mniSvneloba aqvs aramarto Tesvis vadebs, aramed kulturuli mcenaris jiSs da saxeobas. kulturuli mcenareebis naTesebSi sarevlebis aRmocenebis unarze mravali faqtori moqmedebs, maTgan aRsaniSnavia-Teslebis erTnairi zoma, momwifebisa da aRmocenebis periodebis Tanxvedra, niadagis damuSavebis meTodebi, movla-moyvanis da mosavlis aRebis saSualebebi. damaxasiaTebel magaliTs warmoadgens jvaryvavilovanTa ojaxis erTwliani sarevelebisa da marcvlovani kulturebis urTierTSeTanwyoba, gamonakliss brinji warmoadgens, radgan igi movla-moyvanis specifikur pirobebs moiTxovs, rac ganapirobebs iseTi sarevlebis arsebobas, romlebic eguebian datborvas an Zlier datenianebul niadagebs. iseT kulturebSi ki rogoric simindia, rigTaSorisebis damuSavebis Sewyvetisas intensiurad viTardeba iseTi sarevlebi, rogoricaa namikrefia, burCxa, Slafa da sxv. tenian nakveTebSi izrdebian maTTvis damaxasiaTebeli mcenareebi (Svita), gazonebi, sportuli moednebi upiratesad dasarevlianebulia iseTi sarevlebiT, rogoricaa babuawvera, erTwlovani Tivaqasra, JunJruki, MmJavela, mravalZarRva da sxv.

**sarevelebis winaaRmdeg brZolis sistemebi**

sarevela aris mcenare, romelic moreulia kulturul mcenareTa naTesebSi da ar warmoadgens mosavlis miRebis mizans. dReisaTvis sarevelebTan brZolis sami ZiriTadi meTodi arsebobs\_agroteqnikuri, biologiuri da qimiuri.

brZolis **agroteqnikuri** meTodi brZolis ZiriTad meTodaT unda CaiTavlos, rac gamoixateba niadagis damuSavebis da naTesebis movlis sxvadasxva xerxebSi. aRniSnuli xerxebidan unda gamoiyos e.w brZolis gamafrTxilebeli da ganmanadgurebeli RonisZiebebi.

brZolis gamafrTxilebel RonisZiebebs miekuTvneba:

1. saTesle masalis sarevelebis Teslebisagan gawmenda;
2. kulturis umaRlesi xarisxis TesliT Tesva;
3. nakelTan erTad niadagSi sarevela mcenareTa Teslis Setanis aRkveTa (movixmaroT mxolod gadamwvari nakeli);
4. arxisa da gzispirebze xvadaxva mcenareTa Teslis momwifebamde ganadgureba (waTibva);
5. sawyobebisa da manqana-aiaraRebis sistematuri gawmenda-gasufTaveba.

brZolis gamanadgurebel RonisZiebebs miekuTvneba: nakveTis kulturuli xvna, naTesebis drouli movla-gafxviereba, farcxva, kultivacia.

brZolis **biologiuri** meTodebi miCneulia sarevelebTan brZolis yvelaze racionalur meTodad, rac gulisxmobs kulturul mcenareTa optimalur vadebSi Tesvas, kulturaTa swor morigeobas, Tesvis optimaluri normiT Tesvas, agroteqnikuri RonisZiebebis droulad Catarebas, sasuqebis racionalur gamoyenebas. yovelive zemoaRniSnuli xels uwyobs mosavlianobis zrdas da niadagis saxnav fenebSi 20-25% amcirebs sarevelebis Teslis raodenobas.

brZolis biologiuri meTodis saukeTeso magaliTad unda CaiTvalos saSemodgomo TavTavianebis Tesva. optimalur vadebSi da optimaluri normiT daTesili saSemodgomo kulturebi SemodgomiT dabuCqebis fazaSi adre gazafxulisa da zafxulis sarevelebisagan gansxvavebiT energiulad izrdebian, jejili mTlianad faravs niadagis zedapirs da ar aZlevs saSualebas sarevelebis axalgazrda aRmonacenis ganviTarebas, ris Sedegadac sarevelebi iRupebian.

**brZolis qimiuri meTodi.** Tanamedrove etapze sul ufro da ufro didi yuradReba eqceva sarevelebTan brZolis qimiur meTods, rogorc yvelaze ufro efeqtur saSualebas. dReisaTvis soflis meurneobaSi sarevelebTan brZolis sakmaod bevri qimiuri preparatebi (herbicidebi) arsebobs, mcenareze moqmedebis xasiaTis mixedviT isini or jgufad iyofa: 1. amorCeviTi moqmedebis da 2 saerTo moqmedebis.

saerTo moqmedebis herbicidebi ZiriTadad gamoiyeneba sasoflo-sameurneo kulturebisagan Tavisufal nakveTebze (aneulze, nawveralze, gzispirebze, arxispirebze). amorCeviTi xasiaTis preparatebi sxvadasxva biologiuri jgufis mcenareebze sxvadasxvagvarad da intensiobiT moqmedeben. rogorc cnobilia, kulturuli mcenareebi, ise rogorc sarevelebi iyofian erTlebnianebad da orlebnianebad. zogierTi herbicidi efeqturad moqmedebs erTlebnianebze (viwro lancetisebur foTlianebze) da ar moqmedeben orlebnianebze (farTofoTlianebze) da piriqiT. herbicidebis moqmedebis aseT Tvisebas SerCeviTi xasiaTis moqmedeba ewodeba.

sazogadod, herbicidebis umravlesoba aqtiurad moqmedebs orlebnianebze da maTi gamoyeneba did sifrTxilesTan aris dakavSirebuli, radgan arsebobs kulturuli, orlebniani mcenaris dazianebis didi albaToba. zogierTi herbicidi anadgurebs erT romelime sarevelas, miuxedavad imisa igi erTlebnian Tu orlebnianTa jgufs miekuTvneba. magaliTad herbicidebi simindis naTesebSi gamoiyeneba, rogorc erTlebniani aseve orlebniani sarevelebis mosaspobad, xolo simindisaTvis maT araviTari ziani ar moaqvT. xorblis naTesebSi gamoiyenebuli herbicidebi moqmedeben Svriukas (sarevela) winaaRmdeg miuxedavad imisa, rogorc Svriuka, ise xorbali erTi da igive biologiur jgufs miekuTvneba. aseve gamoiyeneba bardas naTesebSi herbicidebi orlebniani sarevelebis mosaspobad a.S.

SerCeviTi moqmedebis herbicidebi or jgufad iyofa – kontaqturad da sistemurad. kontaqturi herbicidebi azianebs mcenaris im nawils, romelsac moxvdeba e.i ZiriTad vegetatiur nawilebs da uvneblad tovebs mcenaris fesvebs. mravalwlovanTa winaaRmdeg aseTi herbicidi nakleb efeqturia, radgan uvnebeli fesvi isev inviTarebs vegetatiur nawilebs.

gansxvavebiT kontaqturi herbicidebisa, sistemuri herbicidebi mcenareSi aRwevs foTlis, Rerosa da fesvebis (Tu SevitaneT niadagSi) saSualebiT gadaadgildeba mTel mcenareSi, arRvevs masSi fiziologiur procesebs da mcenare 2-3 kviris Semdeg kvdeba.

**herbicidebis gamoyenebis** 2 wesi arsebobs. erTi, rodesac herbicidi moixmareba mcenaris aRmocenebis Semdeg, ganviTarebis garkveul fazaSi Sesxulebis wesiT da meore - niadagSi Setanis gziT. aRmonacenSi herbicidi SeaqvT sxvadasxva koncentraciis xsnaris saxiT. herbicidis saWiro raodenoba Tu igi Segvaqvs Semsxurebeli specialuri manqanebiT ixsneba 400-500 litr wyalSi (1 ha-ze), Tu TviTmfrinaviT - wylis raodenoba mcirdeba 50 litramde. rogorc wesi, naTesebi unda damuSavdes Tbil, uqaro amindSi. Sesxurebis saorentacio fazebia: TavTavian pureulebSi \_ bartyobis faza, simindis naTesebSi rodesac mcenare ganiviTarebs 3-6 foTols, barda 4\_6 foTols da a.S.

miuxedavad imisa, rom qimiuri meTodi sarevelebTan brZolis metad efeqturi RonisZiebaa, herbicidebis normidan gadaxra, misi gadidebuli normebis moxmareba, iwvevs garemo pirobebis dabinZurebas, xolo Setanis vadebis darRveva ki sagrZnoblad amcirebs maT efeqturobas. imisaTvis, rom sarevelebTan brZola ufro efeqturi gavxadoT da naklebi ziani mivayenoT garemos, ekologiuri TvalsazrisiT praqtikaSi bolo dros didi yuradReba eqceva brZolis kompleqsur meTods, rac gulisxmobs agroteqnikur, biologiur da qimiuri brZolis meTodebis SeTanawyobas.

**niadagis ganoyiereba**

soflis meurneobis dargebis ganviTareba niadagis ganoyierebis gonivruli sistemis gareSeE yovlad warmoudgenelia. is miRwevebi, romlebic gaaCnia CvenSi agrarul mecnierebas didad aris damokidebuli sasuqebis swor da racionalur gamoyenebaze. sworad da racionalurad gamoyenebuli sasuqebi uzrunvelyofs niadagis nayofierebis zrdas, mosavlis matebas, garemos uaryofiTi pirobebisadmi mdgradobas, daavadebaTa da mavnebelebis mimarT gamZleobas da sxva.

sasuqebi iyofa sam ZiriTad jgufad: organuli, mineraluri da baqteriuli sasuqebi. organul sasuqebs miekuTvneba: nakeli, torfi, wunwuri. maT SeiZleba miekuTvnos agreTve mwvane sasuqebic\_sideratebic. organuli sasuqebi adgilobrivi sasuqebis saxeliTaa cnobili.

mineraluri sasuqebi iyofa or jgufad: makro da mikro sasuqebad. makro sasuqebs miekuTvneba N,P,K, xolo mikro sasuqebs\_bori, manganumi, spilenZi, TuTia, rkina da sxva.

niadagSi mikrobiologiuri procesebis gaaqtiurebis mizniT gamoiyeneba biologiuri sasuqebi, sadac Tavmoyrilia aqtiuri mikroorganizmebi.

yvela sakvebi elementi, garda naxSirbadisa da Jangbadisa romelTa 80-85%-s mcenare atmosferos haeridan iRebs, warmodgenilia niadagSi da mcenaris mier SeiTviseba fesvebis saSualebiT.

niadagi yvela zemoT CamoTvlili mikroelementebiT praqtikulad met-naklebad uzrunvelyofs mcenaris moTxovnebs, xolo makroelementebiT mcenaris uzrunvelyofa mTlianad niadags ar SeuZlia. amitomac aris, rom maTi niadagSi Setana sasoflo-sameurneo kulturebis maRali da xarisxiani mosavlis miRebis safuZvelia.

**azoti** xels uwyobs mcenaris vegetatiuri nawilebis aqtiur zrdas. igi cilebis Semcveli erT-erTi ZiriTadi nawilia. azotiT uzrunvelyofili mcenare energiulad izrdeba, muqi mwvane ferisaa, gamoirCeva mavneblebisa da daavadebebisadmi mdgradobiT, misi nakleboba iwvevs mcenaris dakninebas, metoba ki vegetaciis gaxangrZlivebas, Sesabamisad simwifeSi gvian Sesvlas.

**fosfori** xels uwyobs nayofis simwifis daCqarebas, WarxalSi Saqrianobis, xolo kartofilSi saxameblis matebas. misi nakleboba gamoixateba fesvebisa da foTlebis dakninebaSi.

**kaliumi** mcenares aZlevs simtkices da naklebad wveba, axangrZlivebs produqciis Senaxvis periods, amcirebs TavTaviani pureulebis da mravalwlovani balaxebis zamTargamZleobis unars.

soflis meurneobis intensifikacia da misi efeqturobis amaRleba, garda agroteqnikuri RonisZiebebisa, mWidrod aris dakavSirebuli sasuqebis gamoyenebasTan, efeqti miT ufro SesamCnevia rac ufro gonivrulad, erTmaneTTan Serwymuli da Sexamebuli iqneba gatarebuli agroteqnikuri RonisZiebebi sasuqebis SetanasTan.

**organuli sasuqebi**

organuli sasuqebis jgufs miekuTvneba nakeli, nakelis wunwuxi, xelovnuri nakeli, torfi da misgan damzadebuli sasuqebi, Sereuli kompostebi, fekaluri sasuqi, sasoflo\_sameurneo da samrewvelo sawarmoTa narCenebi, mdinaris lami, agreTve mwvane sasuqi (sideratebi).

organuli sasuqebidan yvelaze farTo gamoyeneba aqvs msxvilfexa rqosani pirutyvis nakels. soflis meurneobaSi nakelis gamoyenebas didi xnis istoria aqvs. imis gamo, rom nakeli sruli sasuqia, misi efeqti yovelgvar niadagze, TiTqmis yvela kulturis qveS iZleva SesamCnev efeqts, misi moqmedeba mJave kordian-ewer niadagebze yvelaze efeqturia. nakelis moqmedebis xangrZlivoba saSualod 4-5 weliwads grZeldeba.

nakeli mcenarisaTvis aucilebel yvela sakveb nivTierebas Seicavs da amasTan erTad aumjobesebs niadagis fizikur Tvisebebs, ase, magaliTad nakelis SetaniT matulobs msubuqi da qviSnari niadagebis bmuloba, xolo mZime Tixnari niadagebi SedarebiT fxvieri xdeba. nakeli xels uwyobs niadagis mier wylis SeTvisebas, umjobesdeba misi Tburi Tvisebebi da struqtura, ufro cxovelmyofeli xdeba niadagis mikroorganizmebi.

nakelSi azoti warmodgenilia cilovani nivTierebebiT da amoniakis saxiT. cilovani nivTierebebi gvian iSleba da nakelis moqmedebis xangrZlivoba (4-5 weli) swored amazea damokidebuli. sazogadod nakelSi sakvebi nivTierebebis Semcveloba - misi raodenoba ZiriTadad damokidebulia pirutyvis saxeobaze.

nakelze did gavlenas axdens Senaxvis pirobebi. wylis aorTqlebisa da organuli nivTierebebis mineralizaciis Sedegad azotis, foforisa da kaliumis procentuli raodenoba matulobs, magram nakelis xangrZlivad Senaxvis pirobebSi azotis Semcveloba nawilobriv klebulobs, amitom aucilebelia davicvaT misi Senaxvis moTxovnebi. rac Seexeba fosforsa da kaliums, maTi raodenoba TiTqmis ucvleli rCeba. pirutyvis saxeobidan da Senaxvis pirobebidan gamomdinare nakelSi azotis, fosforis da kaliumis raodenoba (gansakuTrebiT azotis) did farglebSi meryeobs, saSualod ki udris: azoti\_0,5%, fosfori (**P205) –** 0,2%, kaliumi (K2O) 0,6%. igi Seucvleli da yvelaze iafi sasuqia. sakvebi nivTierebebis raodenobis mixedviT gamoirCeva cxvrisa da cxenis nakeli, SedarebiT naklebia msxvilfexa rqosani pirutyvis nakeli, xolo am TvalsazrisiT frinvelis nakeli pirvel adgilzea.

nakelis rogorc raodenoba, aseve misi xarisxi bevrad aris damokidebuli Senaxvis pirobebze, mas unda mieqces Sesaferisi yuradReba. dReisaTvis nakelis Senaxvis ori wesi arsebobs: cxlad da civad Senaxva.

cxlad Senaxvisas nakeli ewyoba 50—70 sisqiT dautkepnav Stabelebad. Caxurebul nakels zemodan umateben Semdeg fenas, manam sanam Stabelis simaRle ar miaRwevs 2,5-3 m-s. Semdeg mas Tavze ayrian 10-20 sm-is sisqiT miwas. Senaxvis aseT pirobebSi ikargeba azotis didi raodenoba, amitom ar SeiZleba CaiTvalos igi perspeqtiulad.

civad Senaxvisas nakeli yoveldRiurad grovdeba sanakele ormoSi an tranSeiSi da itkepneba. ase grZeldeba sanakele ormos nakeliT amovsebamde da gadaifareba 10-20 sm-is sisqis miwiT. datkepnil nakelSi temperatura ar aRemateba 30-400, amitom azotis dakargva SesamCnevad Semcirebulia.

**nakelis niadagSi Setanis vadebi da wesebi.** Senaxvis xangrZlivobis mixedviT nakeli SeiZleba iyos axali, naxevrad gadamwvari da gadamwvari. axali nakeli marTalia mcenarisaTvis SesaTvisebel sakveb elementebs didi raodenobiT Seicavs, magram igi naklebad gamoiyeneba, radgan jer erTi, masSi didi raodenobiT gvxvdeba qveSsafeni, rac xels uSlis nakelis Tanabrad ganawilebas niadagis zedapirze da SemdgomSi Caxvnis dros manqana\_iaraRebis muSaobas aferxebs. Ggarda amisa, masSi gvxvdeba jer kidev sicocxlis unariani sarevelaTa Tesli, rac sagrZnoblad asarevlianebs niadags da aseTi nakeli ufro zianis momtania vidre sargeblobis.

naxevradgadamwvar nakelSi, marTalia Senaxvis periodSi sakveb elementTa raodenoba mcirdeba, magram masSi qveSsafeni ukve daSlilia, sakmaod fxvieria da advilad nawildeba niadagis zedapirzec, SedarebiT mcirea masSi aRmocenebis unaris mqone sarevelaTa Tesli.

gadamwvari nakeli, Tavisi SedgenilobiT gacilebiT bevrad CamorCeba axal nakels (Senaxvis periodSi sakvebi elementebis 50% kargavs), magram igi ukeTesia vidre axali nakeli. soflis meurneobaSi yvelaze efeqturia naxevradgadamwvari nakeli.

nakelis, rogorc sasuqis niadagSi Setanis vadebs da wess didi mniSvneloba eniWeba. sagazafxulo kulturis qveS da aneulze nakeli unda SevitanoT ZiriTadi xvnis win da SetanisTanave unda Caixnas niadagSi, pirvel rigSi azotis maqsimalurad SenarCunebis mizniT. gazafxulze nakelis Setana dasaSvebia iseT farTobebze, romlebic dakavebuli iyo SemodgomiT naTesi romelime Sualeduri kulturiT da gankuTvnilia saSemodgomo TavTavianebisaTvis. mosavlianobis matebis saqmeSi gansakuTrebiT karg Sedegs iZleva nakelis da mineraluri sasuqis erToblivi Setana.

**M mineraluri sasuqebi**

**mineraluri sasuqebi** or jgufad iyofa: mikro da makro sasuqebad. qvemoT ganvixilavT ZiriTad makro sasuqebs maT saxeebs, Tvisebebs, Setanis vadebs, wesebs da normebs sakvebi kulturebis qveS.

**azotovani sasuqebi.** cnobilia, rom azoti mcenarisaTvis da saerTod cocxali organizmisaTvis aucilebel elements warmoadgens. azotis gareSe, cxoveluri Tu mcenareuli warmoSobis arc erT ujreds sicocxle ar SeuZlia. azoti cilebis 15-16% Seadgens. Cvens planetaze azotis praqtikulad ganusazRvreli raodenoba moipoveba. misi udidesi raodenoba atmosferos haerSia Tavisufali saxiT, rasac mcenare ver iyenebs. niadagSi atmosferos azoti sxvadasxva gziT xvdeba da isic Zlier mcire raodenobiT - naleqebis gziT, amoniakisa da azotis Jangeulebis saxiT. aRniSnuli azoti misi simciris gamo SesamCnev dadebiT gavlenas ver axdens mcenaris zrda-ganviTarebaze. niadagSi azotis dagrovebis ufro intensiuri gzaa azotis mafiqsirebeli baqteriebis moqmedebiT Setanili azoti, romlebic parkosan mcenareTa fesvebze cxovroben da cnobilia koJris baqteriebis saxelwodebiT. niadagSi orive gziT moxvedrili azotis raodenoba srulad ver uzrunvelyofs mcenaris moTxovnebs. gamomdinare aqedan, saWiro xdeba niadagis azotiT gamdidreba, azotSemcveli mineraluri sasuqebiT.

bunebaSi azotSemcveli marilebis yvelaze didi sabadoebi samxreT amerikaSi gvxvdeba (CileSi) da Ciles gvarjilis saxelwodebiTaa cnobili. gasagebia, rom igi ver uzrunvelyofs azotze msoflio moTxovnebs, amitom dReisaTvis azotovani sasuqebis udidesi raodenoba qarxnuli wesiT mzaddeba. ZiriTadi azotovani sasuqebidan cnobilia Semdegi:

**amoniumis gvarjila** (NH4NO3) Seicavs 34,6% nitratul da amiakur azots. amoniumis gvarjila zedmetad higroskopiulia, moyviTalo feris da kristaluria, advilad orTqldeba. imisaTvis, rom SevamciroT misi higroskopiuloba, mas amzadeben granulebis saxiT. xarisxiani amoniumis gvarjila unda pasuxobdes Semdeg moTxovnebs: azotis Semcveloba 34,6%, tenianoba araumetes 0,4%, neitraluri an susti mJave reaqciis, wyalSi uxsnadi nivTiereba ara umetes 0,1%. maRali higroskopiulobis gamo igi unda inaxebodes mSral SenobaSi da wyalgaumtar tomrebSi. imis gamo, rom igi advilad ixsneba wyalSi da advilad orTqldeba, aucilebelia misi xmarebisas sasuqis niadagSi Setana, raTa Tavidan aviciloT zedmeti danakargebi. niadagis maRali tenianobis SemTxvevaSi sasuqi niadagSi advilad Cairecxeba, rac iwvevs sagrZnob danakargebs.

**amoniumis sulfati** (NH4)2SO4 Seicavs 20,5\_21% azots. naklebad higroskopiulia, ZiriTadad TeTri feris mzaddeba, Seicavs 0,2\_0,3% tens, 0,025\_0,05% Tavisufal gogirdmJavas, rac amoniumis sulfatis susti mJave reaqciis maCvenebelia, Seicavs 23\_24% gogirds, romelic mcenaris kvebis saqmeSi metad mniSvnelovan wyaros warmoadgens. imis mixedviT, Tu ra teqnologiiT aris sasuqi damzadebuli, SeiZleba iyos molurjo an mowiTalo Seferilobis. SedarebiT Znelad ixsneba wyalSi, misi Setana niadagSi, rogorc amoniumis gvarjilas SemTxvevaSi, ar aris aucilebeli uSualod Teslis win, aramed SesaZlebelia Setanili iqnes ZiriTadi xvnis win. misi xSiri da sistematuri Setana niadagSi, imis mixedviT, Tu ra niadagTan gvaqvs saqme met-naklebad, zogjer ki mniSvnelovnad zrdis niadagis mJavianobas.

**Txevadi azotovani sasuqebi.** myari saxis sasuqebTan (amoniumis gvarjila, sulfat amoniumi) SedarebiT Txevadi azotovani sasuqebis warmoeba daaxloebiT 40% ufro iafi da efeqturia, advilad SeiTvisebs mcenare, magram mas aqvs uaryofiTi mxareebic, radgan unda iqnes daculi Sesaferisi temperatura, transportireba unda xdebodes metalis kasrebiT, advilad orTqldeba da aS. yovelive es sagrZnoblad amcirebs misi moxmarebis areals.

am bolo periodSi metad didi yuradReba eqceva **Sardovanas (karbamids\_CO(NH2)2),** igi Seicavs 46% azots, amitom misi gamoyeneba ekonomiurad xelsayreli da efeqturic aris. ar iwvevs niadagis mJavianobis matebas da sxva sasuqebTan SedarebiT ukeTesi SedegebiT xasiaTdeba, SesaZlebelia misi 1% xsnariT fesvgareSe gamokveba.

**azotovani sasuqebis gamoyeneba.** azotovani sasuqebi gamoiyeneba sxvadasxva sasoflo-sameurneo kulturis qveS gansxvavdeba mxolod misi Setanis normebi, vadebi da jeradoba. arsebobs mcdari Sexeduleba imaze, rom TiTqos parkosnebis qveS azotovani sasuqebi ar iZleva TvalsaCino efeqts, radgan isini niadagSi TviTon agroveben koJris baqteriebis saSualebiT atmosferodan azots, aseTi mosazreba nawilobriv samarTliania, magram koJris baqteriebi niadagSi agrovebs azots sruli ganviTarebis periodSi, manamde ki jer kidev axalgazrda mcenare moiTxovs azots da mas iRebs fesvebis saSualebiT niadagidan. e.i axalgazrda parkosnebis qveS, maTi uxvi mosavlis misaRebad saWiroa niadagSi SevitanoT mineraluri azoti.

gansakuTrebiT did moTxovnebs uyenebs azotovan sasuqebs saSemodgomo TavTavianebi. ase, magaliTad saSemodgomo xorbali azotis normis naxevars moiTxovs dabuCqebis fazaSi, rac xels uwyobs mcenaris energiul zrdas, gansakuTrebiT ki produqtiuli Reroebis zrdas, xolo Semdeg masze moTxovna klebulobs. azotovani sasuqebis efeqti kidev ufro TvalsaCinoa teniT uzrunvelyofil an sarwyav pirobebSi. simindi azotze maqsimalur moTxovnas ayenebs TiTqmis mTeli vegetaciis periodSi, gansakuTrebiT ki marcvlis cvilisebur simwifeSi da a.S. azotovani sasuqebi (imis gamo, rom xsnadia da advilad orTqldeba e.i misi intensiurad xarjva mokle periodSi warmoebs) umjobesia Setanili iqnes nawil-nawil im periodSi, rodesac mcenare moiTxovs azotis maqsimums, magram rogorc wesi, Tesvis win an Tesvis periodSi Setanili unda iqnes normis nawili. vegetaciis periodSi niadagSi azotis nawil-nawil Setana mcenaris gamokvebis saxiT aris cnobili. saSualod azotis Setanis saorientacio normaa N60\_90 kg moqmedi nivTiereba.

mravalwlovani balaxebis naTesebSi azotis Setana ukavSirdeba adre gazafxuls da yoveli gaTibvis Semdgom periods.

**fosforovani sasuqebi**

fosfori mcenaris kvebis aucilebel elements warmoadgens. fosforis gareSe ara marto umaRlesi mcenareebis, aramed umdablesi organizmebis sicocxlec warmoudgenelia. igi did rols TamaSobs nivTierebaTa cvlis procesSi. gansakuTrebuli roli eniWeba organul nivTierebebSi Semaval, pirvel rigSi ki nukleinis mJavebSi Semaval fosfors, romelic monawileobs sasicocxlo procesebSi (cilebis sinTezSi, zrdasa da gamravlebaSi, niSan-Tvisebebis gadacemaSi da sxva).

ganviTarebis fazebis mixedviT sxvadasxva mcenare sxvadsxva raodenobiT moiTxovs fosfors. magaliTad, xorbals yvelaze meti raodenobiT esaWiroeba fosfori aRerebidan daTavTavebamde. fosforis dagrovebac mcenaris sxvadasxva nawilebSi gansxvavebulia. simindis marcvalSi (moxmarebuli fosforis mTliani odenobidan %-Si) igi grovdeba 52,3% odenobiT, foTlebSi 2-6%; ReroebSi 10,5%; fesvebSi 4,2% da a.S. P205–ze moTxovnis uzrunvelyofa mniSvnelovania ara marto mcenarisaTvis, aramed cxovelisTvisac, radgan sakvebSi misi nakleboba amcirebs sakvebis yuaTianobas. yovelive es aucilebels xdis xelovnurad SevitanoT pirutyvis racionSi fosformJavas mineraluri nivTierebebi.

fosforis moqmedebis efeqturoba ganisazRvreba sxvadasxva faqtorebiT: Setanis vadiT, siRrmiT, normiT da sxva sasuqebTan SeTanawyobiT. didi mniSvneloba eniWeba Setanis siRrmes, radgan fosformJavas anionebi Znelad gadaadgildebian siRrmeSi, amitom misi Setana Rrmad met Sedegs iZleva. aseve didi mniSvneloba eniWeba Setanis normas. saSualod respublikaSi sasurvel normad miRebulia P90, rac SeiZleba Seicvalos imis mixedviT, Tu ra maragia niadagSi fosforisa da rogori teniania niadagi. fosforis Setanili raodenoba SeiZleba meryeobdes 60\_120 kg/ha farglebSi (moqmedi nivTierebis angariSiT). am TvalsazrisiT, yuradsaRebia Tu romeli kulturis qveS Segvaqvs sasuqi. fosforis efeqturoba kidev ufro TvalsaCino xdeba azotTan da kaliumTan erTad Setanisas.

**kaliumiani sasuqebi**

kaliumi miekuTvneba elemetTa im jgufs, romelic sicocxlisaTvis upirobod esaWiroeba mcenares, cxovels da mikroorganizmebs. mcenareSi misi udidesi 4/5 nawili gvxvdeba ujredis wvenSi. kaliumis ganawileba mcenaris sxvadasxva nawilSi ar aris erTanairi. zogadad, rom vTqvaT, misi raodenoba metia mcenaris im nawilSi, sadac intensiurad mimdinareobs nivTierebaTa cvla da ujredis dayofa. kaliumis sagrZnoblad didi raodenobaa agreTve, yvavilis mtverSic. Tu mcenares ganvixilavT sasaqonlo da arasasaqonlo produqciis TvalsazrisiT, azotisa da fosforisagan gansxvavebiT, igi metia arasasaqonlo produqciaSi. magaliTad, simindis foTlebSi kaliumis raodenoba 45% aWarbebs, ReroSi –32, fuCeCSi \_5, fesvebSi\_5, xolo marcvalSi\_14%-ia. kaliumis nakleboba aferxebs kulturis ganviTarebas da mis simwifes. TavTavianebSi kaliumis optimaluri raodenoba maRla wevs mis mdgradobas Cawolisadmi.

ZiriTad kaliumian sasuqebs miekuTvneba KCl (kaliumis qloridi**), KCI . NaCI**, **kaliumis 40% marili**. kaliumian sasuqze moTxovna ganisazRvreba niadagis tipisa da kulturis mixedviT. saSualod respublikaSi 1 ha-ze SeaqvT 45\_60 kg **K2O** sasuqi. Setanis ZiriTad vadad iTvleba SemodgomiT ZiriTadi xvnis win, xolo siRrmed 20-25 sm\_i.

mineraluri sasuqebis Setanis norma Semdegnairad iangariSeba: vTqvaT niadagSi azotis Setanis norma udris 90 kg/ha (sufTa moqmedi nivTiereba). gvaqvs amoniumis gvarjila, romlis procentuli Semadgenloba 33%, e.i. yoveli 100 kg-ze 33 kg aris moqmedi nivTiereba. azotis Setanis norma unda gavyoT moqmed nivTierebis procentze (90:33) da gavamravloT 100-ze ( 90 : 33 ) X 100 = 270 kg. e.i imisTvis, rom niadagSi SeviatnoT N 90 saWiroa 1 ha-ze SevitanoT 270 kg azotovani sasuqi, fizikuri woniT.

**mwvane sasuqebi**

**mwvane sasuqebi** niadagis nayofierebis amaRlebisa da mosavlianobis matebis TvalsazrisiT saukeTeso saSualebas warmoadgens. igi gulisxmobs mcenaris mwvane masis niadagSi Caxvnas humusiTa da azotiT misi gamdidrebis mizniT. xSirad am xerxs sideracias uwodeben, xilo am miznisaTvis gamoyenebul mcenareebs-sideratebs. sasideratod (Casaxnavad) arCeven ZiriTad naTes da Sualedurad naTes kulturebs. orive SemTxvevaSi mcenare gamoiyeneba niadagSi Casaxnavad. sasideratod kulturebi iTeseba nawveralze, ganaTibze an or romelime ZiriTad kulturaTa Soris. sasideratod gamoiyeneba erTwlovani parkosnebi: xanWkola, cercvela, xanduri da sxva. maTi Caxvna mizanSewonilia yvavilobis fazaSi.

**baqterialuri sasuqebi**

baqterialuri sasuqebma soflis meurneobaSi didi praqtikuli gamoyeneba moipova. baqterialur sasuqebad iyeneben nitragins, azotobaqterins da fosforbaqterins. nitragini ixmareba parkosnebis Teslis damuSavebisaTvis, maTi koJris baqteriebiT dasnebovnebis mizniT. aRniSnuli RonisZieba metad efeqturi saSualebaa atmosferos Tavisufali azotis niadagSi fiqsaciisaTvis, gansakuTrebiT im nakveTebze, romlebzedac pirvelad iTeseba samarcvle-parkosanebi da saerTod parkosani kulturebi. azotobaqterini warmoadgens niadagSi Tavisuflad mcxovreb azotmafiqsirebeli baqteriebis sufTa kulturas, romelic niadagSi Seitaneba TeslTan erTad. fosforobaqterini preparatia, romelic Seicavs baqteriebs, romelTac aqvT unari organuli nivTierebidan gamoyon mcenarisaTvis SesaTvisebeli fosfori da gaaumjobeson mcenaris fosforiT kveba.

baqteriuli sasuqebi niadagSi Seitaneba siTxis saxiT da mcire normebiT, dasamuSavebeli saTesle masala unda dainamos sasuqiT, Semdeg kargad gadavurioT, raTa yvela Tesli dasnebovndes da 1-3 dRis Semdeg davTesoT. aRniSnul periodSi baqtriebi intensiurad mravldeba da cxovelmyofeli xdeba.

**efeqturi mikroorganizmebis teqnilogia**

ukanaskvnel periodSi miwaTsargeblobis procesSi farTod gamoyeneba efeqturi mikroorganizmebis teqnilogia. xangrZlivi periodis manZilze qimiuri preparatebis Sedegad dairRva niadagSi mcxovrebi organizmebis TviTregulirebis bunebrivi procesi, Sesustda mcenaris dacvis Zala. niadagis Tanaswori balansuri srulyofis SenarCuneba praqtikulad SeuZlebeli gaxda, xolo marto sakvebi saSualebebis Setana niadagSi ver SeZlebs aRadginos masSi biologiurad aqtiuri nivTierebebi. niadagSi makro da mikroelementebis dabalansebis gareSe ver miviRebT xarisxovan da maRal mosavals.

sasargeblo mikroorganizmebis garda niadagSi arsebobs daSlisa da lpobis gamomwvevi organizmebi. axali Taobis mikrobuli preparatebi efeqturad moqmedebs niadagze, unarCunebs mas biologiurad aqtiur mdgomareobas da uzrunvelyofs maRal nayofierebas.Eefeqturi mikroorganizmebis gamoyenebis teqnologia efuZneba bunebriv pirobebSi mcxovrebi sasargeblo da paTogenuri mikroorganizmebis saxeobaTa myar simbiozs (80 saxeoba), igi 3-5 wlis manZilze aRadgens niadagis bunebriv nayofirebas, xolo miRebuli produqti aris ekologiurad sufTa. sasargeblo mikroorganizmebis gamoyenebis teqnologia pirvelad Seqmnili iqna iaponeli mecnieris Terio xigas mier 1988 wels, Tumca pirveli cdebi am mimarTulebiT dawyebuli iyo me-20 saukunis 30-ian wlebSi rusi mecnierebis mier.

cnobilia, rom sakveb areSi baqteriebis gamravlebis siCqare Zalian maRalia, daaxloebiT 20 wuTSi baqteriebi iyofa, xelsayrel pirobebSi dRe-RameSi dayofili baqteriebis raodenoba saSualod Seadgens 400 tonas. 1 gram Savmiwa niadagebSi mikroorganizmebis biomasa Seadgens 2-2,5 miliards, anu 15-20 tonas. baqteriebi mcenareuli organuli narCenebisa da mineraluri nivTierebebis gadamuSavebiT uzrunvelyofs niadagSi mcxovrebi faunis kvebas, xolo maT mier gadamuSavebuli da gamoyofili eqskrementebis raodenoba Seadgens 123 t/ha-ze. efeqturi mikroorganizmebis gamoyenebis norma heqtarze Seadgens 6 kg/tona wyalze.

**sasuqi-stimulatori stimufungi**

stimufungi damzadebulia mcenareuli nedleulisagan, igi gamoiyeneba fesvgareSe gamokvebis formiT, rogorc nayofierebis stimulatori**.** Sedgeba aminomJavebis, oligopeptidebis, vitaminebis, fitohormonebis, makro da mikroelementebisagan. misi gamoyenebabostneul kulturebSi (pomidori, kitri, yabayi, wiwaka, stafilo, badrijani, xaxvi, kama, salaTa, kombosto da sxv.) uzrunvelyofs adreuli da saerTo mosavlianobis matebas 10-20%-iT, Teslebis gaRivebadobis matebas 3-15%-iT, mwvane masis matebas da yvavilobis stimulacias, mdgradobas daavadebebis, gvalvisa da garemos sxva araxelsayreli pirobebisadmi, zrdis vitaminebis (beta-karotinis, askorbinmJavis da sxv.) Semcvelobas mosavalSi 10-25%-iT, amcirebs nitratebisa da nitrozaminebis Semcvelobas 5-15%-iT. mcenareTa damuSavebis dros SeiZleba misi damateba inseqticidebTan, herbicidebTan, nematocidebTan da sasuqebTan erTad. Teslis dasamuSaveblad gamoiyeneba 40 ml/kg. gamokvebis saxiT Sesxureba saWiroa orjeradad, 2-3 namdvil foTols fazaSi da pirveli damuSavebis Semdeg 15 dReSi. xarjvis normaa 1000 ml/ha.

stimufungisgamoyeneba zrdis kartofilis tuberebis gaRivebas 3-5%-iT, aCqarebs amonayaris gamoCenas ramdenime dRidan erT kviramde, damwifebas da mosavlis xarisxis matebas 30 %-mde. preparatiT 20 ml/kg axdenen saTesle masalis Tesviswina damuSavebas. aseve mniSvnelovania kartofilis damuSaveba vegetaciis dros: or-samjeradi Sesxureba butonizaciis fazaSi da Semdeg 15-20 dRis intervaliT-1000 ml/ha.

TavTavian marcvlovnebze (sagazafxulo da saSemodgomo xorbali, Wvavi, qeri) stimufungi uzrunvelyofs mosavlianobis zrdas 3-5 c/ha-ze, Teslis gaRivebadobas-2-15%-iT, zrdis energiis matebas 5-10%-iT, dabuCqebas-6-55%, produqtiuli Reroebis raodenobas-10-140 c/m2-iT. xdeba meoradi fesvebis gaZlierebuli warmoqmna da fesvTa sistemis saSualo mateba 0,8 sm-iT, gvalvamedegobis zrda 10-30%-iT, fenologiuri fazebis daCqareba 10 dRemde. aseve SeimCneva: 1000 marcvlis masis mateba 0,5-4,1 g-iT, TavTavis sigrZis mateba-1,2-2 sm-iT, marcvalTa ricxvis mateba TavTavSi 9 calamde, moumwifebeli (fuye) TavTavebis Semcireba saSualod 20%-iT. xorblSi webogvaras Semcveloba izrdeba 0,5-5%-iT. Teslis damuSavebisas normaa 1 ml/kg-ze. fesvgareSe gamokvebisas-1000 ml/ha. damuSaveba tardeba orjeradad, ylortis amoReba-alerebisa da daTavTaveba-yvavilobis fazebSi.

mzesumziras mosavalis namati stimufungis gamoyenebiT Seadgens saSualod 10-25%. preparati aseve aCqarebs Teslis momwifebas 6-7 dRiT, kalaTis diametris matebas\_2,5-5 sm-iT, zeTis gamosavalis matebas\_22%-iT. mzesumziras Teslis damuSavebisaTvis saWiroa 5 ml/kg. saheqtaro norma Seadgens 1000 ml, orjeradi damuSaveba, warmoebs 4-7 namdvili foTols fazisa da yvavilobis dawyebis (kalaTis gaSlis) fazaSi.

simindis kulturaSi stimufungis gamoyeneba zrdis mwvane masis mosavlianobas 14-50 c/ha-ze, xolo marcvlis mosavals saSualod 3,5 c/ha-ze, taros masas 3-6%-iT. simindis Teslis damuSaveba xdeba 2 ml/kg normiT. moxmarebis saheqtaro norma Seadgens 1000 ml-s. damuSaveba tardeba orjeradad yloris amoRebisa da aRerebis fazaSi.

preparatis gamoyenebiT vaSlis mosavalianoba izrdeba 10c/ha-iT. farTobis damuSaveba xdeba samjeradad-Tanayvavilebis gamosvlis, yvavilobis dasasruls da nayofis formirebis fazebSi. norma Seadgens 2000 ml/ha, vazis kulturaSi preparatis gamoyenebisas vlindeba stimulacia mcenaris yvela organoze: rqaze, foTlebsa da mtevnebze. stimufungiT SeimCneva vazis rqis wliuri mateba 30-65%-iT, marcvlebis momwifebis procenti izrdeba 3-14%-iT; mtevnis Sevsebisa da masis raodenoba izrdeba-21-24%-iT. farTobis damuSavebis norma Seadgens 1000-1500 ml/ha,

yvavilovan kulturebSi stimufungi iwvevs ufro adrian da uxv yvavilobas, aCqarebs ayvavebas 3-15 dRiT, yvavilobis xangrZlivobas 4-35 dRiT (1,5-2,5-jer), zrdis TiTo mcenareze yvavilebis ricxvs, aumjobesebs maT dekoratiul Tvisebebs, umaRlesi da eqstra klasis yvavilTa produqciis gamosavals 10-15%-iT da gamZleobas daavadebebis mimarT. mcenareSi qlorofilisa da antioqsidantebis gaZlierebuli sinTezis wyalobiT aRiniSneba foTlebisa da yvavilebis ufro mkveTri Seferiloba. preparati mniSvnelovnad aCqarebs yvavilobas da mcenareze yvavilTa ricxvs. gamoyenebis norma Seadgens 1000 ml/ha, rekomendirebulia 3-jeradi damuSaveba, butonizaciis dasawyisSi da SemdegSi 2-kviriani intervaliT.

gazonis balaxebis Sesxureba stimufungiT zrdis gamozamTrebas da ylortwarmoqmnas 6-56%-iT, mwvane masis raodenoba izrdeba 17%-iT, qlorofilis Semcveloba-8-10%-iT, uzrunvelyofs Tanabar zrdas, matulobs wamozrdis siCqare da balaxis simaRle. erTi kg Teslis dasamuSaveblad iyeneben 20 ml stimufungis xsnars. preparatis xarjvis saheqtaro norma Seadgens 1000 ml. gazonis Sesxureba iwyeba mcenaris wamozrdis dasawyisidan (gazafxulze), Semdegi-7 dRis intervaliT. damuSavebaTa jeradoba-2-5 vegetaciis periodSi. rekomendebulia stimufungis gamoyeneba gazonis zrdisa da dabuCqebis stimulaciisaTvis kritikul periodebSi (gamozamTrebis, moTibvis, sasuqebisa da pesticidebis Setanis Semdeg, gvalvis dros). stimufungis Sesxureba normaluri zrdis dros arasasurvelia, radganac iwvevs balaxis Warb zrdas.

dekoratiuli mwvane nargavebis Sesxureba stimufungiT uzrunvelyofs ylortebis zrdis daCqarebas da maTi wliuri namatis raodenobas saSualod 20%-iT, foTlebSi qlorofilis Semcvelobis matebas 6-12%-iT, foTlebis fiziologiuri mdgomareobis gaumjobesebas da asimilaciuri zedapiris zrdas 15-75%-iT, yvavilobis daCqarebas 3-10 dRiT, buCqze yvavilTa ricxvis zrdas 9-10%-T, mcenareTa medegobis matebas stresebis mimarT (haerisa da niadagis dabinZureba, temperaturis cvalebadoba). Sesxurebis norma Seadgebs 3000 ml/ha, 3-jeradi damuSaveba, kvirtebis gaSla-butinizaciis stadiidan da yoveli 15 dRiani intervalebiT.

**biohumusi (vermikultura)**

biohumusi miiReba wvimismieri Wiayelebis mier nakelisa da sxva organuli narCenebis gadamuSavebis Sedegad. am meTodiT 1 tona nakelis gadamuSavebiT miiReba 600 kg biohumusi, romelic 49%-mde humuss Seicavs. 1 tona biohumusi 10 tona nakelis tolfasia. vermikulturis meTodiT SeiZleba gadamuSavdes qalaqis nagavi (sxvadasxva minarevebisagan gasufTavebis Semdeg), mcenareTa foTlebi, sasaklaos da qaRaldis warmoebis narCenebi, bostneulis gadamuSavebis narCenebi. bevr qveyanaSi nakelis da sxva organuli narCenebis wvismieri WiebiT gadamuSaveba xdeba adgilzeve, fermerebis mier, rac bevrad iafi jdeba, vidre mineraluri sasqebis SeZena da gamoyeneba.

germania, italia, kuba, safrangeTi, espaneTi, Svecia, poloneTi, ungreTi, iaponia da sxva qveynebi mimarTavs Wiayelebis samrewvelo gamravlebis Semdeg, maT pirdapir niadagSi gaSvebas, sadac isini swrafad mravldeba da viTardeba, gadaamuSaveben niadagSi arsebul organul narCenebs (fesvebi, foTlebi) da amdidreben niadags humusiT.

**niadagis mulCireba**

mulCireba aris niadagis SiSveli zedapiris gadafarva sxvadasxva saSualebebiT, romlis mizans warmoadgens aRmofxvras an Seamciros is arasasurveli movlenebi, rasac iwvevs niadagis zedapirze mcenareuli safaris uqonloba. mulCireba gavlenas axdens niadagSi mimdinare fizikur, biologiur da qimiur procesebze. mulCs, rogorc eroziis sawinaaRmdego RonisZiebas, ufro didi mniSvneloba aqvs gvalviani raionebisaTvis. igi icavs niadagis agregatebs naleqebis mosvlisas. amis gamo ar iqmneba qerqi, teni naklebad orTqldeba da mcirdeba zedapiruli Camonadeni. amave dros gasaTvaliswinebelia is faqti, rom mulCireba aZlierebs mikroorganizmebis cxovelqmedebas, rac SemdgomSi niadagis bioqimiuri procesebis gaaqtiurebas uwyobs xels, iwvevs niadagSi fosforis da kaliumis moZravi formebis Semcvelobis gadidebas, amave dros adgili aqvs azotis xarjvas, rac mulCis masis gaxrwnas xmardeba, amitom SesaZlebelia mulCirebam gamoiwvios niadagSi azotis ukmarisoba, rac unda Seivsos azotiani sasuqebis SetaniT. dReisaTvis mulCireba farTodaa gamoyenebuli rogorc erTwlian, ise mravalwlian kulturebSi. misi farTod gamoyenebiT 9%-mde izrdeba niadagis tenianoba da amave dros 1,5-7,5-iT amcirebs niadagis temperaturas swored maSin, rodesac es yvelaze metadaa saWiro sasoflo-sameurneo kulturisaTvis. magaliTad, kartofilSi tuburebis formirebis dros maRali temperatura miuRebelia. xolo muCirebiT kartofilis mosavlianoba izrdeba 75%-iT, xolo zogjer ormagdeba kidec.

mulCireba warmoadgens umniSvnelovanes RonisZiebas resursdamzogi teqnologiebidan sameurneo danaxarjebis Semcirebisa da jansaRi produqciis warmoebisaTvis. mulCirebis upiratesobebia: wylis naklebi danakargi, Sesabamisad naklebi morwyvis moTxovna, radgan mulCirebis SemTxvevaSi niadagis zedapiridan xorcieldeba naklebi wylis aorTqleba; zRudavs sarevelebis zrdas; mulCirebisas niadagis temperatura zamTarSi ufro Tbilia, xolo zafxulSi ufro grili; xels uSlis niadagis daxeTqvas, romelic iwvevs erozias da sokovani daavadebebis gavrcelebas niadagSi; mulCirebisas organuli firis gamoyenebiT SesaZlebelia niadagis Tvisebebis gaumjobeseba, radgans misi masa rCeba niadagSi da gardaiqmneba rogorc sasuqi; xels uSlis niadagis SekumSvas; mulCirebisas mcenares ufro mZlavrad aqvs gadgmuli fesvTa sistema; mcenares niadagTan ar aqvs kontaqti.

kartofilSi kulturaSi mulCirebis idea kolorados xoWos winaaRmdeg iqna gamoyenebuli. misi gamoyeneba efeqturia fermerebisaTvis.

mulCad SeiZleba gamoviyenoT nebismieri organuli narCeni: torfi, nakeli, namja, Tiva, Txilis naWuWi, mzesumziris narCevi, wipwa, gamxmari gvimra (an sxva sarevelebi), naTesi kultura (rigTSorisebSi winaswar iTeseba sruli moTesviT kultura, vTqvaT Wvavi, Svria an sxva), romlis gaTibvis Semdeg mwvane masa qucmacdeba da rigTSorisebSi rCeba, Semdeg ki iTeseba (an irgveba) ZiriTadi kultura. mulCad aseve SeiZleba gamoyenebul iqnas polieTilenis apki, mulCis specialuri qaRaldi, an kombinirebuli meTodiT-namja da apki an specialuri qaRaldi, ise rom apkis (qaRaldis) sagane ar unda aRematebodes 60 sm-s, SuaSi gakeTebul WrilebSi dairgveba kartofilis tuberebi an sxva saToxni kulturis Tesli da rigTaSorisebi daifareba namjiT. cnobilia mulCis efeqturoba kartofilSi, amitom aucilebelia misi gamoyenebis gafarToeba, gansakuTrebiT iq, sadac misi dargva dagvianda da tuberebis Camoyalibeba moxdeba cxel da urwyav pirobebSi. kartofilis aRmocenebis dasasruls niadagi unda davfaroT mTlianad 6-10 sm namjiT an 10-15 sm simaRlis gaTibuli gvimriT. Toxna-kultivacia an miwis Semoyra gamoricxulia, arc morwyva ar unda daWirdes kartofils. mxolod Catardeba daavadebebisa da mavneblebis sawinaaRmdego RonisZiebebi. mulCirebas dadebiTi Sedegebis motana SeuZlia sxva erTwlian da mravalwlian kulturebSic.

mevenaxeobaSi niadagis nayofierebis SenarCunebis biomeTodebidan aRsaniSnavia: niadagis mTliani an riggamoSvebiT dakordeba. mwkrivTaSorisebSi balaxnarevisa da parkosnebis SeTesva, mulCireba, sideracia da sxva. ekologiur mevenaxeobaSi, niadagis nayofierebis SenarCunebis mizniT, sul ufro xSirad iyeneben organuli narCenebisagan damzadebul komposts, nakels, nasxlavs, daqucmacebul lerws, yurZnis WaWas. kompostis gamoyenebis mTavari efeqti gamoixateba niadagis humusiT gamdidrebaSi. cnobilia, rom niadagSi humusiT gaRaribeba regularulad mimdinareobs. komposti ki Seicavs mcenarisaTvis aucilebel yvela makro da mikroelements. venaxis mwkrivTa Soris parkosnebisa da sxvadasxva balaxnarevebis SeTesvis efeqti naklebadaa cnobili da CvenTan saerTod ar mimarTaven. mwkrivTa Soris balaxnarevisa da parkosnebis SeTesvis umTavresi daniSnuleba niadagis organuli nivTierebebiTa da azotiT gamdidrebaa. azotis fiqsatori parkosnebi fesvebze arsebuli koJris baqteriebis meSveobiT haeris azots afiqsireben da mcenarisaTvis SesaTvisebel formad gardaqmnian. mwvane safari amdidrebs niadags organuli nivTierebebiT, aumjobesebs niadagis struqturas, mikroflorasa da tenianobas, amcirebs erozias. niadagSi zedapiruli Caxvnisas, mikroorganizmebisa da baqteriebis zemoqmedebis Sedegad, mwvane masa iSleba da humusiT amdidrebs niadags. venaxSi niadagis gakordeba SesaZlebelia riggamoSvebiT, anu pirvelad balaxnarevi iTeseba rigTaSorisebis monacvleobiT, xolo garkveuli periodis Semdeg (4-6 weli) gakordebuli rigebi ixvneba, ris Semdegac mezobeli rigTaSorisebis gakordeba xdeba. arCeven ori saxis gakordebas: bunebrivs (roca venaxSi Tavisuflad izrdeba yvelanairi mcenare) da naTesbalaxovan kords (rodesac winaswar SerCeuli TanafardobiT iTeseba parkosani da marcvlovani balaxebis specialurad SerCeuli saxeobebi da jiSebi). Catarebuli gamokvlevebis Tanaxmad, niadagis gakordeba 8 wlis manZilze venaxis ekonomiuri maCveneblebis gauaresebas ar iwvevs, aRiniSna mosavlianobis Semcireba mxolod bolo 2 wlis ganmavlobaSi. amasTanave sayuradReboa yurZnis Saqrianobis mateba, niadagSi humusis Semcvelobis mateba da mikrofloris gaaqtiureba. kordis moxvnis Semdeg niadagis fizikuri Tvisebebi umjobesdeba, izrdeba nazardis masa da mosavlianoba.

**Teslbrunvebi**

**Teslbrunvis istoria**. Zveli istoriuli dokumentebis mixedviT saqarTveloSi gavrcelebuli iyo niadagis gamoyenebis sanasveno sistema. samegreloSi gamoiyeneboda kulturebis aseTi morigeoba: Romi, simindi, xorbali, Semdeg 3-4 wliT niadags asvenebdnen. aRmosavleT saqarTveloSi iv. javaxiSvilis mixedviT, aseTvive sistemas iyenebdenen im gansxvavebiT, rom Romisa da simindis nacvlad aq sxva kulturebi iTeseboda.

saxnavi miwis gamoyenebis wesi icvleboda niadagis nayofierebis Sesabamisad. kulturaTa gansxvavebuli Tesva-moyvana mimdinareobda sarwyav da urwyav niadagebze. iv.javaxiSvilis mixedviT dasavleT saqarTveloSi karg niadagebs Svid weliwads iyenebdenen, Semdeg ki asvenebdnen, kulturebi iTeseboda aseTi morigeobiT: simindi, simindi, lobio, simindi, Romi, simindi, Romi, nasveni. saSualo nayofierebis miwebs 5 wlis Semdeg asvenebdnen: simindi, Romi, simindi, Romi, fetvi, nasveni, Rarib miwebs ki 3 wlis Semdeg: simindi, Romi, fetvi, nasveni. Tu adre niadagis dasveneba 3-4 wliT xdeboda, SemdgomSi 1-2 wliT Semcirda da umetesad Seusveneblad gamoiyeneboda.

aRmosavleT saqarTveloSi, kerZod Sida qarTlSi sarwyav miwebze gamoiyeneboda aseTi Teslbrunva: 1. simindi 2. saSemodgomo xorbali an qeri 3. xorbali 4. aneuli. Tbilisis midamoebSi gamoiyeneboda umTavresad ormindvriani Teslbvrunva: 1.TavTaviani marcvlovnebi 2. aneuli. ivris xeobis sarwyav miwebze aseTi morigeoba gamoiyeneboda: 1. simindi an fetvi 2. saSemodgomo TavTavianebi, romlis aRebis Semdeg mindors momdevno gazafxulamde ar amuSavebdnen 3. simindi an fetvi (sagazafxulo xnuli). ase rom mindors aneulad ar tovebdnen. kaxeTis sarwyav miwebze Cveulebriv xdeboda sagazafxulo da saSemodgomo kulturebis morigeoba aneulis gareSe, xolo urwyavebze xorblis Semdeg, yovel 3-4 welSi erTxel, mindors tovebdnen aneulad.

saqarTvelos rogorc dasavleT, aseve aRmosavleT regionSi adgili qonda naTesebis SemWidroebasac. magaliTad: sagazafxulo qeris an saSemodgomo xorblis Semdeg iTeseboda saadreo sanawveralo simindi.

saqarTveloSi 1932 wels Seiqmna Teslbrunvebis biouro, romelsac daevala Teslbrunvebis tipobrivi sqemebis SemuSaveba saqarTvelos sxvadasxva raionisaTvis. Tavdapirvelad Teslbrunvis danergva gaTvaliswinebuli iyo barSi, vake adgilebSi. TeslbrunvebSi CarTuli iyo kulturebi: marcvlovnebi, simindi, zogan Tambaqo, Warxali, bamba, aseve erTwlovani balaxebi, sarwyav adgilebSi mravalwlovani balaxebidan metwilad iTeseboda ionja. 1937 wlidan Teslbrunvebze muSaoba Zirfesvianad Seicvala da rekomendebuli sqemebi Seicvala. dasavleT saqarTvelos raionebs garda (sadac Teslbrunvebi gaTvaliswinebuli ar iyo) igegmeboda 8-10 mindvriani naTesbalaxiani Teslbrunvebi mravalwlovani marcvlovnebisa da parkosnebis narevebis ori mindvriT. umTavresad aseTi tipis Teslbrunvebi daproeqtda qarTlisa da kaxeTis regionisaTvis.

1962 wlamde gagrZelda mxolod naTesbalaxiani Teslbrunvebis daproeqteba. SemdgomSi ki mecxoveleobis sakvebi bazis gafarToebis mizniT, mTavar amocanad daisaxa simindisa da samarcvle parkosnebis (soia, cercvi, barda, culispira da sxva) warmoebis mkveTri gazrda, xolo mravalwlovani sakvebi balaxebis roli aRniSnuli amocanis SesrulebaSi saWirod ar iqna Sefasebuli da maTi monawileoba TeslbrunvebSi minimumamde Semcirda. yovelivem gamoiwvia naTesbalaxiani Teslbrunvebis nacvlad saToxnkulturebiani Teslbrunvebis SemoReba, sadac upiratesi adgili uWiravs saToxn kulturebs, pirvel rigSi siminds da samarcvle parkosnebs. naTesbalaxiani Teslbrunva SenarCunda eroziis sawinaaRmdego Teslbrunvis saxelwodebiT mxolod 80-ze meti daqanebis mTisa da ferdobisaTvis.

1966 wlidan Teslbrunvebis daproeqtebisas gaTvaliswinebuli iqna adgilobrivi bunebriv-klimaturi da sawarmoo pirobebi, kerZod meurneobis specializacia. aRniSnulis Sesabamisad aramcTu sxvadasxva zonaSi, aramed erTsa da imave meurneobaSic ki mizanSewonilad CaiTvala sxvadasxva tipisa da saxis Teslbrunvebis SemoReba: SesaZlebelia gvqondes mindvris, sakvebi da specialuri Teslbrunvebi, saToxnkulturebiani, nayofcvliTi, naTesbalaxiani da aneulianic ki.

1967 wels gamocemuli miTiTebebis Sesabamisasd damuSavda Teslbrunvebis sanimuSo sqemebi, romlebic iTvaliwinebda mindvris, eroziis sawinaaRmdego da sakveb Teslbrunvebs saqarTvelos bunebriv-ekonomikuri 11 zonisa da 3 qvezonisaTvis.

TiToeuli fermeruli meurneobisaTvisASemuSavebuli unda iqnes Teslbrunvebis sistema, sadac gaTvaliswinebuli iqneba meurneobis bunebriv-ekonomikuri pirobebis Sesaferisi mindvrisa da sakvebi Teslbrunvebi, garda amisa saWiroebis SemTxvevaSi specialuri Teslbrunvac.

**Teslbrunis roli da mniSvneloba. Teslbrunva** ewodeba, mecnierulad dasabuTebul, sasoflo-sameurneo kulturebis morigeobas (aneulis CaTvliT) drosa da mindvrad ganwyobaSi.

swori Teslbrunva es aris kulturaTa morigeoba drosa da sivrceSi, romelic dadgenilia niadagur-klimaturi da sameurneo pirobebis Sesabamisad.

dros, romlis ganmavlobaSi kultura an aneuli, dadgenili sqemis mixedviT, mimdevrobiT gaivlis yvela mindors, Teslbrunvis **rotacia** ewodeba, xolo rotaciis periodSi, nakveTebsa da wleebSi kulturaTa an aneulis ganlagebis gegmas, rotaciis cxrili.

sasoflo-sameurneo kulturaTa CamonaTvals maTi monacvleobis mixedviT, **Teslbrunvis sqema** ewodeba.

mecnierulad dasabuTebulma kulturaTa morigeobam daamtkica, rom is xels uwyobs mcenareTa mier sakvebi nivTierebebis ukeT gamoyenebas, niadagis fizikur-qimiuri Tvisebebebis gaumjobesebas, eroziasTan brZolas, mavneblebisa da daavadebebis gavrcelebis Semcirebas da sxva iseT faqtorebs, romlebic xels uwyobs niadagis nayofierebis gadidebas da mosavlianobis zrdas.

**Teslbrunvebi** daniSnulebis mixedviT ZiriTadad iyofa: 1. mindvris Teslbrunvebi, romelTa mizans warmoadgens awarmoos sasursaTo da safuraJe marcvleuli, teqnikuri kulturebi da nawilobriv uxeSi (Tiva, namja, Cala) sakvebi; 2. sakvebi Teslbrunvebi-romelTa daniSnulebaa maRalyuaTiani uxeSi (Tiva), sasilose mwvane masa da wvniani sakvebis warmoeba; 3. fermispira Teslbrunvebi mwvane konveieriT, romelic mecxoveleobas uzrunvelyofs mwvane da saZovruli sakvebiT, nawilobriv ki uxeSi (Tiva) sakvebiT. arsebobs specialuri Teslbrunvebi mebostneobis dargebis swori organizaciisaTvis, agreTve qarisa da wylismieri eroziis sawinaaRmdegod da mitovebuli e.w. ,,migdebuli” mcire farToebebis gasamdeloeblad da dasacavad.

Teslbrunvebis yvela zemoT CamoTvlili jgufisaTvis, maTi swori organizaciisa da efeqturobis amaRlebis TvalsazrisiT, ZiriTad amocanas warmoadgens TeslbrunvaSi kulturaTa morigeobis sakiTxi, romelic erTdroulad unda emsaxurebodes meurneobis miznebs, mecxoveleobis amocanebs da unda iTvaliswinebdes TviT mcenaris biologiur mxares. amasTan dakavSirebiT, TeslbrunvebSi mTlianad gamoricxulia monokulturis sakiTxi (erTi da igive mindorze 3-4 da meti wlis ganmavlobaSi erTi da igive kulturis Tesva) rac did zians ayenebs soflis meurneobas.

sxvadasxva kultura, sxvadasxva saxiTa da doniT avlens monokulturis uaryofiT moqmedebas. ase, magaliTad, sagazafxulo TavTavianebi saSemodgomo TavTavianebTan SedarebiT, Zlier amcirebs mosavlianobas maTi zedized Tesvis SemTxvevaSi, pirvel rigSi imis gamo, rom yovelwliurad sul ufro da ufro iCagreba sagazafxulo sarevelebiT da specializebuli mavnebel-daavadebebiT. gansakuTrebiT sagrZnoblad amcirebs mosavlianobas monokulturis formiT selisa da mzesumziras Tesva; jvarosanTa ojaxis warmomadgeneli kulturebi simindi, Wvavi, kartofili da sxva, ki SedarebiT naklebad.

dReisaTvis mecnierulad dasabuTebulia da praqtikulad aRiarebuli, rom monokultura SesamCnevad amcirebs mosavlianobas. monokulturis uaryofiTi gavlena mraval faqtorTan aris dakavSirebuli, magram ZiriTadaT unda miviCnioT dasarevlianebis da daavadeba-mavneblebis maRali procenti, mcenareTa calmxrivi kveba, niadagis struqturis daqveiTeba da sxva.

TeslbrunvebSi imis gamo, rom nakveTi (Teslbrunvis mindori) yovelwliurad an ukidures SemTxvevaSi or weliwadSi erTxel dakavebulia sxvadasxva kulturis qveS, aRniSnuli uaryofiTi movlenebi an mTlianad gamoricxulia an ara da praqtikuli mniSvneloba ar aqvs.

cnobilia, rom sxvadasxva kultura sxvadasxva xarisxiT moqmedebs sarevela mcenareebze. magaliTad, saSemodgomo TavTavianebi sakmaod kargad axSoben iseT sarevelebs rogoricaa Svriuka, Tavcecxla, TaTabo da sxva tipiuri sagazafxulo sarevelebi. yvela saToxni kultura imis gamo, rom vegetaciis periodSi maTi movla-moyvanis teqnologia dakavSirebulia niadagis gafxvierebasTan, sarevelebTan brZolis erT-erTi yvelaze efeqtur kulturebad iTvlebian. gasaTvaliswinebelia agreTve is, rom zogierTi sarevela damaxasiaTebelia ama Tu im kulturisaTvis (specifikuri sarevelebi) magaliTad, kelaptara mzesiumzirasaTvis, amitom kulturebis morigeobiT Tesva, wlebis ganmavlobaSi, Tavidan agvacilebs aseTi sarevelebis uaryofiT moqmedebas.

sudanura da sorgo Zlier aSrobs niadagis saxnav fenas, amitom maTi aRebis Semdeg tenis moyvaruli kulturisaTvis Tesva ver iZleva saTanado Sedegs. saToxni kulturebi sagrZnoblad amtverianeben saxnavi fenis zedapirs, rac iwvevs niadagis struqturianobis daqveiTebas, xolo parkosnebi amdidreben niadags azotiT da a.S.

swori Teslbrunvebis Sesadgenad yuradsaRebia kulturebis vegetaciis xangrZlivobac. grZeli vegetaciis mqone kulturebi an jiSebi saSemodgomo TavTavianebisaTvis ar iTvlebian karg winamorbedad, Tundac imitom, rom maTi aRebis Semdeg saSemodgomo Tesva optimalur vadebs scdeba.

amgvarad, kulturebi TeslbrunvebSi ise unda ganawildes, rom maT, rogorc winamorbedma momdevno kulturebis normaluri zrda-ganviTarebisaTvis Seqmnas xelsayreli pirobebi.

Teslbrunvebis erT-erT Seucvlel rgols mravalwlovani balaxebis movla-moyvana warmoadgens. imis mixedviT Tu romel niadagobriv-klimatur regionSi gvixdeba maTi Tesva da moyvana biologiuri Taviseburebebis gaTvaliswinebiT. bunebrivad teniani, SedarebiT civi klimatis pirobebSi, karg Sedegs iZleva wiTeli samyura; gvalvian pirobebSi umjobesia daiTesos esparceti da yviTeli ionja, xolo sarwyav pirobebSi, sadac vegetaciis xangrZlivoba 6-7 Tves aRwevs lurji ionja, romelic maRali agroteqnologiis fonze mwvane masis 5-6 mosavals iZleva.

mravalwlovani parkosani da marcvlovani balaxebis narevebSi Tesvis roli mniSvnelovania soflis meurneobaSi. imis gamo, rom mravalwlovani balaxebi mravali wlis (samyura, esparceti 3-4 weli, xolo ionja 5-6 weli) ganmavlobaSi ikaveben nakveTs, sagrZnoblad (2,5-jer) aumjobeseben niadagis wyliT momaragebis sakiTxs, mTlianad spoben sarevelebs. rac mTavaria aumjobeseben niadagis struqturas da mis nayofierebas, uzrunvelyofen mecxoveleobas maRali xarisxis mwvane da uxeSi (Tiva) sakvebiT. mravalwlovani balaxebi qmnis ra niadagis kords, amdidrebs mas sakvebi nivTierebebiT, aumjobeseben struqturas.

nabalaxari mindori pirvel rigSi dakavebuli unda iyos im kulturebiT, romlebic meurneobisaTvis wamyvan kulturebad iTvleba. zogadad, kordze TesviT karg Sedegs iZleva saSemodgomo xorbali, qeri, Wvavi; igi gansakuTrebiT karg winamorbedad iTvleba saToxni kulturebisaTvis-simindisaTvis, kartofilisaTvis, baRCeulebisaTvis da sxva sagazafxulo kulturebisaTvisac.

Tavis mxriv saToxni kulturebi kargi winamorbedia sagazafxulo TavTavianebisaTvis, radgan isini niadags toveben sarevelebisagan Tavisufal mdgomareobaSi. Gvalvian, urwyav pirobebSi sagazafxulo kulturebisaTvis, rogorc winamorbedi, karg Sedegs iZleva niadagis mzralad momzadeba.

Teslbrunvis SemoRebamde saWiroa: meurneobis ZiriTadi mimarTulebis codna, meurneobis klimaturi da niadagur-hidrologiuri pirobebis Seswavla, saxnavi miwebis Seswavla da maTi kategoriebad dajgufeba.

Teslbrunvis SemoRebisaTvis meurneobis miwis farTobs yofen gansazRvruli raodenobis Tanabar nakveTebad, romlebzedac adgils iWers Teslbrunvis sqemiT gaTvaliswinebuli kulturebi. dauSvaT, rom TeslbrunvaSi gaTvaliswinebulia kulturebi: samyura, saSemodgomo xorbali, kartofili, qeri, Svria. am SemTxvevaSi farTobs yofen 5 Tanabar nakveTad da TiToeul maTganze ganaTavseben TeslbrunviT gaTvaliswinebul kulturebs. 5 wlis Semdeg TiToeul dasaxelebuli kultura gaivlis xuTive nakveTs da me-6 wels ubrundeba sawyiss.

Teslbrunva gulisxmobs sasoflo-sameurneo kulturaTa morigeobas mindvrad saxnav miwebze. TeslbrunvisaTvis damaxasiTebelia naTesebis garkveuli struqtura, romelic aisaxeba kulturis SemadgenlobiT da TiToeuli maTganis xvedriTi wiliT Teslbrunvis saerTo farTobSi. TeslbrunvaSi mimdinareobs kulturaTa morigeoba drosa da sivrceSi. wlidan wlamde TiToeul farTobze iTeseba gansazRvruli TanmimdevrobiT (morigeoba sivrceSi), aseve TiToeuli kultura adgils inacvlebs, gadainacvlebs ra erTi mindvridan meoreze, mesameze da a.S. (morigeoba sivrceSi). amrigad Teslbrunva es aris kulturaTa iseTi monacvleoba, romlis drosac TiToeuli maTganis xvedriTi wili mTeli naTesis mimarT wlidan wlamde ucvleli rCeba. kulturaTa monacvleoba marto droSi rom xdebodes, maSin ZiriTadi piroba daculi ar iqneba da erT weliwads mTel farTobs erTi kultura daikavebda, meore wels sxva, mesame wels kidev sxva da a.S. aseTi sistema iqneboda ara Teslbrunva aramed ubralod naTesT-monacvleoba.

sworad SeiZleba CaiTvalos iseTi Teslbrunva romelic Seefereba fermeruli meurneobis specializacias, misi ganviTarebis perspeqtivas da uzrunvelyos miwebis efeqtur gamoyenebas, kulturaTa mosavlianobis matebas da mecxoveleobis produqtiulobis zrdas da amavdroulaT uzrunvelyofs niadagis nayofierebis gaumjobesebas.

fermeruli meurneobis moTxovnebisa da naTesi farTobis struqturis Sesabamisad TeslbrunviT dakavebul farTobs yofen Sesabamisi raodenobis mindvrad. TiToeul mindorze iTeseba erT-erTi kultura, romelsac Semdgom wlebSi sxva kulturebi cvlis, winaswar gansazRvruli morigeobis Sesabamisad. es morigeoba SeiZleba iyos rogorc yovelwliuri, aseve zogjer periodulic-es im SemTxvevaSi, roca mindori mravalwlovan balaxebs uWiravs. kulturaTa Tanmimdevrul morigeobas rotacia ewodeba. morigeobis erTi ciklis damTavreba erTi rotaciaa, ori cikli-ori rotacia da a.S. kulturaTa morigeoba Teslbrunvis yvela mindorze gamoixateba sarotacio cxriliT.

Fermeruli meurneobis organizaciul-sameurneo miznebidan gamomdinare zogjer TeslbrunvaSi romelime mindorze garkveuli periodiT toveben erTxel daTesil mravalwlovan balaxebs da aseTi mindori droebiT iTiSeba Teslbrunvidan. rotaciidan mindvris gamoTiSvas droebiTi xasiaTi aqvs. Cveulebriv aseTi gamoTiSva erTi rotacia grZeldeba Tumca SesaZlebelia TiTo-TiTo mindvris aseT gamoTiSvas sistematiuri xasiaTic qondes. aseT SemTxvevaSi erTi rotaciis damTavrebis Semdeg balaxebis naTesi gadaixvneba da mindori Cveulebriv CaerTveba kulturebis morigeobaSi, xolo mis nacvlad balaxebi daiTeseba sxva mindorze da exla es mindori gamoiTiSeba rotaciidan. saWiroebis SemTxvevaSi gamoTiSulmindvriani Teslbrunva SeiZleba Cveulebriv Teslbrunvad gardaiqmnas, sadac yvela mindorze moxdeba kulturebis gansazRvruli yovelwliuri an perioduli morigeoba.

TeslbrunvaSi rotaciis nawils warmoadgens rgoli, romelic Sedgeba erTmaneTisagan dakavSirebuli Tanmimdevruli kulturebisagan. Cveulebriv rgolad iTvleba mocemuli mcenare Tavisi winamorbedi da momdevno kulturiT. magaliTad, Teslbrunvis rgolebia: aneuli, saSemodgomo kultura, sagazafxulo kultura an mravalwlovani balaxebi-pirveli da meore wlis sargeblobis, saSemodgomo an sagazafxulo xorbali rgoli SeiZleba Sedgebodes ori kulturisagan. magaliTad: aseTi Teslbrunva:

1. mravalwlovani balaxebi pirveli wlis sargeblobis

2. mravalwlovani balaxebi meore wlis sargeblobis

3. saSemodgomo xorbali

4. mzesumzira

5. saSemodgomo xorbali mindorze da saSemodgomo xorbali meore naxevarze, nawveralze imave wels daiTeseba simindi soiaTi sasilosed.

6. simindi soiaTi sasilosed

7. saSemodgomo xorbali

8. saSemodgomo xorbali

9. simindi samarcvled

10. saSemodgomo qeri, romlis Semdeg zafxulis bolos daiTeseba mravalwlovani balaxebi.

aRniSnuli Teslbrunva SeiZleba 4 rgolad daiyos: pirveli rgoli pirveli da meore sargeblobis mravalwlovani balaxebi da saSemodgomo xorbali: meore rgoli-mzesumzira, saSemodgomo xorbali da momdevno ganmeorebiT saSemodgomo xorbali: mesame-simindi samarcvled da saSemodgomo TavTavianebi maT nawveralze daTesili soianarevi simindiT: meoTxe-soianarevi simindi da saSemodgomo qeri.

ZiriTadi kulturebis garda, romelTac savegetacio periodis umetesi nawili uWiravs, TeslbrunvaSi SeiZleba CarTuli iqnas Sualeduri naTesebic, romelTa Tesva moyvana SesaZlebelia or ZiriTad kulturaTa Soris darCenil Tavisufal SualedSi. aseTia magaliTad: soia narevi sasilose simindi Teslbrunvis mexuTe mindorze. aseT Sualedur naTess sanawveralo ewodeba. simindis garda am miznisaTvis SeiZleba gamoyenebuli iqnas: lobio, mzesumzira, Warxali kartofili, barda, cercvela, culispira, vigna da sxva. sanawveralo Sualeduri naTesis garda TeslbrunvaSi SeiZleba CaerTos saSemodgomo Sualeduri kulturebi, romlebic iTeseba umTavresad sagviano-sagazafxulo kulturebis (samarcvle simindi, Tambaqo da sxva) Semdeg, SemodgomiT. aseTi kulturebis savegetacio periodi grZeldeba Semodgomidan gazafxulamde, am mizniT SeiZleba gamoviyenoT: marcvlovani parkosnebis narevi, barda, cercvela, culispira, cercvi, turnefsi da sxva.

TeslbrunvaSi SesaZlebelia CarTuli gvqondes kulturebis sufTa naTesi, ori an ramdenime mcenaris narevic, romelTa vegetacia erTdroulad mimdinareobs.Aaseve SesaZlebelia TeslbrunvaSi gamoviyenoT SeTesili kulturebic, romelTac sxvadasxva iarusi uWiravT. magaliTad simindSi SeTesili lobio da soia, sasilose mzesumziras naTesSi vigna da dolixosi. arsebobs SeTesvis iseTi wesic, roca SeTesili kulturebis intensiuri zrda-ganviTareba iwyeba im kulturis mosavlis aRebis Semdeg, romelic misTvis erTgvar safars warmoadegens. aRniSnuli tipis naTess ewodeba safarqveS naTesi. magaliTad TavTavian marcvlovnebSi-qerSi, xorbalSi, SeTesili mravalwlovani balaxebi.

viwro specializaciis pirobebSi zogierTi kultura iTeseba monokulturis saxiT, roca meurneobis garkveul farTobze ganuwyvetliv iTeseba erTi romelime mcenare, romelTa movla-moyvanisaTvis mocemuli pirobebSi xelsayrelia. aseT monokulturis Tesvis klasikuri magaliTia simindis kultura dasavleT saqarTvelos pirobebisaTvis. arsebobs mecnierTa jgufi, romlebic monokulturis arsebobas amarTlebs Tanamedrove miwaTsargeblobis mecnier-teqnikuri SesaZleblobebis farglebSi TiTqos abaTilebs Teslbrunvis upiratesobas monokulturasTan SedarebiT. sarevelebis, mavneblebisa da parazitebis, baqteriebis, virusebis, mavne mwerebis winaaRmdeg sabrZolvelad arsebobs qimiuri preparatebi (pesticidebi) - mcenaris kvebis reJimis mosawesrigeblad-sasuqebi (mineraluri, organuli, baqteriuli) niadagis fizikuri Tvisebebis gasaumjobeseblad-melioraciuli RonisZiebebi. aRniSnuli mosazreba nawilobriv marTalia, magram kulturaTa swor morigeobas iseTi efeqturi Tvisebebi gaaCnia niadagis fizikur-qimiuri Tvisebebisa da bunebrivi nayofierebis TvalsazrisiT, rom vercerTi xelovnuri RonisZieba ver Secvlis. gasaTvaliswinebelia, rom arsebobs mcenareTa biologiuri mizezebiT gamowveuli SeuTavsebloba, romlis daZleva xelovnuri saSualebebis gamoyenebiT SeuZlebelia an dakavSirebulia sawarmoo xarjebis gaumarTlebel matebasTan, an iwvevs produqciis xarisxis gauaresebas da mavne nivTierebaTa saSiS dagrovebas niadagsa da mcenareSi.

mindvris kulturebi TeslbrunvaSi morigeobis TvalsazrisiT SeiZleba daiyos: 1. stabiluri ganmeorebiTi Tesvis dros TviTSeTavsebadi, 2. ganmeorebiTi Tesvis dros ver itans monokulturas, 3. SeuTavsebadi sxva kulturebTan. TviTSeTavsebad kulturebs ekuTvnis: simindi, Wvavi, marcvlovani sakvebi balaxebi, TeTri samyura, yviTeli xanWkola, saSemodgomo cercvela, soia, lobio, vigna, dolixosi, kanafi, Tambaqo, fetvi da kartofili. kartofili kargad itans zedized Tesvas im SemTxvevaSi, Tu niadagSi momravlebuli ar aris nematodebi, winaaRmdeg SemTxvevaSi misi ganmeorebiTi dargva dasaSvebia mxolod 3 wlis Semdeg. aRniSnuli jgufis kulturebis ori da ramdenime wlis manZilze zedized Tesva mosavlianobas mniSvnelovnad ar amcirebs.

meore jgufis kulturebi erTsa da imave nakveTze zedized Tesvas ver itans da aseT pirobebSi maTi mosavlianoba TandaTan mcirdeba, Tumca zogjer dasaSvebia orwliani ganmeorebiTi Tesva, radgan igi mosavlianobaze arsebiT uaryofiT gavlenas ar axdens. aRniSnulin jgufis kulturebis ganmeorebiTi Tesva mocemul farTobze SeiZleba mxolod garkveuli dayovnebis Semdeg, romelic kulturaTa mixedviT meryeobs 3-dan 6-7 wlamde da zogjer metic. aRniSnuli jgufis kulturaTa Semdeg sxva jgufis mcenareTa Tesva Sualedur naTesad amcirebs dayovnebis periods. aRniSnuli jgufis kulturebs miekuTvneba: xorbali, qeri, Svria, sakvebi da Saqris Warxali, kombosto, samyuras umetesi saxeoba, TeTri samyuras garda, seli, barda, mzesumzira, xaSxaSi.

sxva mcenareebTan SeuTavsebeli kulturebi mravalricxovania. umTavresad aq gvxvdeba erTi da igive ojaxis warmomadgenlebi romlebic erTmaneTTan SeuTavsebelia ZiriTadad iseTibiologiuri faqtorebis (sarevelebi, daavadebebi da mavneblebi, fesvebis gamonayofebin da sxva.) gamo, romelic saerToa maTTvis, ris gamoc wina kulturasTan SeuTavsebadi momdevno kulturis mosavlianoba mcirdeba. zogjer SeuTavseblobis mizezia winamorbedis nagerali, romelic amcirebs mis Semdgom daTesili mcenaris mosavals an xarisxs. aRniSnulidan gamomdinare ar unda daiTesos xorbali qeris Semdeg, Svria sagazafxulo qeris Semdeg anda piriqiT, wiTeli samyura ionjas Semdeg da piriqiT, Saqris Warxali da sakvebi Warxali rafsis Semdeg da piriqiT, kombosto rafsis Semdeg, seli bardas Semdeg da piriqiT, cercvi samyuras Semdeg da piriqiT. aqve unda aRiniSnos ZaRlyurZenasebrTa ojaxis kulturuli warmomadgenlebi: pomidori, wiwaka, kartofili, badrijani, romlebic erTimeores Semdeg ar unda irgvebodes.

kulturaTa zemoaRniSnuli jgufebis SeTavseba-SeuTavseblobis magaliTebi pirobiTia, radgan igi damokidebulia ara mcenaris Tandayolil (imunur) biologiur Tvisebaze, ramdenadac im uaryofiTi biologiuri faqtorebis gamovlinebis siZliereze, romelnic SeuTavseblobis mTavar mizezs warmoadgenen. es mizezebi metad cvalebadia da damokidebulia garemo pirobebze, niadagze da sxva.

sameurneo kulturaTa morigeobiT Tesvamoyvanis aucilebel mizezTa Soris aRsaniSnavia qimiuri, fizikuri, biologiuri da ekonomiuri faqtorebi. aucilebel qimiur mizezebs miekuTvneba urTierTdamokidebuleba, romelic iqmneba niadagis qimiuri Tvisebebsa da mcenaris niadaguri kvebis procesSi. fizikuri mizezebidan aRsaniSnavia sasoflo-sameurneo kulturebis gansxvavebul moTxovnilebaSi fizikuri faqtorebis (wyali, haeri, siTbo, dasxiveba) mimarT, romlebzedac TviT es mcenareebi gansxvavebulad reagireben. biologiurs ganekuTvneba sasoflo-sameurneo kulturebis biologiuri Taviseburebani da maTze dadebiTad Tu uaryofiTadmoqmedi biologiuri faqtorebi-mavneblebi, sokoebi, baqteriebi, virusebi, sarevelebi, biologiurad aqtiuri nivTierebebi-vitaminebi, fermentebi, zrdis stimulatorebi, antibiotikebi. ekonomiuri mizezebidan aRsaniSnavia warmoebis Sromis organizaciisa da ekonomikis sakiTxebTan, romelTagan aRsaniSnavi teritoriis organizacia-sasoflo sameurneo savargulebis Sefardeba, manqana-iaraRebis, energrtikis da muSaxelis gamoyeneba, Sromis nayofierebisa da warmoebis rentabelobis done monikulturisa da Teslbrunvis pirobebSi.

**Teslbrunvis agrobiologiuri safuZvlebi**. Teslbrunvis danergvis aucilebloba upirveles yovlisa ganpirobeblia sasoflo-sameurneo kulturebis biologiuri Taviseburebebidan, romelTagan arsaniSnavia:

1. savegetacio periodis xangrZlivoba da gaadgileba wlis ganmavlobaSi

2. fesvTa sistemis ganviTareba

3. moTxovnileba zrdis faqtorebze

4. gavlena niadagis nayofierebaze

5. damokidebuleba mavneblebsa da avadmyofebTan

6. damokidebuleba sarevelebTan

kulturaTa savegetacio periodis xangrZlivoba da gaadgileba wlis ganmavlobaSi gansxvavebulia. erTwlovani kulturebisaTvis es periodi ramodenime kviridan 9-10 Tvemde meryeobs. kulturebi arsebobs saSemodgomo, saadreo sagazafxulo, sagviano sagazafxulo, sagazafxulo sanawveralo, saSemodgomo Sualeduri. kulturebis morigroba TeslbrunvaSi saSualebas gvaZlevs maqsimalurad gamoviyenoT mcenaris zrdis faqtorebis wliuri resursebi. (saSemodgomo naTesebi iyeneben Semodgoma zamTrisa da gazafxulis naleqebs, adreuli sagazafxulo-gazafxulisa da zafxulis pirveli naxevris, xolo sagviano sagazafxulo, garda aRniSnulisa,zafxulis meore naxevrisa da Semodgomis, sawveralo naTesebi iyeneben aseve zafxulis meore naxevrisa da Semodgomis naleqebs, Sualeduri saSemodgomo-Semodgoma-zamTrisa da gazafxulis nawilis resursebs).

aRsaniSnavia, rom biologiouri produqtiulobis zrdis TvalsazrisiT uaRresad didi mniSvneloba aqvs mzis sxiuri energiis ufro srul gamoyenebas maSin,roca saxnav-saTesi miwis farTobi wlis ganmavlobaSi rac SeiZleba metxans aris dafaruli kulturuli mcenareulobis mwvane safariT.

kulturaTa morigeoba da memcenareobis dargSi gamoyenebuli kulturebis mravalferovneba saSualebas iZleva racionalurad (gonivrulad) iqnes gamoyenebuli mcenareTa zrdis resursebi, aseve muSaxeli da manqana-iaraRebi.

**fesvTa sistema.** kulturaTa fesvTa sistema gansxvavdeba morfologiiT, simZlavriT da niadagis fenebSi ganawilebis unariT. gamokvlevebiT dadgenilia, rom xorblis fesvebi vrceldeba niadagSi 103 sm-ze, fetvi 105-ze, Svria 110-ze, qeri 120-ze, Wvavi 113-ze, ionja 150-200, samyura 135-150, Saqris Warxali 246, saerTod marcvlovnebis fesvebi niadagSi Cadis 100-120 sm-ze, marcvlovani parkosnebis-150-200 sm-mde, Zirnayofebis 200-250 sm-mde. sagulisxmoa, rom didi gansxvaveba kulturebis fesvTa sistemis horizontalurad gavrcelebis mxrivac. saSemodgomo xorbals uWiravs 14616 sm2, sagazafxulo xorbals 10712, Svrias 10340, siminds 15342, kartofils 6000, mzesumziras 17400, sakveb Warxals 16060. rogorc aRniSnulidan Cans yvelaze met farTobs ikavebs mzesumzira, Warxlisa da simindis fesvTa sistema, SedarebiT nakleb farTobs ikavebs TavTavianebi-saSemodgomo ufro mets, vidre sagazafxulo.

kulturaTa Soris mniSvnelovani gansxvavebaa niadagSi fesvTa narCenebis datovebis raodenobis mixedviT. gasaTvaliswinebelia, rom funja sistemis fesvebis mqone kulturebi, romlebic niadagis zeda fenebSi viTardeba, sargebloben ra wyliTa da sakvebiT ZiriTadi saxnavi fenidan, upiratesad amdidreben niadagis zeda fenas organuli narCenebiT (nivTierebebiT), vidre mTavarRerZiani fesvTa sistemis mqone kulturebi, romlebic ZiriTadad niadagis qveda fenebidan sazrdooben da am fenebSi toveben organuli masis ufro met raodenobas.

mravalwlovani balaxebis fesvTa narCenebi niadagSi 2-3 jer aRemateba marcvlovnebis fesvTa narCenebs. aRsaniSnavia, rom yvelaze nakleb fesvTa narCenebs tovebs niadagSi saToxni kulturebi. ase magaliTad: sanawveralo marcvlovnebis fesvTa narCenebi niadagSi Seadgens 24 c/ha mSral masas anu 100%, kartofili 6 c/ha anu 25%, ionja 80c/ha anu 333%, samyura 40-50 c/ha anu 167-208%, samyurasa da marcvlovnebis narevi Sesabamisad 60 c/ha da 250%, saSemodgomo Sualeduri kulturebi 20c/ha da 83%, sanawveralo kulturebi 10c/ha da 42%, safarqveS naTesi 25 c/ha anu 104%.

mravalwlovani sakvebi balaxebis TesviT mniSvnelovnad izrdeba niadagSi humusis raodenoba. humusis raodenobis matebas niadagSi aseve xels uwyobs saSemodgomo Sualeduri kulturebic. aRsaniSnavia, rom saToxni kulturebis Tesvisas niadagSi mniSvnelovnad mcirdeba humusis da azotis raodenoba. cdebiT dadgenili iqna, rom Ria wabla sarwyav niadagebze oTxi wlis sargeblobis ionjas naTesidan saxnav fenaSi (0-20sm) fesvebis raodenobam Seadgina 100-115 c/ha mSrali masa.

niadagSi darCenili mcenareuli fesvTa sistemis raodenobisa da daSlis siswrafis garda mniSvnelovania maTi (fesvebis) qimiuri Semadgenloba, umTavresad maTSi naxSirwylebisa da azotis SenaerTebis Sefardeba. aRsaniSnavia, rom azotiT mdidaria umetesad saToxni kulturebis fesvebi, magaliTad: kartofilis fesvebSi 35-mdea, Saqris WarxalSi-2,8%-mde, SedarebiT metia azoti parkosnebis fesvebSi 2-2,5%, mdelos mcenareebis fesvebSi mcirea, 0,6%-mde. saToxni kulturebisagan gansxvavebiT mdelos mcenareuloba xels uwyobs niadagis gamdidrebas humusiTa da azotiT.

**moTxovnileba zrdis faqtorebze**. mcenaris zrdis faqtorebidan (sinaTle, siTbo, haeri, wyali da sakvebi nivTierebebi) miwaTmoqmedebis umTavres amocanas Seadgens regulirebadi faqtorebis (wylisa da sakvebi nivTierebebis) reJimis mowesrigeba.

niadagis kvebis reJimis mixedviT kulturuli mcenareebi gamoirCeva umTavresad, rogorc azotmomxmarebeli da azotdamgroveblebi. araparkosani, azotmomxmarebeli kulturebi kvebisaTvis iyeneben bmul azots, romelic niadagSi aris umetesad nitratuli da amiakuri azotis formiT, xolo parkosani kulturebi axdens Tavisufali azotis fiqsacias maT fesvebze dasaxlebuli baqteria rizobiumis saSualebiT. aseTi dayofa pirobiTia, radgan parkosnebic moxmarebuli azotis 1/3 bmuli azotis saxiT iReben niadagidan, magram sabolood mainc amdidreben mas azotis SenaerTebiT, maSin roca araparkosnebi yvela SemTxvevaSi sxvadasxva xarisxiT aRaribeben niadags azotiT.

sakveb nivTierebaTa biologiuri brunvis uzrunvelyofis TvalsazrisiT sagulisxmoa kulturul mcenareTa dayofa: nakelis Semqmnelebad (rogoricaa cxovelis sakvebad an safenad gamoyenebuli Tiva, mwvane sakvebi, silosi, senaJi, marcvlovnebis Cala, namja) da nakelis araSemqmneli (Tambaqo, eTerzeTovani kulturebi, seli, kanafi, bamba da sxva) aRniSnuli jgufis mcenareTa Sefardebas TeslbrunvaSi didi mniSvneloba aqvs organuli sasuqebis dagrovebisaTvis.

mcenaris kvebis ZiriTadi elementebis (azotis, fosforis, kaliumis da sxva) Semcvelobis mixedviT kulturaTa Soris mniSvnelovani gansxvavebaa rogorc mosavlis saxiT gamotanili, aseve niadagSi da mis zedapirze darCenili raodenobis mixedviT. cnobilia, rom marcvlovnebs 20 c/ha-ze marcvlis mosavlianobisas niadagidan gamoaqvs saSualod 50 kg azoti, 25 kg fosfori da 50kg kaliumi, aqedan kaliumis meti raodenoba CalaSia, romelic nawilobriv mindorSi rCeba sanawveralo narCenebis saxiT; danarCeni ki nakelTan erTad niadags ubrundeba. azotisa da fosforis umetesi nawili ki marcvals miyveba da sabolood akldeba niadags. Saqris Warxalis SemTxvevaSi 250 c/ha-ze mosavlianobis dros niadagidan gamoitaneba 100 kg azoti, 40 kg fosfori da 170 kg kaliumi. aRniSnuli elementebis umetesi raodenoba mcenaris foCSia da mxolod mcire raodenobiTaa ZirebSi, romelic Saqris misaRebad gamoiyeneba. im SemTxvevaSi, roca sworad mimdinareobs yvela narCenis gonivruli gamoyeneba niadags mniSvnelovnad ar aRaribebs sakvebi elementebiT. sxva teqnikuri kulturebi-mzesumzira, bamba, kanafi, Tambaqo niadagis gamaRaribebeli mcenareebia. mzesumziras kulturis SemTxvevaSi cnobilia, rom zeTi mcire raodenobiT Seicavs azots, fosfors da kaliums, magram Tu meurneobam koptoni ar gamoiyena, xolo Reros dawvis dros darCenili nacari (romelic didi raodenobiT Seicavs kaliums) mindorSi ar gaitana-mzesumzira mniSvnelovnad aRaribebs niadags sakvebi nivTierebebiT.

mcenareebs Soris arsebobs gansxvaveba niadagidan sakveb nivTierebaTa mopovebis unaris mxriv, rac mniSvnelovanwilad damokidebulia fesvTa sistemis simZlavreze da aseve mcenaris biologiur Taviseburebaze SeiTvisos niadagidan sakvebi SedarebiT naklebadxsnadi formebiT. aseTi unariT xasiaTdeba magaliTad barda, wiwibura, xanWkola da zogierTi sxva kultutrebs. SedarebiT susti unariT xasiaTdeba TavTavianebi, Warxali da sxva.

kulturebis niadaguri kvebis TaviseburebaSi garkveul rols asrulebs mikroorganizmebi, kerZod rizosferuli mikroorganizmebi, romelTa raodenoba da saxeobrivi Semadgenloba umeteswilad specifikuria calkeuli kulturebisaTvis.

Teslbrunvis sqemis Sedgenisas angariSgasawevia, rom sxvadasxva kulturis Semdeg niadagSi advilad moZravi azotis raodenoba metad gansxvavebulia, rac gavlenas axdens momdevno kulturis zrda-ganviTarebaze. cnobilia, rom parkosani balaxebis Semdeg niadagSi meti raodenobis nitraruli formis azoti rCeba, vidre samarcvle parkosnebis Semdeg, xolo simindis da sxva saToxni kulturebi umeteswilad aRaribeben niadags humusiT da azotiT, vidre sxva kulturebiT, marcvlovnebi-fosforiT, Zirnayofa kulturebi, tuberianebi, mzesumzira-kaliumiT da sxva.

wylis bunebrivi da xelovnuri resursebis gonivruli gamoyenebis TvalsazrisiT mniSvnelovania, rom sxvadasxva kulturebi wylis metnaklebi momTxovnia, aseve gansxvavebulia maT mier wylis saerTo moxmarebis ganawileba wlis ganmavlobaSi, aRniSnuli gasaTvaliswinebelia rogorc urwyav, aseve sarwyav miwaTmoqmedebaSi, radgan sxvadasxva kulturebis Semdeg niadagSi. produqtiuli tenis maragi sagrZnoblad gansxvavebulia. saerTod gasaTvaliswinebelia, rom sxva pirobaTa Tanabrobis SemTxvevaSi, rac ufro xangrZlivia kulturaTa savegetacio periodi da maRalia mSrali masis mosavali, miT ufro metad aSrobs igi niadags. amasTanave mniSvnelovania agreTve produqtiuli tenis gamoyenebis koeficienti, romelic damokidebulia mcenaris biologiur Taviseburebaze da agroteqnologiaze metwilad gamoyenebis doneze.

cdebiT dadgenilia, rom TavTaviani marcvlovnebi wylis maqsimalur raodenobas moixmars aRerebis fazaSi (gazafxulze april-maisSi), simindi qoCoCis amotanis fazaSi, aseve kargad iyenebs zafxulis meore naxevris naleqebs, romelic TavTavianebisTvis usargebloa. mzesumzira moxmarebuli wylis erT Tvis ganmavlobaSi iTvisebs (kokroba-yvavilobis dros) Zirnayofebsa da gogrovanebs axasiaTebs wylis SedarebiT Tanabari moxmareba mTeli vegetaciis ganmavlobaSi.

niadagis zedapiruli tenis regulirebis TvalsazrisiT gansxvavdeba marcvlovnebi da farTofoTlovani kulturebi. erTwlovani da mravalwlovani balaxebi, farTofoTlovani saToxni kulturebi (kartofili, Warxali, kombosto da sxva) niadagis zedapirs kargad Crdilavs da amiT amcirebs wylis usargeblo aorTqlebas, marcvlovnebis naTesi niadagi vegetaciis Sua periodSi mcenareebiT kargad iCrdileba, magram vegetaciis bolos es efeqti mkveTrad mcirdeba. niadagSi tenis raodenoba minimumamde mcirdeba mocemuli kulturis momwifebis fazaSi, xolo Semdeg Cveulebrivad matulobs. rac metia dro mosavlis aRebidan momdevno kulturis Tesvamde, miT meti SesaZlebloba arsebobs gadidebuli iqnes niadagSi produqtiuli tenis maragi.

cnobilia, rom mravalwlovani balaxebs axasiaTebs didi miwiszeda foTlovani zedapiri da niadags kargad Crdilavs, magram maRali transpiraciis koeficientis gamo bevr wyals aorTqleben, vegetaciac xangrZlivi aqvT, fesvebi ki niadagSi Rrmad ganviTarebuli. aRniSnulidan gamomdinare mravalwlovani balaxebi didi raodenobiT xarjavs wyals, umetesad gaTibvis Semdeg,miwiszeda mwvane masis aRdgenaze. aRniSnulis gamo, Cveulebriv niadagi did siRrmezea gamomSrali. marcvlovnebis foTlis zedapiri bevrad naklebia, vegetaciac ufro xanmokle, fesvebi mcire siRrmeze ganviTarebuli ris gamoc isini niadagsac naklebad aSroben. TavTavianebis Semdeg momdevno sagazafxulo Tesvamde periodi xangrZlivia (TiTqmis 10 Tve) amitom niadagSi tenis maragi advilad Seivseba, TavTavian marcvlovnebs Soris saSemodgomo kulturebi sagazafxulosTan SedarebiT, teniTac ufro uzrunvelyofilia da niadagsac nakleb gamomSrals tovebs.

**gavlena niadagis nayofierebaze.** sxvadasxva biologiur sameurneo jgufis kulturebis morigeobiT Tesva warmoadgens mcenaris zrdis niadaguri faqtorebis mowesrigebis RonisZiebas. igi xels uSlis sakveb nivTierebaTa calmxriv gamofitvas da maT Soris mcenarisaTvis optimaluri Sefardebis darRvevas, uzrunvelyofs sxvadasxva xsnadobis mqone nivTierebaTa ufro srul gamoyenebas. maSasadame maTi efeqtianobis matebad, aseve uzrunvelyofs niadagis sxvadasxva fenaSi arsebuli sakveb nivTierebaTa ufro Tanabarzomier gamoyenebas.

niadagSi, mcenaris rizosferoSi sasargeblo mikroorganizmebis damoukideblad mcxovrebi azotmafiqsirebeli azotbaqterini, klostridiumi, agreTve celulozis damSleli da sxva baqteriebis, sokoebis, aqtinomicetebis raodenobaze, Semadgenlobaze da urTierTkavSirze damokidebulia zrdis nivTierebaTa da zrdis inhibitorTa, vitaminebis, fermentebis dagrovebis dinamika niadagSi, rac mniSvnelovnad moqmedebs mis nayofierebaze.

gansakuTrebiT mniSvnelovania mcenareTa gansxvavebuli gavlena niadagis struqturaze da fizikur Tvisebebze. Cveulebriv agroteqnologiis pirobebSi niadagis struqturas yvelaze metad auaresebs saToxni kulturebi, SedarebiT naklebad marcvlovnebi, metadre saSemodgomo TavTavianebi, kidev ufro naklebad erTwlovani parkosani balaxebi, samarcvle parkosnebi, agreTve wiwibura. mravalwlovani sakvebi balaxebi-rogorc sufTa naTesebi, aseve narevebi, niadagis struqturas aumjobesebs, xels uwyobs agronomiulad yvelaze ufro saWiro wvrilkoStovani struqturis warmoqmnas, rac damokidebulia imaze, rom balaxebis naTes mindorze niadagis (kordis) damuSaveba Sewyvetilia da niadagi TandaTan mdidrdeba organuli nivTierebebiT (narCenebiT).

**saxnavi miwebis intensiuri gamoyeneba**

niadagis nayofierebis gadidebisa da sasoflo-sameurneo kulturaTa mosavlianobis matebis mniSvnelovan saSualebas warmoadgens Teslbrunvebi. Teslbrunvebis SemoRebisas uzrunveloyofili unda iqnes: naTesis farTobis mosavlianobiT fermeruli meurneobis moTxovnilebis dakmayofileba, saxnavi miwebis mizanSewonili (swori) gamoyeneba da kulturaTa sworad SerCeva- ganawileba, mecxoveleobis sakvebi bazis Seqmna da sxva.

Teslbrunvis sqemis Sedgenisas upirveles yovlisa yuradReba unda mieqces sasoflo-sameurneo kulturaTa swor morigeobas, maTi zrdias pirobebis da moTxovnilebaTa gaTvaliswinebiT. dadgenilia rom erTi da igive kulturis erTsa da imave adgilze xangrZlivi periodiT Tesva Cveulebriv iwvevs niadagis ganoyierebis Semcirebas, mindvrebze sarevelebis, kulturaTa daavadebebis da mavnebelebis ganviTarebas. aRniSnuli ki iwvevs mosavlianobis mniSvnelovan Semcirebas da zogjer mat srul daRupvas.

kulturaTa swori morigeobis dasadgenad aucilebelia mTel rig ronisZiebaTa gaTvaliswineba, romelTagan ZiriTad pirobas warmoadgens niadagSi arsebuli sakvebi nivTierebebis sworad gamoyeneba. cnobilia, rom sxvadasxva mcenare Tavisi zrda ganviTarebisaTvis niadagidan sakveb nivTierebebs erTnairad ar iyenebs. magaliTad pureuli kulturebi meti raodenobiT moiTxovs azotsa da fosfors; parkosani kulturebi–piriqiT, koJris baqteriebis saSualebiT niadagSi agrovebs azots; sakvebi Zirxvenebi da kartofili ufro metad xarjavs kaliums, SedarebiT naklebad moixmars niadagis azots da fosfors.

kulturaTa morigeobis dros aucilebelia gaTvaliswinebuli iqnes kulturis fesvTa sistemis gavrceleba niadagSi (siRrmeSi), gamomdinare aRniSnulidan kulturebi sakveb elementebs niadagis sxvadasxva fenebidan iyeneben magaliTad pureuli Tavisi funja fesvTa sistemiT sakvebs niadagis zeda fenebidan iRebs, maSin rodesac parkosani mcenareebi inviTareben ra mTavarRerZian fesvTa sistemas, sakveb niadagis qveda fenebidan iRebs.

sarevelebis mier pureuli kulturebi Cveulebriv Zlier iCagreba, maSin rodesac saToxni kulturebi (kartofili, mzesumzira, simindi, Zirxvenebi) saTanado movliT (mwkrivTa Soris damuSaveba, rigebSi sarevelebis gamargvla) xelsuwyobs sarevelebis gasufTavebas. mravalwlovani sakvebi balaxebi xels Slis sarevelebis zrda ganviTarebas da nakveTs momdevno kulturisaTvis sarevelebisagan sufTas tovebs. aseve sarevelebis winaaRmdeg brZolis saukeTeso saSualebas warmoadgens Savi aneuli (kulturis Rebis Semdeg farTobis ramdenjerme damuSaveba).

kulturaTa morigeoba aris saukeTeso saSualeba mcenareta mavneblebisa da daavadebebTan brZolis saqmeSi.

kulturaTa morigeoba-iseTi mcenareebis Secvla, romlebic niadagidan cota wyals iReben (simindi, sorgo da sxva) iseTebic romlebic wyals meti raodenobiT moiTxoven (samarcvel pureulebi), saukeTeso pirobebs qmnis kulturul mcenareTa zrda ganviTarebisaTvis.

kulturaTa morigeoba xels uwyobs struqturuli niadagis Camoyalibebas, niadagSi haeris kargad SeRwevas da tenis advilad gamoyenebas. aRniSnulis miRweva mniSvnelovnad ganpirobebulia mravalwlovani marcvlovnebisa da parkosnebis narevebis TesviT. balaxebis xangrZlivoba TeslbrunvaSi damokidebulia Teslbrunvis xasiaTze da bunebriv pirobebze.

zemoaRniSnulidan gamomdinare mniSvnelovania TeslbrunvaSi kulturaTa swori morigeoba. calkeul kulturaTa adgilis gansazRvra TelsbrunvaSi uzrunvelyofs Teslbrunvis efeqturobas da mis mniSvnelobas fermeruli meurneobisaTvis.

Teslbrunvis ori ZiriTadi tipi arsebobs: mindvris da sakvebi Teslbrunvebi. sakvebi Teslbrunvebi iyofa fermispira da saTib-saZovrul teslbrunvebaT. mindvris Teslbrunvebi uzrunvelyofs niadagis nayofierebis pureuli kulturebisa da zogierTi teqnikuri mcenareebisaTvis. sakvebi Teslbrunvebi (sakarmidamo, fermispira, saTib-saZovruli) miznad isaxavs dakmayofildes fermeruli mecxoveleoba sakvebi baziT. mindvris TeslbrunvebSi SesaZlebelia pureuli kulturebis Tesva zedized or welze metxans erTi da igive mindorze, aseve mravalwlovani marcvlovan-parkosani balaxebi iTesebodes narevebis saxiT TavTaviani pureulebis safarqveS.

saSemodgomo kulturebisaTvis saSemodgomo xorbali da saSemodgomo Wvavi) TeslbrunvaSi saukeTeso wina morbedia sufTa aneulebi da maT Soris Savi aneuli, tenian regionebSi sarevelebisagan sufTa miwebze SeiZleba saSemodgomo kulturbi moTesili aneulebis Sedegadac daiTesos. magram Sav aneuls saSemodgomo kulturebi ufro maRal mosavals iZleva.

sagazafxulo xorbalisaTvis (sarevelebisagan Zlier iCagreba) saukeTeso winamorbeds warmoadgens mravalwliani nasveni da myari miwebi, mravalwlovani balaxebi, saToxni kulturebi (simindi, mzesumzira da sxva), saSemodgomo kulturebi. qeris kultura aseve iCaqreba sarevelebisagan da moiTxovs niadagSi advilad xsnad sakveb nivTierebebs, misTcis saukeTeso winamorbedia ganoyierebuli saSemodgomo an saToxni kulturebi.

Svria niadagisadmi nakleb momTxovnia da sarevelebiT sxvebze naklebad iCagreba, amitom igi SeiZleba moTavsdes yvela mindorSi.

samarcvle parkosani kulturebi ufro momTxovni arian niadagisadmi vidre Wvavi, qeri da Svria. isini niadagSi azotis damgroveblebi arian, amitom mravali kulturiosaTvis karg winamorbeds warmoadgens. TviT es mcenareebi unda moTavsde iseTi winamorbedis Semdeg romelnic Tavis Semdeg mindorSi fosfors da kaliums sakmarisi raodenobiT toveben. TeslbrunvebSi maTTvis sauketesoa mravalwliani balaxis an ganoyierebuli saSemodgomo kulturis farTobi.

saToxni kulturebi (kartofili, simindi, sorgo, mzesumzira, Saqris Warxali) karg mosavals iZleva mravalwliani balaxebi da saSemodgomo kulturebis Semdeg, aseve parkosnebis Semdeg Tesvisas. saToxni kulturebis mwkrivTa Soris damuSavebis Sedegad sarevelebisagan farTobs toveben sufTad da sxva kulturebisaTvis saukeTeso winamorbeds warmoadgens, gansakuTrebiT sagazafxulo pureuli kulturebisTvis.

baRCeuli kulturebi (sazamTro, gogra) karg mosavals iZleva mravalwlovani balaxebis Semdeg nasven da myar miwebze Tesvisas.

mravalwlovani balaxebi Tavis mxriv kargi winamorbedia sagazafxulo da saSemodgomo kulturebisaTvis, radgan maTi Tesvis Semdeg niadagi mdidrdeba azotiT da organuli nivTierebebiT, iZens mtkice wvrilmarcvlovan struqturas.

sakvebi Teslbrunvebi iyofa or tipad: fermispira, romlis ZiriTad mizans Seadgens uzrunvelyofa umTavresad wvniani sakvebiT da saTib-saZovruli Teslbrunvebi, romelTa mizania cxovelTa uzrunvelyofa TiviT an saZovruli mwvane sakvebiT.

fermispira Teslbrunvebi ewyoba fermis axlos (maxloblad), imisaTvis rom cxovelma fermis axlos Zovos da wvniani sakvebis gadazidvaze didi Sroma da transporti ar dagvWirdes.

fermispira TeslbrunvaSi SeaqvT sagazafxulo pureulebi balaxebis SeTesviT, 3-4 mindori mravalwlovani da erTwlovani balaxebiT. mravalwlovani da erTwlovani balaxebis Setana SesaZleblobas iZleva movawyoT mwvane konveieri e.i. uzrunvelvyoT cxovelTa moTxovnileba saZovruli sakvebiTBbunebrivi saZovrebisa da naTesi sakvebi kulturebis xarjze, adre gazafxulidan gvian Semodgomamde.

fermispira Teslbrunvis mravalnairi tipi arsebobs. magaliTad 5-6 mindvriani Teslbrunva, sadac erT mindorze daiTeseba mwvane sakvebad cercvela SvriiT, 1-2 mindorze Zirxvenebi da sasilose kulturebi, 2 mindorze-samyura timoTelaTi da erT mindorze-sagazafxulo marcvleuli kulturebi.

meRoreobisaTvis fermispira Teslbrunvis tipi SeiZleba iyos: 1. sagazafxulo marcvleuli, sadac mravalwliani balaxebia SeTesili ionjas WarbobiT. 2. mravalwlovani balaxebi Tivad da mwvane sakvebad. 3. mravalwlovani balaxebi saZovrad. 4. baRCeuli. 5. erTwlovani balaxebi saZovrad. 6. sasilose kulturebi da Zirxvenebi. 7. miwavaSla (Teslbrunvis gareSe). aRniSnuli tipis Teslbrunva Seicavs sxvadasxva tipis Teslbrunvebs, romlebic uztrunvelyofs cxovels Zovebis mTel periods-mwvane konveieris formiT.

fermispira Teslbrunvis erT-erT ZiriTad amocanas warmoadgens cxovelTa uzrunvelyofa sakvebiT, amitom misi dagegmva unda moxdes mindvris Teslbrunvis dagegmvastan erTad.

saTib-saZovruli Teslbrunva ewyoba mcire produqtiul, gadagvarebul mdeloebze mravalwlovani da erTwlovani balaxebis morigeobiT. saTib-saZovruli Teslbrunva moicavs or periods: mindvris periods, roca moxnuli mdelo erTwliani mindvris kulturebisaTvis gamoiyeneba da mdelos periods, rodesac teslbrunbvis mindvrebis nawili mravalwlovani balaxnarevebiT iTeseba.

mindvris periodis xangrZlivoba TeslbrunvaSi ZiriTadad damokidebulia sakvebis farTobis tipze da ganisazRvreba im periodiT, romlis ganmavlobaSic belti sakmarisad daiSleba (2-4 weli, zogjer 4-5 weli).Mmdelos periodis xangrZlivoba niadagis pirobebis, balaxnarevebis Semadgenlobisa da gamoyenebis pirobebis mixedviT SeiZleba 4-7 wlamd meryeobdes. saTib saZovrul Teslbrunvas safuZvlad udevs organul nivTierebaTa dagroveba da misi daSla orwlovani da mravalwlovani balaxebis morigeobis saSualebiT. organuli nivTierebis dasaSlelad da beltis maRali nayofierebis gamosayeneblad Teslbrunvis mindvris periodSi mravalwlovani balaxebis Semdeg marcvleuli da sakvebi kulturebi iTeseba.

saTib-saZovrul TeslbrunvaSi mravalwlovani sakvebi balaxebis Tesva-moyvanis mtavar mizans Seadgens mwvane saZovruli sakvebisa da Tivis miReba. saTib-saZovruli periodi agroteqnologiurad ganisazRvreba niadagobrivi pirobebiT, balaxnarevebis SemadgenlobiT da maTi gamoyenebis droiT. saTib-saZovris periodis pirvel or wels mravalwlovani balaxebi Cveulebriv Tivad gamoiyeneba Semdg saZovrad da Tivad, imis mixedciT Tu ra moTxovnaa Tivaze da saZovarze.

mindvris periodisaTvis kulturebis SerCevis dros mxedvelobaSi unda iqnes miRebuli dasaTesi kulturebis mniSvneloba savargulebTan da mavneblebTan brZolis saqmeSi.

mindvris periodisaTvis kulturebis SerCevis dros mxedvelobaSi unda viqonioT dasaTesi kulturebis mniSvneloba sarevelebTan da manveblebtan brZolis saqmeSi. marcvleul kulturebTan da erTwlovan balaxebTan erTad mindvris periodSi Setanili unda iqnes, rogorc sarevelebTan brZolis xelSemwyobi saSualeba, sToxni da bostnis kulturebi, xolo Teslbrunvis gareSe mindorze iTeseba miwavaSli. magaliTad veils zonaSi: 1. mravalwlovani balaxebi Tivad; 2-4 mravalwlovani balaxebi mwvane sakvebad da saZovrad, 5. xorbali, 6. sudanura, 7. simindi gasaZoveblad, 8. pureulebi mravalwlovani balaxis SeTesviT. **M**

**monokultura.** kulturis ramodenime wlis ganmavlobaSi Seunacvlelad movla-moyvana iwvevs zogierTi mavneblebisa da avadmyofobis masobriv gamravlebas da gavrcelebas. Saqris Warxlis, aseve kartofilis ganmeorebiTi Tesvisas ufro metad ziandeba nematodebiT, sxva kulturebs nematodebi SedarebiT naklebad azianebs. puris bzuala nawveralze daTesil TavTavian marcvlovnebs bevrad metad azianebs, vidre sxva kulturebis Semdeg. mavTula Wia Zlier azianebs samyuras, xolo samarcvle parkosnebs, TavTavian marcvlovnebs-naklebad. TavTavianebis mxerxavi mwerebi maTi specifikuri mavnebelia, asevea simindisTvis farvana da a.S.

kulturaTa Seunacvlelad Tesvisas bevri avadmyofobac poulobs pirobebs gamravlebisaTvis da gavrcelebisaTvis. magaliTad marcvlovnebis fesvis sidamplis gamomwvevi sokoebi zedized Tesvis dros metad saSiS xasiaTs Rebulobs da mniSvnelovnad amcirebs mosavlianobas. kartofilis dargva nakartofilarze iwvevs fitoftoras gavrcelebas, xels uwyobs Wknobasa da gadagvarebis gamomwvevi virusebis gamravlebas. selis kultura ziandeba fuzariozisagan im SemTxvevaSi Tu garkveulma drom ar gaiara mindorze mis xelaxal dabrunebamde. marcvlovnebis Jangas winaaRmdeg brZolis erT-erTi saukeTeso saSualebaa Teslbrunvis SemoReba.

sarevelebis winaaRmdeg brZolis saukeTeso saSualebaa Teslbrunva. ama Tu im kulturebs Tan axlavs specifikuri sarevelebis ganviTareba. cnobilia, rom Wiota umTavresad asarevlianenbs TavTavianebs; Zurwa-fetvs, brinjs, wiwmataseli-sels; Salafa-siminds; paraziti sarevelebi-abreSuma da kelaptara asarevlianebs da parazitobs: abreSuma-samyuraze, ionjaze, selze, kelaptara-mzesumziraze, kanafze, Tambaqoze da a.S. amgvari specifiuri sarevelebis gamravleba-gavrcelebis mniSvnelovani SezRudvis garda kulturebis monacvleoba warmoadgens saukeTeso agroteqnikur RonisZiebas sarevelebTan sistematiuri efeqturi brZolisaTvis.

kulturebis Sesabamisad niadagis damuSavebis gansxvavebuli siRrme, sxvadasxva dro, wesi da Tesvis ganasxvavebuli vadebi, aseve movlis gansxvavebuli agroteqnika; TviT mcenaris biologiuri Taviseburebani-zrdis sawyisi gansxvavebuli siswrafe, sarevelebis daCagvris met-naklebi unarianoba, yvelaferi es SeiZleba maqsimaluri efeqtianobiT gamoviyenoT Teslbrunvis pirobebSi. mravalwlovani da nawilobriv erTwlovani sakvebi balaxebis Sekruli balaxnari Crdilavs da axSobs mTel rig sarevelaTa ganviTarebas. gansakuTrebulad efeqturia am mxriv mravalwlovani balaxebis roli moklexnovani sarevelebis raodenobrivi SemcirebisaTvis. 2-3 wlis manZilze niadagis damuSavebis Sewyveta da farTobis balaxebiT dakaveba zRudavs da axSobs sarevelaTa Teslis aRmocenebas, aRmocenis zrdas. mravalwlovani balaxebis Sekruli kordi da sistematuri Tibva axSobs ara marto moklexnovanebis, aramed bevri fesvnayriani da fesuriani sarevelebis ganviTarebas (Salafas gavrceleba). aRniSnulidan gamomdinare sxvadasxva kulturebis Semdeg mindori sxvadasxva xarisxiTaa dasarevlianebuli, TavTavian marcvlovnebs Soris SedarebiT naklebad ikidebs fexs sarevelebi saSemodgomo WvavSi, Semdeg saSemodgomo xorbalSi. sagazafxulo marcvlovnebi xorbali, qeri, Svria mindors yvelaze metad dasarevlianebuls tovebs. agroteqnologiis sruli dacvis SemTxvevaSi saToxni kulturebis (Warxali, kartofili) Semdeg mindori sarevelebisagan SedarebiT sufTaa. aseTive mdgomareobaSi rCeba mindori-bardas, xanWkolas, cercvelas, culispiras sufTa naTesebi anda maTi marcvlovnebTan–qerTan, SvriasTan, WvavTan narevSi Tesvisas.

**Sualeduri kulturebi**

Sualeduri kulturebi ewodeba iseT mcenareebs, romlebic iTeseba (irgveba) da mosavals iZleva ZiriTadi kulturis daTesvamde an ZiriTadi mosavlis aRebis Semdeg. is saSualebas iZleva weliwadSi miviRoT 2 mosavali.

gamoyofen Sualeduri kulturebis Semdeg saxeebs: **SeTesili, sanawverali da mozamTre.**

SeTesili Sualeduri kultura iTeseba ZiriTadi kulturis safarqveS da misi mosavali aiReba imave wlis Semodgomaze.

sanawveralo iTeseba ZiriTadi kulturis mosavlis aRebis Semdeg da maTi mosavalic aiReba imave wels (simindi, sudanura, boloki). mozamTre Sualeduri kultura iTeseba an safarqveS, an ZiriTadi kulturis mosavlis aRebis Semdeg da misi mosavali aiReba momdevno wels, ZiriTadi kulturis daTesvamde (rafsi, barda, Svria).

Sualeduri kulturebi garda imisa, rom zrdian produqciis mosavals erTeul heqtar farTobidan, amdidreben niadags organuli nivTierebiT, amcireben niadagis dasarevlianebas

**kulturaTa movla\_moyvana**

adamiani kulturul mcenareTa movla-moyvanas uxsovari droidan misdevda CineTSi, indoeTSi, siriaSi, egvipteSi, meqsikaSi da sxva qveynebSi. saqarTveloc im qveynebis jgufs miekuTvneba, sadac kulturul mcenareTa moyvanas didi xnis istoria aqvs, Cveni qveyana samarTlianad iTvleba zogierTi kulturuli mcenaris ( vazi, xorbali) warmoSobis kerad.

dReisaTvis agraruli meurneoba warmodgenilia ori ZiriTadi, urTierT mWidrod dakavSirebuli dargebiT-memcenareobiTa da mecxoveleobiT. maTi mWidro kavSiri gamoixateba imaSi, rom memcenareoba mecxoveleobas uzrunvelyofs uxeSi, mwvane, wvniani da koncentrirebuli sakvebiT, xolo mecxoveleoba Tavis mxriv uzrunvelyofs memcenareobis ganviTarebas organuli sasuqiT, rasac udidesi mniSvneloba eniWeba ekologiurad sufTa, stabiluri da maRali mosavlis miRebis saqmeSi.

memcenareobaSi Sromis ZiriTad sagans warmoadgens mcenare, romelsac axasiaTebs mkveTrad gamoxatuli sezonuroba. stabiluri da maRali mosavlis misaRebad saWiroa mcenarisaTvis SevqmnaT saarsebo optimaluri pirobebi. romelTagan upirvelesia mindvris samuSaoebis (niadagis damuSaveba, sasuqebis Setana, Tesva, naTesis movla, mosavlis aReba da sxva) drouli da xarisxiani Catareba. mcenaris movla-moyvanis teqnologiaSi daSvebuli Secdomebis gasworeba did siZneleebTan aris dakavSirebuli, xolo rig SemTxvevaSi gamousworebelic ki aris.

memcenareobis amocanas warmoadgens daamuSaos yvela sasoflo-sameurneo kulturisaTvis myari, maRali da xarisxiani mosavlis miRebis Teoriuli safuZvlebi, agroteqnologiuri procesebis sworad warmarTva, kulturaTa potenciuri SesaZleblobebisa da rezervebis maqsimalurad gamovlena, romlebic gaaCnia mcenares.

adamians, Tavisi miznebisaTvis (msoflioSi} mohyavs kulturul mcenareTa 20 aTasze meti saxeoba, magram gadamwyveti mniSvneloba eniWeba 640 saxeobas, romelTagan 90 miekuTvneba mindvris kulturaTa jgufs. msoflioSi yvelaze didi farTobi\_mTeli naTesi farTobis 70%, uWiravs marcvlovan (xorbali, brinji, simindi, qeri, sorgo, fetvi, Wvavi) kulturebs; sakmaod did farTobze iTeseba kartofili, Saqris lerwami da Saqris Warxali, soia, mzesumzira da sxva.

**marcvlovani kulturebis zogadi daxasiaTeba**

mosaxleobis kvebis saqmeSi marcvlovan kulturebs udidesi roli eniWeba. puri adamianis moxmarebis ZiriTadi produqtia, marcvali koncentrirebuli sakvebia sasoflo-sameurneo pirutyvisaTvis da nedleuli mrewvelobis mravali dargisaTvis.

marcvlovani kulturebi miekuTvnebian TivaqasraTa (Poacea) ojaxs. ZiriTadi organoebis agebulebis mixedviT Zlier emsgavsebian erTmaneTs. morfologiuri Tvisebebis mixedviT marcvlovani kulturebi iyofian 3 jgufad: pirveli jgufis marcvlovan pureulebs miekuTvneba: xorbali, qeri, Wvavi, Svria; meore jgufSi gaerTianebulia simindi, fetvi, sorgo, brinji da wiwibura; mesame jgufs ekuTvnis samarcvle parkosnebi barda, sakvebi cercvi, culispira, ospi, xanWkola, lobio, soia.

Mmarcvlovnebis fesvTa sistema funjanairia, gaRivebisas marcvali inviTarebs e.w pirvelad fesvebs. imis mixedviT, Tu romel macvlovanTan gvaqvs saqme maTi raodenoba sxvadasxvaa. fesvebis ZiriTadi masa ganlagebulia niadagis saxnav fenaSi. maRaltaniani marcvlovnebi, rogoricaa simindi da sorgo miwis zemoT, zedapirTan axlos mdebare muxlebidan, inviTarebs damatebiT miwiszeda e.w sahaero anu sayrden fesvebs, romlebic icavs mcenares Cawolisagan. fesvebis ganviTarebis siZlieriT gamoirCeva simindi, saSemodgomo xorbali da Wvavi.

marcvlovnebis Rero martivi agebulebisaa, dautotavia, cilindruli formis, igi dayofilia muxlebiT. muxlebs Soris manZils muxlTaSorisebi ewodeba. muxlebis raodenoba TavTavianebSi 5\_7-ia, gamonaklisia simindi da sorgo. aq muxlebis raodenoba 12\_15, zogjer 20-mdec aRwevs. simidisa da sorgos Rero amovsebulia parenqimiT, xolo TavTavianebis Rero carielia. qveda, niadagTan axlo muxlTaSorisebi moklea.

foToli Reroze mimagrebulia cvladi rigebiT, morigeobiT, erTmaneTis sawinaaRmdegod. foToli Sedgeba ori nawilisagan - Rarisagan (vagina), rome-lic Semoxveulia mcenaris Reros da aZlevs mas simtkicesa da firfitisagan (lamina) romelic lancetiseburia. foToli vaginasa da laminas SeerTebis adgilze inviTarebs e.w kauWebs, romlebic kulturis mixedviT sxvadasxva zomisaa. am mxriv gamoirCeva qeri, romlis kauWebi TiTqmis Semoxveulia Reros jvaredinad.

Reros yvelaze zemo muxlTSorisze moTavsebulia yvaviledi, romelic Sedgeba yvaviledis Rerosa da TavTunebisagan. yvaviledi ori saxisaa. TavTavi, rodesac TavTunebi uSualod sxedan yvaviledis Reroze da qmnian kompaqtur sxeuls da sagvela, rodesac TavTunebi sxedan mTavari RerZis danatotebze. TavTavian marcvlovnebs miekuTvnebian – xorbali, qeri, Wvavi, xolo sagvelians Svria, sorgo, rac Seexeba siminds, am TvalsazrisiT sruliad gansxvavdeba zemoaRniSnuli marcvlovnebisagan. simindSi mamrobiTi organo sagvela, moaTvsebulia mcenaris kenweroSi, datotvilia da danatotebze sxedan yvavilis mtvris parkebi. mdedrobiTi organo – taro, moTavsebulia foTlis iRliaSi da inviTarebs grZeli zomis e.w ulvaSebs, romlis meSveobiTac moxvedrili yvavilis mtveri miemarTeba butkoSi da nayofierdeba. ganayofierebis mixedviT, marcvlovnebi SeiZleba daiyos or jgufad - TviTgamanayofierebeli da jvaredinad gamanayofierebeli mcenareebi. TviTgamanayofierebel mcenareTa jgufs miekuTvneba xorbali, qeri, Svria. maTi ganayofiereba mimdinareobs mcenaris aRerebis procesSi. jvaredinad gamanayofierebeli mcenareebia \_ Wvavi, simindi, sorgo da sxva. maTi ganayofiereba mimdinareobs Ria wesiT jvaredinad.

pureulebis marcvlisqimiur Sedgenilobaze did gavlenas axdens garemo pirobebi. ase, magaliTad, Siraqis velze moyvanili saSemodgomo xorbali Seicavs saSualod 15,57% cilas, xolo lagodexSi\_11,47%, yvarelSi\_ 11,78, xaSurSi\_12,77 da a.S. cilebis maRali SemcvelobiT gamoirCeva magari xorbali. pureulebis marcvalSi cilebis SemadgenlobaSi Sedis albulini, globulini, glutenini, gliadini. es aminomJavebi wyalSi ar ixsnebian da cnobilia **webogvaras** saxelwodebiT. webogvaras SemcvelobiT sxvadasxva marcvlovnebis Tesli gamoirCeva erTmaneTisagan. magaliTad, xorbalSi webogvaras raodenoba meryeobs 16\_50% farglebSi, WvavSi 3,1\_9,5, qerSi 2\_19% da a.S. webogvaras Semcvelobazea damokidebuli gamomcxvari puris xarisxi. rac ufro metia webogvara, miT metia cxobis unari da maRalia puris SeTvisebis unaric. amitom aris, rom xorblis puri Tavisi TvisebebiT sxva pureulebTan SedarebiT ufro maRla dgas.

marcvlovnebis ganviTarebis fazebi mcenareSi momxdari Tanmimdevruli fiziologiuri gardaqmnebis Sedegia da igi organoleptikurad (Tvalzomurad) ganisazRvreba. mcenaris ganviTarebis fazebia: **gaRiveba, aRmoceneba, bartyoba, aRereba, yvaviloba, daTavTaveba, simwife**. odnav gansxvavdeba simindisa da sorgos SemTxvevaSi. siminds ar axasiaTebs bartyobis faza da daTavTaveba, sorgos ar axasiaTebs daTavTaveba, samagierod igi inviTarebs sagvelas. xorbalSi, qerSi da SvriaSi yvaviloba mimdinareobs aRerebis procesSi. Wvavi, simindi da sorgo jvaredinad damamtverianebeli mcenareebia.

**gaRiveba.** niadagSi moxvedrili marcvali, xelsayrel pirobebSi ganicdis biologiur cvlilebebs, saxamebeli gadadis naxSirwylebSi, Tesli jirjvdeba. gajirjvebuli Tesli inviTarebs pirvelad fesvebs.

**aRmoceneba.** pirvelad fesvebs aqvT unari niadagidan SeiTvisos sazrdo nivTierebebi, rac xels uwyobs mcenaris energiul zrdas. pirveladi Rero dafarulia Txeli apkiT (SaliTiT), romelic icavs Rerosa da pirvelad foTlebs dazianebisagan, romelic kvdeba pirveladi foTlis zrdis damTavrebisTanave. pirveladi foToli aRmocenebidan me-6 - me-14 dRes amTavrebs zrdas. pirveladi foTlis gaSlidan erTi kviris Semdeg viTardeba meore, Semdeg mesame da meoTxe foToli. foTlebis zrdasTan erTad, energiulad izrdeba pirveladi fesvebi da 4 foTlis zrdis dasasrulisaTvis aRwevs 30-35 sm-s. bartyobis fazaSi aRwevs 40\_50 sm, xolo aRerebis fazaSi 60\_90 sm-s.

**bartyoba** es aris mcenaris Reros miwisqveSa datotva, xolo im adgils, sadac bartyoba mimdinareobs ewodeba **bartyobis naskvi.** bartyobasTan erTad (erTdroulad) bartyobis naskvidan izrdeba meoradi fesvebi da gansxvavebiT pirveladi fesvebisagan, isini lagdebian mxolod saxnav fenaSi. meoradi fesvebis energiul zrdas xels uwyobs niadagis tenianoba da niadagSi fosforis Semcveloba. bartyobis fazaSi mcenares unviTardeba ramdenime Rero da imis mixedviT, Tu ramdeni Rero daTavTavdeba da mogvcems marcvals, arCeven produqtiul Reros, romelic mosavals iZleva da araproduqtiul Reros, romelic marcvals ar iZleva. am TvalsazrisiT adgenen bartyobis produqtiulobas. saSemodgomo TavTavianebi bartyobas amTavreben SemodgomiTve, dazamTrebamde.

**aRereba.** TavTavian pureulebSi aRerebis dros bartyobis naskvis zeda pirveli muxlTSorisi iwyebs energiul zrdas da msxvildeba, amodis niadagis zedapirze da 5\_6 dRis ganmavlobaSi energiulad izrdeba, SemdegomSi zrdis tempi iklebs da me\_15 me\_17 dReze aCerebs zrdas. Semdeg zrdasa da gamsxvilebas iwyebs meore da Semdgomi muxlTSorisebi manam, sanam foTlis vaginidan Tavs ar amoyofs yvaviledi\_TavTavi an sagvela.

mcenaris aRereba\_daTavTavebis fazebi erT\_erTi gadamwyvetia uxvi mosavlis miRebis TvalsazrisiT. aRniSnul fazebSi energiulad izrdeba TviT mcenare da rac mTavaria, sabolood xdeba TavTavis an sagvelas formireba, razec didad aris damokidebuli mosavlianoba. amitom, mcenare moiTxovs niadagis optimalur tenianobas da sakveb nivTierebaTa maqsimalurad uzrunvelyofas.

**yvaviloba.** rogorc zemoT avRniSneT, marcvlovnebi yvavilobis mixedviT iyofa or jgufad: TviTdamamtveravebad da jvaredinad damamtveravebad. yvaviloba TviTdamamtverav mcenareebSi (xorbali, qeri, Svria) mimdinareobs aRerebis fazaSi, xolo jvaredinad damamtverav mcenareebSi, Tbil amindSi. qaris saSualebiT erTi mcenaris yvavilis mtveri xvdeba meore mcenaris yvavilis butkos da mimdinareobs ganayofiereba. Tu mcenaris butkos moxvda Tavisi yvavilis mtveri ganayofiereba Zlier gaZnelebulia.

simindis yvaviloba, imis gamo, rom mdedrobiTi da mamrobiTi yaviledebi moTavsebulia mcenaris sxvadasxva adgilze, qoCoCi-mamrobiTi yvaviledi mcenaris wverze, xolo mdedrobiTi foTlis – iRliaSi, yvaviloba advilad SesamCnevia. mamrobiTi yvavili 3\_4 dRiT adre mwifdeba da ganayofiereba xdeba mas Semdeg. rodesac butko ganiviTarebs e.w dings da gamoCndeba foTlis iRliidan.

**simwife** mimdinareobs etapobrivad da arCeven marcvlis **rZisebur,** **cvilisebur da srul simwifes**. simwifis aRniSnuli fazebi Tavisi SedgenilobiT gamoirCevian erTmaneTisagan. rZisebur simwifeSi iwyeba saxameblis dagroveba da matulobs srul simwifemde, samagierod klebulobs marcvalSi wylis raodenoba, ris xarjzec marcvali pataravdeba, Sreba da iRebs Tavis damaxasiaTebel formas da simtkices.

**saSemodgomo pureuli kulturebi**

saqarTveloSi marcvlis warmoebis gazrdis TvalsazrisiT didi mniSvneloba eniWeba saSemodgomo pureulebis movla-moyvanas. jer erTi, pureulebis movla-moyvanis ZiriTad zonebSi saSemodgomo marcvlovnebi sagazafxulosTan SedarebiT, maRali mosavlianobiT xasiaTdebian, meorec, isini aTavisufleben farTobs droulad da sruli SesaZlebloba iqmneba nakveTi momzaddes maRal agroteqnologiur doneze Semdegi kulturis dasaTesad.

saSemodgomo pureulebis Taviseburebad iTvleba is, rom normaluri aRmocenebisaTvis iTxoven SedarebiT dabal dadebiT temperarturas, amitom maTi Tesva mimdinareobs SemodgomiT stabiluri yinvebis dawyebamde 50-60 dRiT adre. gazafxulze, zamTris ganmavlobaSi mosul naleqebs iyeneben ufro srulad, adre iwyeben zrda-ganviTarebas da zafxulis pirvel naxevarSi iZlevian mosavals. magaliTad saSemodgomo xorbali sagazafxulo xorbalTan SedarebiT 8-10 dRiT adre Semodis, saSemodgomo qeri sagazafxuloze 10-12 dRiT adre iZleva mosavals da a.S.

saSemodgomo pureulebis yinvagamZleoba ar aris erTnairi. magaliTad, Wvavi SedarebiT advilad itans 200C yinvas, xorbali 16-180C, qeri ki-120C sagrZnoblad ziandeba.

**samarcvle parkosnebis zogadi daxasiaTeba**

samarcvle parkosnebs miekuTvneba lobio, soia, barda, culispira, cercvi, xanWkola, muxudo, ugrexeli, cercvela, vigna, dolixisi miekuTvnebian parkosanTa ojaxs. maTi rogorc marcvali, ise mcenaris vegetatiuri masa Seicvas didi raodenobiT cilebs, romelTac didi mniSvneloba aqvs rogorc adamianis, aseve cxovelTa kvebaSi

samarcvle parkosnebi fesvebze inviTarebs koJris baqteriebs, romlebic axdens atmosferos haeris azotis fiqsacias (SeboWvas), agroveben niadagSi sakmaod didi raodenobiT azots. mniSvnelovnad umjobesdeba niadagis nayofiereba. ase, magaliTad xanWkola niadagSi agrovebs 400 kg/ha azots, barda da cercvela 100 kg, soia 150 da a.S. garda aRniSnulisa, samarcvle-parkosnebis marcvali Seicavs adamianisa da cxovelisaTvis Seucvlel (lizins, meTionins, triftofans da sxva) aminomJavebs. Seucvleli aminomJavebis raodenobisa da maTi balansirebis TvalsazrisiT pirvel adgilze dgas soias marcvali. yoveli 1 kg mSral nivTierebaze modis 170 mg. xanWkola (150 mg), sakvebi cercvi (150 mg) da a.S.

**s**amarcvle-parkosani kulturebis movla-moyvana soflis meurneobis sami ZiriTadi amocanis gadaWras emsaxureba. pirveli–es aris marcvlis warmoebis gadideba; meore – mcenareuli warmoSobis cilebze adamianisa da cxovelis moTxovnilebis dakmayofileba; mesame - niadagis nayofierebis amaRleba. CvenTan ise, rogorc mTel msoflioSi cilis problema pirveli rigis problemad iTvleba. cnobilia, rom pirutyvisaTvis damzadebul yovel sakveb erTeulze saSualod unda modiodes 110\_115 gr proteini. sinamdvileSi ki, misi raodenoba 85\_86 gr ar aRemateba e.i pirutyvi uzrunvelyofilia fiziologiuri normis mxolod 71-75%\_iT, samarcvle-parkosnebis marcvali kombinirebuli sakvebis Seucvleli komponentia. isini iZleva maRali xarisxis mwvane sakveb masas da Tivas. miRebuli namja maRali xarisxisaa (Seicavs 8-14% cilas, marcvlovnebisa ki mxolod 3-4%), vidre marcvlovani kulturebis namja. rogorc cnobilia, sakvebSi cilebis deficiti iwvevs sakvebis xarjis erTi\_orad da metad gadidebas, Tu gaviTvaliswinebT imas, rom mecxoveleobis produqciis TviTRirebulebis 30%-mde sakvebze modis sruliad gasagebia misi SesamCnevad gaZvireba. miuxedavad amisa, msoflio miwaTmoqmedebis mixedviT samarcvle-parkosnebs, magaliTad soias, lobios, bardas, pureulebis naTesi farTobis 13% uWiravT, xolo saSualo mosavlianoba 12-14,5 c/ha udris.

samarcvle-parkosnebi ise, rogorc parkosanTa ojaxis yvela warmomadgeneli, mTavarRerZian fesvTa sistemas inviTarebs, amitom niadagis Rrmad damuSaveba did gavlenas axdens maT mosavlianobaze. mTavari fesvidan viTardebian meoradi fesvebi, romelTa umetesoba ganlagebulia saxnav fenaSi.

samarcle-parkosnebis Rero imis mixedviT, Tu romel kulturasTan gvaqvs saqme SeiZleba iyos swormdgomi (muxudo, cercvi, xanWkola, lobio da soia \_ buCqisebri formebi) an garTxmuli (barda, cercvela, culispira, ospi, garTxmuli formis lobio da soia), romlebic daparkebis fazidan Cawvebian, amitom maT sayrdenad moixmareba xisgan damzadebuli Wigoebi anda iTeseba umTavresad marcvlovnebTan (ZiriTadad qerTan, SvriasTan, WvavTan) narevebSi.

samarcvle-parkosnebi foTlis agebulebis mixedviT sam jgufad iyofian: 1. mcenareebi, romlebic foTlis frTisebri moyvanilobiT xasiaTdebian (barda, culispira, ospi, muxudo, cercvela); 2. mcenareebi samfoTloviani foTliT (lobio, soia); 3. mcenareebi TiTismagvari foTlebiT (xanWkola).

parkosnebis yvavili Sedgeba araTanabari zomisa da formis oTxi gvirgvinis furclisagan, aTi mtvrianasagan – 9 Sezrdili, 1 gancalkevebuli da butkosagan erTbudiani naskviT da ramdenime TeslkvirtiT. feris mixedviT SeiZleba iyos sxvadasxva, TeTridan kaSkaSa wiTlamde da iisferamde. yvavilebi Sekrulia mtevnisebr an TavTavisebr yvaviledebad. nayofi parkia. sxvadasxva zomisa da formis parkSi moTavsebulia mravali formis, ferisa da zomis ramdenime Tesli.

samarcvle parkosnebi siTbos mimarT sxvadasxva moTxovnebs ayeneben, amitom siTbos moTxovnebis TvalsazrisiT 3 jgufad iyofian: 1. mcenareebi, romlebic siTbos mimarT naklebi momTxovnia (barda, culispira, cercvela); Tesli gaRvivebas iwyebs +20C temperaturaze da iTesebian adre gazafxulze, pirveli SesaZleblobisTanave; 2. mcenareebi, romlebic siTbos mimarT SedarebiT maRal moTxovnebs ayeneben (xanWkola, cercvi, ospi), Tesli gaRivebas iwyebs +40C da iTesebian SedarebiT mogvianebiT; 3. mcenareebi, romlebic siTbos mimarT Zlier momTxovnia (soia, lobio) Tesli gaRivebas iwyebs 8-100C da sagazafxulo kulturaTa Soris yvelaze gvian iTesebian.

tenis mimarT samarcvle-parkosnebi marTalia met-naklebad, magram sakmaod momTxovni kulturebia. gaRivebisaTvis maTi Tesli saWiroebs marcvlis masis 110-140% tenianobas. tenis maRali moTxovniT gamoirCeva soia, sakvebi cercvi, xanWkola, lobio da sxva. gvalvas SedarebiT kargad uZlebs culispira da ospi.

sinaTlis mimarT moTxovnilebis mixedviT samarcvle-parkosnebi 3 jgufad iyofa: 1. grZeli dRis mcenareebi (barda, muxudo, culispira, xanWkola, cercvi); 2. mokle dRis mcenareebi (soia); 3. mcenareebi, romlebic naklebad reagireben dRis xangrZlivobaze (lobio, ospi).

samarcvle-parkosnebi niadags sakmaod maRal moTxovnebs uyenebs. kargad eguebian sustad mJave an neitraluri reaqciis, fosforiT, kaliumiTa da kalciumiT mdidar Tixnar da qviSnar niadagebs. mJave niadagebze maTi moyvana SesaZlebelia niadagis mokirianebis SemTxvevaSi. am mxriv gamonakliss warmoadgens xanWkola.

gavrcelebuli iyo mcdari Sexeduleba, TiTqos samarcvle parkosnebs imis gamo, rom TviTon agroveben niadagSi azots, ar sWirdebaT azotovani sasuqebi, magram irkveva, rom parkosnebisTvis ganviTarebis adreul fazebSi azoti iseve saWiroa, rogorc fosfori da kaliumi, magram SedarebiT mcire normebiT. koJris baqteriebis gaaqtiurebas didad uwyobs xels molibdenis raodenoba da niadagSi misi optimaluri raodenobiT SenarCuneba metad aucilebel pirobas warmoadgens, amitom molibdenis Setana niadagSi xdeba nitraginTan erTad, Teslis Tesviswina damuSavebis periodSi. Teslis Tesviswina damuSaveba xdeba Semdegnairad: iReben saTesle masalas, asveleben, SeaqvT Sesaferisi odenobiT nitragini da molibdeni, kargad gadaureven Tesls da 2 dRis Semdeg mimdinareobs Tesva.

aRmocenebis mixedviT samarcvle-parkosnebi sam jgufad iyofa: 1. mcenareebi, romelTa lebnebi niadagSi rCeba (barda, muxudo, culispira, cercvi da sxva); 2. mcenareebi, romelTa lebnebi mcenaris aRmocenebasTan erTad niadagis zedapirze amodis da mwvandeba (lobio, soia, vigna); 3. mcenareebi, romelTa lebnebi niadagis zemoT amodis, magram ar mwvandeba (xanWkola).

parkosnebSi, marcvlovnebisagan gansxvavebiT, ganviTarebis fazebi Taviseburad mimdinareobs. aRmocenebas cvlis datotvis faza. mcenare zrdasTan erTad inviTarebs ramdenime tots morigeobiT. TiToeul totze morigeobiT enacvlebian dakokrebis, yvavilobis, daparkebisa da marcvlis simwifis fazebi. e.i totebis ganviTarebis mixedviT, Cven erTdroulad varCevT zemoaRniSnul fazebs. swored aRniSnulma gamoiwvia marcvlis mosavlis optimaluri vadebis SerCevis aucilebloba, gansakuTrebiT iseT kulturebSi an jiSebSi, romelTa parkebi simwifesTan erTad advilad skdeba da mosavali ikargeba. dReisaTvis miRebulia, rom mosavlis aRebis optimalur vadad iTvleba periodi, rodesac mcenaris qveda 2/3 nawilze parkebi muq Sefervas miiRebs.

**erTwlovani parkosani balaxebi**

erTwlovan parkosan balaxebs mecxoveleobis sakvebiT uzrunvelyofis saqmeSi udidesi mniSvneloba aqvs, radgan maTi gamoyeneba gamomdinare biologiuri Tvisebebidan (mokle savegetacio periodi, maRali kvebiTi Rirebuleba, advilad Semguebloba sxvadasxva garemo pirobebisadmi, mwvane masis maRali mosavlianoba da sxva,) iZleva did SesaZleblobas maTi movla-moyvanis arealis gafarToebisaTvis. yovelive zemoTaRniSnulidan gamomdinare, respublikis niadagobriv-klimaturi pirobebis gaTvaliswinebiT, SesaZlebelia erTwlovani parkosnebi efeqturad gamoviyenoT sanawveralo, sanaTibo da ganmeorebiTi naTesebis saxiT, erTi wlis ganmavlobaSi erTi da igive mindorze miviRoT 2-3 mosavali. rogorc vxedavT, aRniSnuli didi rezervia miwis racionaluri da intensiuri gamoyenebis TvalsazrisiT, iseTi mciremiwiani qveynisaTvis rogoric saqarTveloa.

garda aRniSnulisa, maTi mokle, magram vegetaciis xangrZlivobis sxadasxvaoba gvaZlevs SesaZleblobas vuzrunvelvyoT pirutyvi gacilebiT didi xnis ganmavlobaSi cilebiT mdidari mwvane sakvebiT, gansakuTrebiT maSin, rodesac igrZnoba mwvane sakvebis didi ukmarisoba. garda amisa, gveZleva sruli SesaZlebloba davamzadoT uxeSi sakvebi (Tiva) optimalur vadebSi da maqsimalurad SevinarCunoT sakvebSi yuaTianoba. saqarTveloSi am mxriv perspeqtiulad unda miviCnioT, rogorc saSemodgomo, ise sagazafxulo cercvela, culispira, xanduri, cercvi da sxva.

**erTwlovani marcvlovani balaxebi**

sakvebwarmoebis dargis sworad warmarTva dRevandeli soflis meurneobis sinamdvileSi erTwlovani sakvebi balaxebis movla-moyvanis gareSe, miT umetes wvrili fermeruli meurneobis pirobebSi ararealuria. aRsaniSnavia rom isini pirvel yovlisa iZleva saSualebas erTwlovani parkosani balaxebis efeqturad gamoyenebisa da meorec, kritikul periodSi avseben mwvane sakvebis deficits. efeqturad gamoiyeneba, rogorc sanawveralo aseve sanaTibo da ganmeorebiTi naTesi kulturebis saxiT.

**wvniani sakvebis momcemi kulturebi**

Zirxvenebs saxalo meurneobis ganviTarebis saqmeSi friad mniSvnelovani adgili uWiravT. kerZod, isini iZleva adamianisaTvis iseT sasicocxlo produqts, rogoricaa Saqari, zamTris ganmavlobaSi mecxoveleobas uzrunvelyofs vitaminebiT mdidari sakvebiT, mrewvelobas aZlevs saSualebas miiRos umaRlesi xarisxis teqnikuri spirti, xolo zogierTi maTgani warmoadgens uSualod sasursaTo kulturas.Aamitomac aris, rom wvniani sakvebis momcemi kulturebi sxvadasxva mizniT, met-naklebi raodenobiT moyavT msoflios yvela kontinentze.

**Zirxvenebi.** maT miekuTvneba Saqrisa da sakvebi Warxali, Talgami, stafilo, da sxva. isini iZleva advilad mosanelebel produqcias, rac maT dadebiT Tvisebad unda CaiTvalos. garda aRniSnulisa, yuradRebas ipyrobs is garemoebac, rom aumjobeseben niadagis haeracias, sarevelebisgan sufTas toveben farTobs, xSir SemTxvevaSi SesaZlebelia savegetacio periodSi miRebuli iqnes ori mosavali; karg winamorbedad iTvleba bevri sasoflo-sameurneo kulturisaTvis; SesaZlebelia SevinaxoT didi xnis ganmavlobaSi TiTqmis ucvlel mdgomareobaSi; (Seicavs iseT wyals, romelic Sedis ujredis SemadgenlobaSi); gamoiyeneba rogorc Zirxvena, aseve foCi.

**mravalwlovani parkosani balaxebi**

soflis meurneobaSi mravalwlovani sakvebi balaxebis roli metad didia. maTi gonivruli gamoyeneba xels uwyobs niadagis wvrilkoStovani struqturis Seqmnas, nayofierebis aRdgenas, sasargeblo mikroorganizmebis cxovelmyofelobis gaaqtiurebas, niadagSi arsebuli tenis ekonomiurad xarjvas, mecxoveleobis mtkice sakvebi bazis Seqmnas da produqtiulobis amaRlebas. sakvebi balaxebis movla\_moyvana mniSvnelovani saSualebaa wylis, qaruli da irigaciuli eroziis winaaRmdeg brZolis saqmeSi. warmoadgens karg winamorbeds mravali sasoflo-sameurneo kulturebisaTvis. mravalwlovani balaxebi or ZiriTad jgufad iyofa: parkosnebad da marcvlovnebad.

parkosanTa ojaxi ekuTvnis orlebnianTa klass, masSi gaerTianebulia ZiriTadad mravalwlovani, agreTve erTwlovani da orwlovani mcenareebi. parkosnebisTvis damaxasiaTebelia mTavarZerZiani fesvTa sistema, romelic niadagSi 1.5\_2.5 metrze da zogjer ufro Rrmad Cadis da gverdiT mravalricxovan damatebiT fesvebs iZleva. parkosnebi Ziridanve datotvil Reros inviTarebs, marcvlovnebisagan gansxvavebiT parkosnebis Reros kenwruli zrda axasiaTebs. Zovebis dros swored es nawili ziandeba da mcenare advilad iRupeba. Rero SeiZleba iyos swormdgomi, miwaze ganTxmuli, wamoweuli da mxviara. foTlebi rTulia, TanafoTlebi Reroze morigeobiTaa ganlagebuli. yvavilebi mtevnad an Tavakad aris Sekrebili. nayofi erTi an mravalTesliani parkia.

parkosan mcenareebs axasiaTebs fesvebze koJrebis ganviTareba, maTSi arsebuli koJris baqteriebi axdens atmosferuli azotis fiqsacias da mniSvnelovnad amdidrebs niadags mcenarisaTvis SesaTvisebeli formis azotiT.

parkosani balaxebi ufro swrafad aRmocendeba, vidre marcvlovnebi. magaliTad lurj ionjas gansakuTrebuli biologiuri Tavisebureba axasiaTebs. mas Tbil amindSi, nayofier da teniT uzrunvelyofis pirobebSi erT savegetaciuo periodSi SeuZlia mogvces 6-8 naTibi.

bunebrivi saTib-saZovrebis SeqmnaSi parkosnebis xvedriTi wili 5-10%-s Seadgens. parkosnebis Tivis gamoSrobisas saWiroa sifrTxile, radgan maTi foTlebi gadabrunebis, gadatanisa da dazvinvis dros advilad imtvreva da ikargeba, rac mniSvnelovnad amcirebs xarisxs.

parkosanTa Soris aris sasursaTo, samkurnalo, dekoratiuli, Taflovani mcenareebi, aseve gvxvdeba Sxamiani da mavne mcenareebic: yvavisfrCxila, samkurnalo xboSubla, tyis cocxi, patara ionja da sxva. parkosani balaxebis umravlesoba saukeTeso sakvebi mcenareebia, rogorc saZovarze, aseve Tivis saxiT. kvebisa da gavrcelebis TvalsazrisiT mniSvnelovani parkosani balaxebia: samyura, ionja, culispira, cercvela, ZiZo da sxva. balaxnarevebSi TesvisaTvis umTavresad parkosnebidan gamoiyeneba: wiTeli, hibriduli da TeTri samyura, lurji da yviTeli ionja, kurdRlisfrCxila, esparceti.

im adgilebSi, sadac Warbobs parkosnebi, gansakuTrebiT namisa da wvimis Semdeg, pirutyvis Zovebis dros saWiroa sirfrTxile, radgan msxvili rqosani pirutyvi da cxvari SeiZleba muclis gaberviT (timpanitiT) daavaddnen. unda aRiniSnos, rom kurdRlisfrCxila, esparceti da TeTri samyura gabervas ar iwvevs.

parkosnebis yvela saxeoba xasiaTdeba maRali yuaTianobiT. yvaviloba-nayofobis fazaSi saSualod Seicavs 17.6% proteins, 13.7% cilas, 3.2% cxims, 28.1% ujredanas, 42.0% uazoto eqstraqtul nivTierebas da C vitamins. 100 kg Tiva aRebuli nayofobis dasawyisSi Seicavs 50-60 sakveb erTeuls da 9-10 kg monelebad proteins. maRali yuaTianobisa da kargi monelebadobis gamo parkosani balaxebi sakveb balaxebs Soris pirvel adgilze dgas.

mravalwlovani parkosani balaxebi garemo pirobebis mimarT sxvadasxva moTxovnebs ayenebs. siTbos mimarT ionja, samyura da esparceti erTmaneTisgan didad ar gansxvavdebian. maTi Tesli gaRivebas iwyebs 1-20 Ctemperaturaze, zrdisaTvis optimalurad iTvleba 18-200C. rac Seexeba kurdRlisfrCxilas, igi SedarebiT siTbosmoyvarulia. Tesli Rivdeba 6-80 C pirobebSi, zrdisaTvis optimalurad iTvleba 22-230C. zemoT CamoTvlili kulturebi sakmaod kargad uZlebs zamTris dabal temperaturas. magaliTad, samyuras axalgazrda aRmonaceni SedarebiT advilad itans 7-90C yinvas, ionja 5-60C, xolo esparceti SedarebiT gamoirCeva zamTar da yinvagamZleobiT. uTovlo zamTarSi esparcetis naTesma 42-450 C -ian yinvebsac ki SeiZleba gauZlos.

niadagis tenis mimarT ionja, samyura da kurdRlisfrCxila, sakmaod maRal moTxovnebs ayenebs, xolo esparceti maRali gvalvagamZleobiT gamoirCeva, rac saSualebas aZlevs mas, farTo gavrceleba povos gvalviani, urwyavi miwaTmoqmedebis pirobebSic ki.M

mravalwlovanobis mixedviT, gamoirCeva ionja da kurdRlisfrCxila. maRali agroteqnikisa da gamoyenebis pirobebSi maT SeuZliaT mogvces stabiluri mosavali 6-10 wlis ganmavlobaSi da savegetacio periodSi sul cota 4-5 ganaTibi. kurdrlisfrCxila 5-6 wlis manZilze iZleva stabilur mosavals da iTibeba 3-4-jer weliwadSi. rac Seexeba samyuras da esparcets, sami wlis Semdeg maTi naTesebi imdenad meCxerdeba, rom maTi ganaxleba me-4 wels xdeba saWiro.

**mravalwlovani marcvlovani balaxebi**

marcvlovani balaxebis kvebiTi Rirseba metad maRalia rogorc saZovarze, aseve Tivis damzadebisas, xSirad isini sakvebis 80-90%-s Seadgens. Tivis damzadebisas isini kargad inaxeba, gadazidvisas foTlebi ar emtvreva.

simaRleSi zrdisa da SefoTvlis xasiaTis mixedviT marcvlovnebi or jgufad iyofa: maRlari da dablari marcvlovani balaxebi.

maRlari marcvlovnebis jgufs ekuTvnis maRaltaniani marcvlovnebi Reros kargi SefoTvliT. maRlari marcvlovnebidan balaxnarevebSi dasaTesad iyeneben ufxo Svrielas, saTiTuras, mdelos timoTelas, mdelos wivanas, mdelos melakudas, maRal koindars, ufesuro Wangas, mravalsaTib koindars.

dablari marcvlovnebis jgufs ekuTvnis dabali, sustad SefoTlili Reroebiani marcvlovnebi, romlebic niadagis zedapirTan axlos inviTareben didi raodenobiT foTlebis ylortebs. dablari marcvlovnebidan balaxnarevebSi dasaTesad iyeneben mdelos Tivaqasras, wiTel wivanas, saZovris koindars, TeTr namikrefias.

marcvlovani balaxebidan didi sameurneo mniSvneloba aqvT velis wivanas, Svrielebs, datotvil da mxoxav Wangas. naklebi Rirebuleba aqvT Cveulebriv namikrefias da Tivaqasras, romelTac cxoveli Tumca kargad Wams, magram dabali mosavlianobiT gamoirCevian. sakvebi TvalsazrisiT naklebi Rirebuleba aqvT Zigvas, qasras, maxrCobelas, lels. am balaxebs cxoveli Wams vegetaciis adreul fazaSi, xolo aRerebisa da yvavilobis Semdeg ki, rodesac Zalian uxeSdebian, cxoveli mas TiTqmis aRar ekareba.

marcvlovan balaxebs Soris gvxvdeba Sxamaini (Salafa) da mavne mcenareebi (Zurwa), romlebic iwveven cxovelis piris Rrus lorwovani garsis anTebas, mxedvelobis daqveiTebas, koWlobas da sxva.

marcvlovani balaxebis zrdis wertili muxlis areSi-foTlis ZirTan axlosaa moTavsebuli da Zovebisas es adgili umetes SemTxvevaSi dauzianebeli rCeba. maSin, rodesac parkosnebisaTvis damaxasiaTebelia kenwruli zrda, gamomdinare aqedan Zovebisas parkosnebis swored es nawili ziandeba da adviladac iRupeba mcenare. xolo marcvlovani balaxebi SedarebiT advilad itans Zovebas.

ise, rogorc mravalwlovan parkosnebs, marcvlovnebsac didi roli eniWebaT miwaTmoqmedebis sworad warmarTvis saqmeSi. kerZod, isini parkosnebTan narevSi qmnian niadagis wvrilkoStovan struqturas, niadagSi agroveben sakmao raodenobiT organul nivTierebebs, rac mosavlianobis gadidebis erT-erTi mniSvnelovani wyaroa, mecxoveleobisaTvis sakvebis warmoebis ZiriTad kuturebad iTvlebian da bolos, isini gamoirCevian sakmaod maRali yuaTianobiTac. ase, magaliTad saTiTuras yoveli 100 kg mwvane masa Seicavs 22,8 sakveb erTeuls da 0,9 monelebad cilas, ufxo Svriela, Sesabamisad 20,5 da 1,4; kapueta 21,1 da 1,5; mdelos wivana 54.7 sakveb erTeuls da 3,8 kg monelebad cilas. maT dadebiT Tvisebad unda CaiTvalos agreTve isic, rom parkosnebisagan gansxvavebiT axasiaTebT naklebi foTolcvena Srobisa da transportirebis dros, gamoirCevian farTo asortimentiT, advilad eguebian niadobriv-klimatur pirobebs; naklebi momTxovni arian maT mimarT, rac ganapirobebs maTi movla-moyvanis farTo areals.

parkosnebisagan gansxvavebiT marcvlovnebs datotva ar axasiaTebT, samagierod xasiaTdebian mZlavri bartyobis unariT da buCqis ganviTarebis mixedviT, arCeven meCxer da mkvrivbuCqebian, xolo SefoTvlis mixedviT, dablar da maRlar saxeobebs. Tu mcenares Reroebi niadagis zedapiris mimarT izrdeba raime maxvili kuTxiT, maraosebr, ewodeba meCxerbuCqiani, xolo Tu niadagis zedapiris perpendikularulad - mkvrivbuCqianebi. Tu mcenare qveda iarusSia SefoTlili, niadagis zedapiridan axlos, ewodeba dablari. Tu piriqiT, niadagis daSorebiT mcenaris wverosken, maRlari.

respublikisaTvis marcvlovnebidan perespeqtiulad unda CaiTvalos: sxvadasxva saxis koindari, saTiTura, ufro Svriela, viwro da farToTaviani kapueta, timoTela, mdelos wivana da sxva. marcvlovnebis asortimentis simravle, saSualebas iZleva konkretul niadagobriv-klimatur pirobebSi gamoviyenoT 2 an 3 marcvlovani balaxi, rac warmoebis TvalsazrisiT raRaTqma unda did efeqts mogvcems.

rogorc cnobilia, mravalwlovani parkosani da marcvlovani balaxebis erTad (narevSi) Tesva, garda imisa, rom maRali mosavlianobiT xasiaTdeba, vidre maTi cal-calke Tesva da niadags sarevelebisagan sufTas tovebs, mokle xnis (2-3 wlis) ganmavlobaSi qmnis kargad Sekrul, niadagis wvrilkoStovan struqturul, nayofier kords, rac kargi winamorbedia mravali kulturisaTvis, pirvel rigSi ki, saToxni kulturebisaTvis (simindi, mzesumzira, baRCeulebi). am Tvisebebis niadagi 4-5 wlis manZilze inarCunebs aRniSnul Tvisebebs da gamomdinare aqedan, maTi movla-moyvana soflis meurneobis warmoebis sinamdvileSi metad efeqturia.

**B balaxnarevebi, maTi mniSvneloba da gamoyeneba**

intensiuri miwaTmoqmedebisaTvis, ise rogorc saerTod agraruli mecnierebisa da warmoebis pirveli rigis amocanas warmoadgens maRalmosavliani sasoflo-sameurneo kulturebis SerCeva, maRalmosavliani jiSebis movla-moyvaniT, Sesaferisi agroteqnologiis gamoyenebiT, romlebic gaaumjobeseben niadagis nayofierebas da daicaven mas eroziisagan, aRniSnulTan erTad cxovrebam cxadyo aranakleb mniSvnelovani sakiTxi, mecxoveleobisaTvis mtkice sakvebi bazis Seqmna, rac uzrunvelyofs cxovelis fiziologiur normas sayuaTo nivTierebebis TvalsazrisiT da mis maRal produqtiulobas.

mecxoveleobisaTvis saWiro maRalyuaTiani da vitaminebiT mdidari sakvebi bazis Sesaqmnelad naTes sakveb balaxebs udidesi mniSvneloba aqvs. balxebi yvelaze efeqturad gamoiyeneba sakveb kulturaTa Soris. maTgan miiReba maRali kvebiTi Tvisebebis Tiva, amasTanave naTesi saukeTeso saZovari da mwvane sakvebia cxovelisaTvis, vitaminebiT mdidari sakvebi, romelic dadebiTad moqmedebs cxovlTa zrda-ganviTarebasa da produqtiulobaze.

sakvebi balaxebi biologiuri Taviseburebis, Tesva-moyvanisa da daniSnulebis mixedviT or jgufad iyofa: parkosnebi da marcvlovnebi. orive jgufSi warmodgenilia mravalwlovanebi da erTwlovanebi formebi. maT Tesaven calke (sufTad) da balaxnarevis saxiT.

kvebis racionSi cilebiT mdidari sakvebis misaRebad didi mniSvneloba aqvs balaxnarevebs, sufTaA naTesTan SedarebiT igi iZleva maRal da myar mosavals, ukeTesad iyenebs sasicocxlo faqtorebs-siTbos, sinaTles, tens da niadagis sakveb nivTierebebs. kulturaSi naTesi marcvlovnebis fesvebi niadagSi 100-150 sm siRrmeze Cadis, zogierTi marcvlovnebis (ufxo Svriela, maRali koindari, kapueta) fesvebi niadagSi 2 metrze met siRrmes aRwevs. mravalwlovani parkosnebi ki kidev ufro Rrmad fesviandebian, vidre marcvlovani balaxebi. marcvlovnebisa da parkosnebis fesvebis 50-70% ganlagebulia niadagis zedapiris 20-30 sm siRrmeze.

balaxnarevebis Zovnadoba da gamoyenebis koeficienti maRalia, vidre sufTa naTesis. marcvlovani da parkosani balaxebis narevad naTesi ufro gamZle aris araxelsayreli pirobebisadmi da ukeTesad ebrZvis sarevelebs. balaxnarSi parkosnebis gameCxerebisas Tavisufal adgilebs ikavebs ufro gamZle da xangrZlivi sicocxlisunariani marcvlovnebi. marcvlovani da parkosani balaxebis araTanabari ganviTarebis gamo balaxnarevebSi Tesvisas TiToeuli maTganisaTvis iqmneba SedarebiT sasurveli pirobebi niadagis tenisa da sakvebi nivTierebebis gamoyenebis TvalsazrisiT, rac uzrunvelyofs Tivis maRali mosavlis miRebas, gaTibvisa da gaZovebis Semdeg balaxnaris karg aqvits (wamonazards). rTuli balaxnarevebi wleebis mixedviT (sami da meti weli) iZleva ufro stabilur da maRal mosavals, vidre martivi balaxnarevebi.

balaxnarevebis (marcvlovan-parkosani) Srobisas parkosnebis (samyura, ionja) foTlebis sruli SenarCuneba xdeba, maSin rodesac parkosnebis calke Srobisas foTlebis didi danakargi aRiniSneba da Sesabamisad mniSvnelovania kvebiTi maCvenebleblebis Semcirebac. balaxnarevebis Tesvisas sagrZnoblad umjobesdeba niadagis fizikur-qimiuri mdgomareoba, izrdeba niadagis dakordebis procesi.

gamoyenebis xangrZlivobis mixedviT arsebobs moklevadiani (2-3 wlis) da grZelvadiani (4-6 da meti) sargeblobis balaxnarevebi.

bunebrivi pirobebis gaTvaliswinebiT balaxnarevebis Semadgenloba sxvadasxvanairia. narevSi iTeseba adgilobrivi pirobebisaTvis yvelaze mosavliani da maRali kvebiTi Rirebulebis balaxebi. SerCevisas gaTvaliswinebuli unda iqnes maTi damokidebuleba niadgis, wylis reJimis, sakvebi nivTierebebis da sxvaTa mimarT. magaliTad marcvlovnebi azotis mimarT momTxovni arian, amitom isini kargad izrdeba azotiT mdidar niadagebze. parkosnebi kargad izrdeba fosforisa da kaliumis Semcvel niadagebze. saSualo tenianobis niadagebze kargad izrdeba mdelos wivana, ufxo Svriela, mdelos Tivaqasra, saTiTura, wiTeli da TeTri samyura. maRali tenianobis pirobebSi karagd izrdeba mdelos timoTela, mdelos melakuda, TeTri namikrefia, vardisferi samyura da sxva.

xangrZlivi gamoyenebis saTibebisaTvis mizanSewonilia daiTesos fesuriani maRlari balaxebi, xolo saZovruli gamoyenebis SemTxvevaSi umjobesia daiTesos dablari, Zovebis amtani balaxebi. saerTod balaxnarevebis Tesvisas aucilebelia SerCeuli iqnes Tanabari (SeTavsebadi) vegetaciis mqone mcenareebi, imisaTvis rom miviRoT maRali da myari mosavali, gamoviyenoT meore naTibis miRebis SesaZlebloba.

xangrZlivi sargeblobis mravalwlovani saZovrebis Sesaqmnelad mizanSewonilia balaxnarevebSi Setanili iqnes parkosnebi 20-30%, maRlari marcvlovnebi 20%-mde, dablari marcvlovnebi 50-60%.

saZovris tipis balaxnarevebSi Setanili unda iqnes sxvadasxva vadebSi mwifadi balaxebi (saadreo, saSualo, sagviano), romlebic gaZovebis Semdeg karg aqvits iZleva. Zovebis amtan balaxebad iTvleba: saZovris koindari, saTiTura, yviTeli ionja, TeTri samyura, kurdRlisfrCxila da sxva. saZovrul balaxnarevebSi Setanili unda iqnes agreTve maRlari marcvlovnebi, isini swrafad izrdeba da saSualebas aZlebs maTi safaris qveS gaizardos da balaxnarSi damagrdes dablari balaxebi. maRlari marcvlovnebi daTesvis welsve iZleva mwvane masis karg mosavals.

cnobilia, rom rac metia mcenaris miwiszeda nawilebi (Rero-foTlebi), miT meti fesvebi grovdeba niadagSi. imisaTvis, rom mcenarem Seqmnas Rero-foTlebis didi masa mcenares esaWiroeba Zlieri fesvTa sistema, xolo fesvebis didi masis Sesaqmnelad saWiroa niadgSi fesvis mcenareuli qsovilis warmosaqmneli organuli nivTierebis arseboba. mravawlovani balaxebisagan Tivis maRali mosavlis miReba niSnavs, rom mosavlis miRebasTan erTad niadagSi grovdeba azoti (saSualod 1 kg yovel centner Tivaze), fosfori, kaliumi, kalciumi da mcenarisaTvis saWiro sxva sakvebi nivTiereba.

mravalwlovani balaxebis Rero erT weliwads cocxlobs, magram maTi ZiriTadi biologiuri gansxvaveba erTwlovani balaxebisagan imaSi mdgomareobs, rom mTavari Reros fuZeSi, im adgilas sadac Rero uerTdeba fesvs da romelic morfologiurad mcenaris fesvis yels warmoadgens, meore wels warmoiqmneba axali ylortebi. mravalwlovani balaxebis am Tvisebas vegetatiuri ganaxleba ewodeba. mravalwlovani balaxebis es Tviseba damokidebulia fesvis yelisa da masze moTavsebuli kvirtebis cxovelmyofelobaze.

mravalwlovani balaxebis Tesva warmoebs safari kulturebis qveS da usafarod--sufTad. usafarod Tesva sarwyav niadagebze zafxulSi an adre SemodgomiT winamorbedi kulturebis mier niadagis ganTavisuflebisTanave swrafad xdeba, im angariSiT, rom naTesi dazamTrebamde moZlierdes da SesaZlebelia erTi naTibic ki miviRoT.

safarqveS daTesili balaxebi pirvel wels sustad viTardeba da mcire mosavals iZleva, magram amiT Cven vigebT erT savegetacio wels da rac mTavaria vzogavT xarjebs. safari kulturis mosavlis aRebis Semdeg mcenare swrafad viTardeba da imave wels iZleva 1-2 naTibs. kulturebis safarqveS balaxebis Tesva SesaZlebelia adre SemodgomiT an sagazafxulod. aseve SesaZlebelia balaxebis SeTesva gazafxulze simindSi, romlis aRebis Semdeg kargad izrdeba da wlis bolomde 1-2 naTibs iZleva, xolo momdevno wels ukve srulad iTibeba \_4-5-jer.

balaxebisaTvis niadagis damuSaveba damokidebulia Tesvis wesebsa da vadebze. Tu balaxebi iTeseba gazafxulze niadagi unda moixnas mzralad, winsaxvleniani guTniT 22\_25 sm siRrmeze. moxvnis win SeaqvT organuli da mineraluri sasuqebi. adre gazafxulze xnuls farcxaven, xolo Tesvis win atareben kultivacias da farcxvas.

balaxebis zafxulSi an adre SemodgomiT Tesvisas, niadagis ZiriTadi damuSaveba warmoebs winamorbedi kulturisgan niadagis ganTavisuflebisTanave. xnuli Tu beltiania, kargad unda daiSalos diskoebiani farcxebiT, moswordes misi zedapiri kultivaciiT da farcxviT, saWiroa xnulis motkepna sagoravebiani satkepneliT, radgan uzrunvelyofili iqnes balaxebis Teslis Tanabar siRrmeze CaTesva da Sesabamisad naTesis Tanabari aRmonacenis miReba. Tanabari aRmonaceni saSualebas iZleva srulad iqnes gamoyenebuli manqana\_iaraRebi da miRebuli mosavali (Tiva) sagrZnoblad metia, vidre araTanabari aRmonacenis SemTxvevaSi.

**safari kulturebis** qveS balaxebis Tesva mimdinareobs ZiriTadi kulturis gardigardmo mimarTulebiT. Tu Tesva erT agregatSi sruldeba, maSin balaxebs Tesaven ZiriTadi kulturis mwkrivebs Soris. cal-calke Tesvis dros, umjobesia jer daiTesos safari mcenare (xorbali, qeri) da naTesis motkepnis Semdeg daiTesos balaxebi.

mravalwlovani balaxebisaTvis mizanSewonilia Tesva warmoebdes Semdeg vadebSi: aRmosavleT saqarTvelos baris sarwyav niadagebze 20 agvistodan 30 seqtembramde. urwyavi pirobebisaTvis 10 martidan pirvel aprilamde. dasavleT saqarTvelos dablobis sarwyav niadagebze 20 agvistodan 20 seqtembramde. urwyav adgilebSi 20 seqtembridan 10 oqtombramde.

naTesi balaxebis pirveli gaTibva mizanSewonilia Catardes niadagis zedapiridan 5-6 sm simaRleze. am SemTxvevaSi mniSvnelovnad mcirdeba danakargebi da xelsayreli pirobebi iqmneba wamonazardis (aqvitis) ganviTarebisaTvis.

saqarTvelos mcire miwianobis pirobebSi, aRniSnuli sakiTxi kidev ufro mwvaved dgas da momavlSic aseve darCeba Sesaferisi RonisZiebebis gautareblobis SemTxvevaSi. gamomdinare aqedan, yvelaze ufro umartives da ekonomikurad gamarTlebuladaa aRiarebuli sxvadasxva sakvebi kulturebis, biologiuri niSan-Tvisebebis gaTvaliswinebiT narevebSi Tesva. sakvebi kulturebis narevebSi Tesva gulisxmobs: 1. mecxoveleobis uzrunvelyofas maRalyuaTaini sakvebiT mTeli wlis ganmavlobaSi. 2. sakvebis xarisxis gaumjobesebas (riTac mniSvnelovnad mcirdeba sakvebis danakargebi). 3. umjobesdeba (uares SemTxvevaSi ki, imave doneze rCeba) niadagis nayofiereba. 4. izrdeba sakvebi kulturebis mosavlianoba sul mcire 12-15%, zogjer ki metadac.

garda mwvane masis matebisa, narevebi imiTac aris sayuradRebo, rom farTobis erTeulze izrdeba monelebadi proteinisa da sakvebi erTeulebis raodenoba. narevi naTesebidan miRebuli sakvebi cxovelis organizmis mier ukeT SeiTviseba, vidre sufTa naTesebidan miRebuli. aseve maRalia narevi naTesebis Wamadobis xarisxic.

aRsaniSnavia, rom respublikaSi damzadebuli sakvebi, yuaTianobiT sagrZnoblad CamorCeba cxovelis fiziologiur normebs, gansakuTrebiT proteinis Semcvelobis TvalsazrisiT da igi ar aRemateba 65-70 gr, nacvlad aucilebeli 115-120 gramisa. es ZiriTadad sxvadasxva mizezebTan erTad gamowveulia imiT, rom damzadebuli sakvebis didi umetesoba marcvlovan mcenareebze modis. sruli WeSmaritebaa, rom sakvebSi proteinis nakleboba ver uzrunvelyofs cxovelis kvebas Sesaferisi ulufiT, rac iwvevs sakvebis gadaxarjvas da mecxoveleobis produqtebis gaZvirebas.

miuxedavad aseTi dadebiTi mxareebisa, narevebi, Tu isini arasworad aris Sedgenili, yovelTvis ar amarTlebs daniSnulebas. saerTod miRebulia, rom narevebSi Tesvisas parkosnebisa da marcvlovnebis Tesvis normis Sefardeba unda akmayofilebdes 3-4:1 mizanSewonilia, komponentebi SerCeuli iqnes msgavsi biologiuri moTxovnilebebis mixedviT. magaliTad, tenis moyvarulebi tenis moyvarulebTan, gvalvagamZleni gvalvagamZleebTan, mravalsaTibiani mravalsaTibianebTan da a.S. karg Sedegs iZleva balaxnarevebSi miiRos monawileoba orma parkosanma da oran samma marcvlovanma, Tu amis SesaZleblobas gvaZlevs saTesle masala.

gadamwyveti mniSvneloba aqvs mwvane masis aRebis vadis sworad gansazRvras. mosavlis aReba unda ganvaxorcieloT parkosnebis dakokrebis, ukidures SemTxvevaSi yvavilobis fazaSi, miuxedavad imisa, Tu ra fazaSi iqneba marcvlovani balaxebi.

sakvebis warmoebis TvalsazrisiT, yuradsaRebia kidev erTi mniSvnelovani garemoeba, rom erTwlovani sakvebi balaxebis Tesva, parkosnebis biologiuri Tvisebebidan gamomdinare, SesaZlebelia winamorbedi kulturis ganaTibze, TavTavianebis nawveralze da adre SemodgomiTac, rac saSulebas iZleva davamzadoT yuaTiani sakvebi savegetacio periodis sxvadasxva vadaSi. erTwlovani parkosanisa da maTi marcvlovnebTan nareviT xdeba saxnavi farTobis intensiuri gamoyeneba da Tu davicavT maTi movla-moyvanis agroteqnologiis moTxovnebs, SesaZlebelia Tavidan aviciloT niadagis nayofierebis Semcirebac.

**Tivis damzadebis teqnologia**

cxovelTa bagur kvebisas sakvebi racionis 40-50% Tivaze modis. Tivis yuaTianoba, sxva uxeS sakvebTan SedarebiT, maRalia. mravalwovani parkosani da marcvlovani balaxebis da maTi narevebis 100 kg kargi Tiva 50-60%-mde sakveb erTeulsa da 10-15%-mde monelebad proteins Seicavs.

Tivis maRali mosavlisa da masSi yuaTianobis SenarCunebis mTavari piroba, misi aRebis calkeuli procesis sworad Catarebazea damokidebuli.

maRalxarisxovan Tivis miRebis da misi udanakargod aRebis mniSvnelovani pirobaa: balaxis droze gaTibva, gaTibvis simaRlis dacva, moTibvis teqnika, Tibva, naTibis swori Segroveba, Sroba, dabululeba da Tivis Zirebad dadgma. amasTanave Tivis aRebis umTavresi procesebis meqanizacia da Tivis saTanadod Senaxva.

**Tibvis vadebi.** balaxebi yvelaze met sayuaTo nivTierebebs misi ganviTarebis adreul periodSi Seicavs. marcvlovanebSi – bartyobis, aRerebisa da daTavTavebis periodSi proteinis Semcveloba 15%-s aRwevs; xolo parkosnebSi – dakokrebisa da yvavilobis dasawyisSi – 20%-s.

yvavilobisas marcvlovanebSi proteinis Semcveloba 10%-mde mcirdeba, xolo parkosnebSi 18%-mde. miuxedavad mcenareSi proteinis Semcvelobis Semcirebisa, sakveb nivTierebaTa yvelaze meti mosavali miiReba balaxebis yvavilobis fazaSi aRebis dros, rac am periodSi Tivis meti mosavliT aixsneba.

dagvianebuli Tibva iwvevs rogor Tivis mosavlis, aseve misi kvebiTi Rirebulebis Semcirebas.

droulad gaTibul mcenareSi yvela sakvebi nivTiereba Tanabradaa ganawilebuli. mcenare ufro nazia da cxoveli mas advilad inelebs. yvavilobis Semdeg, sakvebi nivTierebani foTlebidan da Reroebidan nayofis (Teslis) ganviTarebas xmardeba; nazi, kvebiTi RirebulebiT Zvirfasi foTlebi xmeba, cviva da amgvarad uaresdeba Tivis xarisxi. gvian gaTibuli balaxi uxeSdeba da cxoveli mas cudad Wams. amasTanave gviani Tibva xels uwyobs sarevelebis ganviTarebasac.

zemoTqmulidan gamomdinare, bunebrivi saTibebis Tibva mcenareTa yvavilobis dasawyisSi unda daiwyos da damTavrdes gabatonebul, yvelaze Zvirfas sakveb mcenaris yvavilobis damTavrebamde. mravalwlovani naTesi balaxebi iTibeba marcvlovanebis daTavTavebis an parkosnebis dakokrebis fazaSi.

saTibeebze Tibvis xangrZlivoba 5-10 dRes ar unda aRematebodes. droul Tibvazea damokidebuli srulfasovani meore naTibis miRebac. marTalia meore Tibvisas 25-50%-iT naklebi Tivis mosavali miiReba, pirvel TibvasTan SedarebiT, magram meore naTibis Tiva gacilebiT nazia, orjer met cilas Seicavs, kargad iWmeva da maRal monelebiT xasiaTdeba.

**moTibvis simaRle**. Tivis mosavlianobasa da xarisxze did gavlenas axdens balaxnaris moTibvis simaRle. gamokvlevebiT dadgenilia, rom Tivis yvelaze maRali da myari mosavali, balaxnaris niadagis zedapiridan 4-6 sm simaRleze Tibvisas miiReba. balaxnaris 10 sm simaRleze Tibvisas, nedli proteinis mosavali TiTqmis erTnaxevarjer mcirdeba, rac gamowveulia marcvlovanebis Ziris foTlebis maRali kvebiTi RirebulebiT. Tu balaxnari meored iTibeba, maSin mizanSewonilia balaxis 6-7 sm simaRleze gaTibva, radgan ufro dabalze naTibi mcenareebi ver SeZleben daagrovon plastikuri nivTierebaTa aucilebeli maragi, zamTarSi Sesasvlelad.

**moTibvis teqnika.** Tivis aRebis danakargis asacileblad da yvela saWiro samuSaoTa SemWidroebul vadebSi Sesasruleblad, gansakuTrebuli mniSvneloba aqvs mosavlis aRebis Sromatevad procesebis meqanizacias, rogoricaa: balaxis Tibva, mogroveba. dabululeba da zvinad dadgma.

bolo wlebSi gansakuTrebuli yuradRebaa gamaxvilebuli sakid da naxevradsakid Tivis amReb manqanebze, TviTmavali Sasisa da traqtorebis gamoyenebiT, romelsac 1 adamiani emsaxureba. traqtoris saTibelebi, gansakuTrebuli mowyobilobebiT TibvasTan erTad qmnian Rvareulebs, romelTac didi mniSvneloba aqvs TivaSi sayuaTo nivTierebaTa maqsimaluri raodenobiT SenarCunebaSi.

moTibuli balaxis ganaTibSi xangrZlivi droiT datoveba iwvevs danakargebs, amitom ukeTesia misi gaTibvis dResve RvareulebSi mofocxva. gamokvlevebiT dadgenilia, rom Tivis danakargi mofocxvis 1 dRiT dagvianebiT, mofocxilTan SedarebiT, Seadgens – 12%-s, 2 dRiT dagvianebiT – 18%-s, 3 dRiT dagvianebiT – 25%, 4 dRiT – 30%-s. danakargTan erTad uaresdeba Tivis feri da suni.

**balaxis Sroba**. mwvane balaxi mniSvnelovani raodenobiT (60-80%) Seicavs wyals. gaTibuli balaxis Srobis dros wyali umTavresad foTlebidan orTqldeba.

moWrili mcenaris Srobis periodSi sakveb nivTierebaTa Sedgeniloba icvleba ori, Tanmimdevruli, gavlili procesebis Sedegad. pirveli – fiziologiur-bioqimiuri (mSieri cvla) balaxis SeWknobis periodSi da mere – bioqimiuri (avtolizi) balaxis Srobis periodSi.

fiziologiur-bioqimiur procesisas – axlad moWril mcenareSi, Tumca wydeba sakveb nivTierebaTa mateba, mcenare mainc agrZelebs sicocxles. adre dagrovil SenaerTebis xarjze masSi grZeldeba xanSirbadis, wyalbadis, Jangbadis da sxvaTa asimilacia. am dros sinTezi Warbobs daSlas, magram droTa ganmavlobaSi, sakveb nivTierebaTa da wylis miuwodeblobis gamo, daSla aWarbebs sinTezs, rac mcenaris ujredis cxovelmoqmedebas wyvets. `mSieri cvlis~ perodSi ikargeba 50%-mde karotini da midis sunTqvaze naxSirwylebis energiuli xarjva, romelTa danakargi 20%-s aRwevs. ujredis cxovelmoqmedeba, masSi tenis 40-50%-mde Camosvlisas mTlianad wydeba.

mcenaris qsovilSi, sikvdilis Semdeg, fiziologiur-biologiuri procesi icvleba bioqimiuriT (avtolizi), romlis drosac mkvdar ujredSi nivTierebaTa Semdgomi daSla (cila, aminomJava, saxamebeli, Saqari da a.S.) mimdinareobs fermentebis moqmedebiT.

mcenaris normaluri Srobis dros (mokle droSi) azotovani nivTierebani ar ganicdian mniSvnelovan cvlilebebs, xolo neli Srobis dros aminomJava iSleba amidamde, zogjer ki amiakis warmoqmnamde. mcenaris masis xangrZlivi Srobis dros, maRali tenianobis (50-55%) pirobebSi ikargeba cilovan nivTierebaTa 25-30%. cilis dakargvisa da aminomJavas daSlis Sedegad mcirdeba proteinis Semcveloba, misi monelebadoba da srulfasovneba. amitom Tivis Srobisas saWiroa mkveTrad Semcirdes `mSieri cvlisa~ da `avtolizis~ periodi.

balaxis mokle droSi Sroba amcirebs sakveb nivTierebaTa danakargebs.

Tivad Srobis yvelaze metad gavrcelebuli wesia mindvris pirobebSi Sroba, romelic SemdegSi mdgomareobs.

karg amindSi gaTibuli balaxi ganaTibSi rCeba 50-55% tenis Semcvelobamde, romlis Semdeg mas Rvareulebad agroveben. rodesac tenis Semcveloba balaxSi 25-30%-s miaRwevs, mas abululeben. bululebSi Tiva sabolood Sreba, 3-5 dRis ganmavlobaSi, 16-17% tenianobamde, romlis Semdeg mas awyoben zvinebad an Zirebad.

gaTibvisTanave, balaxis RvareulebSi gaSrobis Sedegad miRebuli Tiva Seicavs met proteins, radgan masSi mTlianadaa SenarCunebuli foTlebi.

RvareulebSi balaxi Sreba, Cveulebriv, erTi dRis ganmavlobaSi, ris Semdegadac Tiva SeiZleba dabululdes.

Tivis aromatuloba warmoiqmneba Tivis bululebSi, ZirebSi, Tivis SesanaxebSi, TandaTanobiTi saboloo Srobis dros, fermentaciis Sedegad, cvilis, fisis, eTerovani zeTis da sxva nivTierebaTa Sesaferisi temperaturuli da haeris tenianobis pirobebSi.

**Tivis Zirebad dadgma da Senaxva.** Tiva Sesanaxad mzadaa, Tu gadagrexvisas Reroebi ramdenadme imsxvreva, Reroebis nawili imtvreva da wyals ar gamoyofs.

Tivis zvinebi keTdeba mrgvali an oTxkuTxa Ziriani formis. umetesad rekomendirebulia Zirebis Semdegi zomebi: sigane – 4-5 m, simaRle – 6 m, sigrZe ara naklebi 8 m. zvinebis: diametri – 4-5 m, simaRle – 6-6,5 m, Sewvrileba simaRlis 2/3-dan.

xanZris sawinaaRmdegod Zirebs Soris manZili 30 m-ze naklebi ar unda iyos.

Tivis zvinebis an Zirebis dadgmamde, dadgmis adgilas afenen latans, Zvel namjas an fiCxs, xolo zvins zemodan xuraven namjiT. zvinis SuagulSi awyoben saukeTeso Tivas.

SrobadaumTavrebel Tivas awyoben patara zvinebad.

Tivis gadazidvis gasaadvileblad mas wnexaven, romlis drosac moculoba, dauwnexavTan SedarebiT 5-jer mcirdeba. 1m3 moculobis dawnexili Tiva saSualod 350-400 kg-s iwonis, xolo dauwnexavis – 65-80 kg-s.

dawnexili Tiva ukeT inarCunebs sunsa da fers, naklebad nestiandeba.

dawnexili Tivis Ria adgilze Senaxvisas, `Stabelis~ qveS afenen fiCxs, xis yuaficrebs, latnebs, qvebs an sxva safenebs.

Tivis calebs awyoben 20 m sigrZis da 5,5 m siganis grovebad. simaRliT – 8 rigad, me-9 rigis lavgardanamde. me-10 rigidan iwyeben `Stabelis~ TandaTan Seviwrovebas, yoveli rigis orTave mxridan 30-35 sm-is SeviwroebiT. `Stabelis~ Tavs xuraven 75 sm sisqis CaliT an namjiT, xolo `Stabelis~ irgvliv akeTeben 20 sm siganisa da 30 sm siRrmis sawred arxs.

**Tivis Sefaseba**. Tivis Sefaseba xdeba saxelmwifo standartis da sabonitiro Skalis mixedviT.

saxelmwifo standartis mixedviT Tiva iyofa 2 tipad: naTesi balaxebis Tiva da bunebrivi saTibebis Tiva. yovel tips aqvs Tavisi qvetipebi.

naTesi balaxebis Tivas aqvs 4 qvetipi: 1) parkosnebi (samyura, esparceti, ionja da sxv.); 2) marcvlovanebi (saTiTura, timoTela, sudanura, wivana da sxv.); 3) mravalwlovani parkosan-marcvlovanebi (samyura+wivana, ionja+saTiTura da sxv.); 4) erTwlovani parkosan-marcvlovanebi (cercvela+Svria, barda+Svria, qeri da sxv.).

bunebrivi saTibebis Tiva iyofa Semdeg 8 qvetipad: 1) mdelos msxvilbalaxovani: 2) mdelos wvrilbalaxovani; 3) mSralobis mdelos msxvilbalaxovani; 4) tenian mdelos maRalbalaxovani; 5) stepis msxvilbalaxovani; 6) stepis wvrilbalaxovani; 7) mlaSobi mdelos msxvilbalaxovani; 8) mlaSobi mdelos wvrilbalaxovani.

TiToeuli tipisa da qvetipis Tiva mcenareuli Sedgenilobis, droisa da aRebis xarisxis mixedviT iyofa pirvel da meore klasad. meore klasze dabali xarisxis Tiva arastandartulad iTvleba.

standartuli Tiva unda akmayofilebdes Semdeg moTxovnebs: hqondes axali surneli (Smorisa da obis sunis gareSe); tenianoba ar unda aRematebodes 17%-s; iyos mtvris gareSe da ar Seicavdes 1%-ze mets mavne da Sxamian mcenareebs.

I klasis Tiva ar unda Seicavdes Wamad uvargis minarevebs 5%-ze mets, maT Soris sarevelebs 1%-ze mets.

II klasis Tiva ar unda Seicaves Wamaduvargis minarevebs 10%-ze mets, maT Soris sarevelebs 2%-ze mets.

Tivis botanikuri analizisas gamoiyofa Semdegi fraqciebi: 1) marcvlovanebi; 2) parkosnebi; 3) sxva Wamadvargisi balaxebi; 4) Wamaduvargisi balaxebi (Sxamianisa da mavnes garda); 5) Sxamiani da mavne balaxebi.

**s a r C e v i**

Sesavali

mecnieruli miwaTmoqmedebis ZiriTadi kanonebi

niadagis damuSaveba

niadagis ekologiuri mniSvneloba

niadagis zedapiruli damuSavebis xerxebi

niadagis damuSavebis sistemebi

sagazafxulo kulturebisaTvis niadagis damuSaveba anu mzralad xvna

mosavlianobaze moqmedi faqtorebi

niadaguri faqtorebi

niadagis mJavianoba da tutianoba

topografiuli faqtorebi

bioturi faqtorebi

anTropogenuri faqtorebi

konkurentunariani kulturebi

mcenareuli toqsinebi mcenareTa konkurenciis faqtori

mcenareebis konkurentunarianoba

kulturaTa saarsebo pirobebi da maTi regulireba

niadagSi sakveb saSualebaTa regulirebis xerxebi

sarevela mcenareebi da niadagi

kulturuli mcenareebisa da sarevelebis urTierTdamokidebuleba

sarevelebis winaaRmdeg brZolis sistemebi

niadagis ganoyiereba

organuli sasuqebi

mineraluri sasuqebi

azotovani sasuqebi

fosforovani sasuqebi

kaliumiani sasuqebi

mwvane sasuqebi

baqteriuli sasuqebi

efeqturi mikroorganizmebis teqnologia

sasuqi-stimulatori stimufungi

biohumusi (vermikultura)

niadagis mulCireba

Teslbrunvebi

saxnavi miWebis intebsiuri gamoyeneba

monokultura-------------------------------

Sualeduri kulturebi

kulturTa movla – moyvana

marcvlovani kulturebis zogadi daxasiaTeba

saSemodgomo pureuli kulturebi

samarcvle parkosnebis zogadi daxasiaTeba

erTwlovani parkosani balaxebi

erTwlovani marcvlovani balaxebi

wvniani sakvebis momcemi kulturebi

mravalwlovani parkosani balaxebi

mravalwlovani marcvlovani balaxebi

balaxnarevebi maTi mniSvneloba da gamoyeneba

safarqveS balaxebis Tesva--------

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