

# Ukulinywa kwenhlaneyelo yomumbu yohlobo lweHybrid lamaOpen *Pollinated Varieties (OPVs)*



 CIMMYT

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## **Umnyaka: 2006**

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## Isandulelo

Inhlanyelo yomumbu iyimihlobo emibili, i*Hybrid leOpen Pollinated Variety (OPV)*. I*hybrid* yinhlanyelo etholakala ngemva kokuhlanganisa abazali (*inbred lines*) ababili, abathathu kumbe abane. Inhlanyelo ye*OPV* itholakala ngemva kokuhlanganisa abazali abedlula itshumi. Inhlanyelo ye*hybrid* itshiyene leye*OPV* ekuthini yona ikhula ilingana. Isivuno siyehla kakhulu nxa umlimi angahlanyela umumbu we*hybrid* awuvune nyakenye. Nansi ingcazelo egcweleyo mayelana lomehluko wenhlanyelo zombili lezi.

## Umumbu wohlobo lwe*Hybrid*

Umumbu lo utholakala ngemva kokuhlanganisa imihlobo emibili, emithathu kumbe emine yomumbu. Impoko ezisezitshakaleni zomzali okhethiweyo wesilisa (*inbred line*) zihlangana lolevu lomzali okhethiweyo wesifazana (*inbred line*) besezizala i*single-cross hybrid* (Umfanekiso 1).

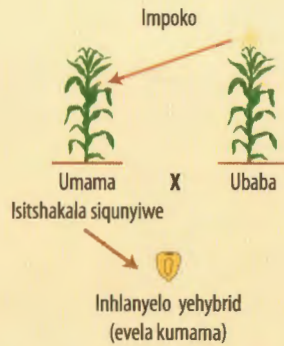
Umhlobo wenhlanyelo etholakala nxa kuhlanganiswe abazali abathathu ubizwa kuthiwa yi*three-way hybrid* (Umfanekiso 2). Nxa kuhlanganiswe abazali abane, inhlanyelo yakhona ibizwa kuthiwa yi*double-cross hybrid* (Umfanekiso 3). Kunhlanyelo ye*three-way hybrid*, umama (umumbu) osetshenziswayo uyabe engumhlobo we*single-cross hybrid*. Impoko zomzali wesilisa kumele zivele esitshakaleni se*inbred line*. I*Double-cross hybrid* itholakala ungahlanganisa inhlanyelo ze*single-cross hybrid* ezimbili. Kulomunye umhlobo wenhlanyelo ye*hybrid* okuthiwa yi*Top-cross*. Inhlanyelo le itholakala ungahlanganisa inhlanyelo ye*OPV* leye*single-cross hybrid*.

## Ukulinywa kwenhlanyelo ye*Hybrid*

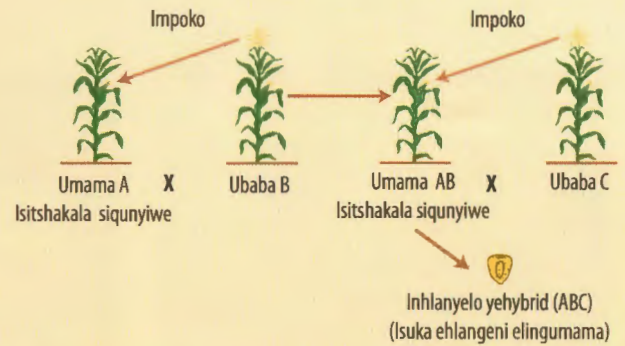
Inhlanyelo le kufanele ilinywe ensimini ekhatshana lamanye amasimu omumbu. Lokhu kwenzelwa ukuthi kungabi lempoko

zezitshakala zomunye umhlobo womumbu ezingaphambanisa umhlobo wenhlanyelo le. Kumele kuhlanyelwe imizila emithathu kusiya kweyisithupha ilandelana eyamahlanga abomama. Le imizila ilandelwa ngumzila owodwa kumbe emibili yamahlanga abobaba (amahlanga omumbu alezitshakala) azakhithiza impoko. Izitshakala zonke zamahlanga angomama kufanele zikhutshwe zisanda kuvela zingakakhithizi impoko. Lokhu kwenzelwa ukuthi ulevu lwamahlanga angomama lwamukele impoko ezivela emahlangeni angobaba kuphela.

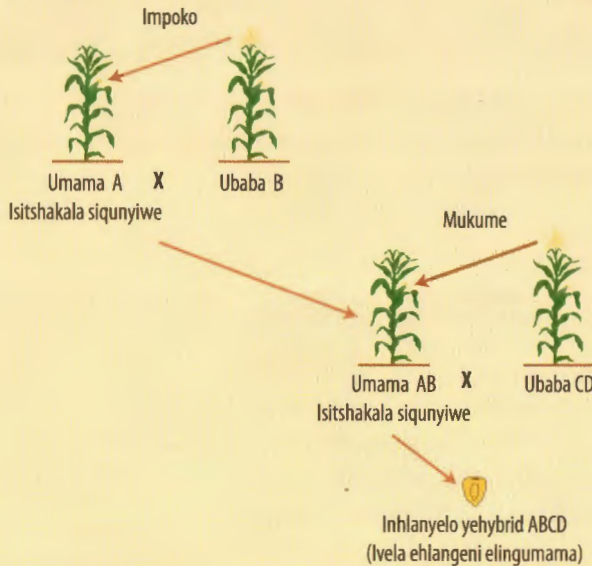
Izitshakala zonke zamahlanga angomama kumele zikhutshwe zingakaqalisi ukukhithiza impoko. Akumelanga kube lendima yomumbu eduzane engaphambanisa umhlobo lo wenhlanyelo. Lokhu kutsho ukuthi umlimi kumele ehlukalise amasimu akhe (*isolation distance*) ngamabanga angamakhulu amane (400m). Insimu yomumbu wenhlanyelo kumele



**Umfanekiso 1: Inhlanyelo yeSingle-cross hybrid itholakala ungahlanganisa umzali wesilisa lowesifazana. Umzali wesifazana kumele aqunywe isitshakala**



**Umfanekiso 2: Inhlanyelo yeThree-way cross hybrid itholakala ungahlanganisa umzali ongumama wesingle-cross hybrid (equnywe isitshakala) lomunye umzala (Inbred-line)**



**Umfanekiso 3. Ukulinywa kwenhlanyelo yedouble-cross hybrid kusetshenziswa amaSingle-cross hybrid amabili**

ihlolwe sikhathisonke ukwenzela ukuthi izitshakala eziphumayo emahlangeni angomama zikhutshwe lokukhangela ukuthi akulampoko ezingaphambanisa umhlobo ezivela ezitshakaleni zabomama kumbe kwamanye amasimu. Amahlanga angobaba kumele agecwe angavele aqede ukukhithiza impoko. Lokhu kwenzelwa ukuthi iziqu zabobaba zingaze zahlangana lezabomama (ezizakuba yinhlanyelo) ekuvuneni.

Inhlanyelo enhle itholakala nxa omama labobaba beveze ulevu lempoko ngasikhathi sinye okuzakwenza ukuthi ulevu lukhithikelwe zimpoko ezinengi (*nicking*). Ukuvela kolevu kungayekela ukuqondana lokukhithika kwempoko kwenza ukuthi isivuno sehle kumbe omama bacine besamukela impoko zomunye umhlobo ongafunekiyo.

Abazali (*inbred lines*) benhlanyelo ye*single-cross hybrid* bakhula kancane kancane. Abalimi kumele babone



**Umfanekiso 4. Indima yenhlanyelo ye*hybrid* itshengisa imizila emibili yamahlanga angobaba (ilezitshakala), igabaniswe lemezila eyisithupha yamahlanga angomama (iqunywe izitshakala)**

ukuthi amasimu abo alomvundiso lobumanzi obeneleyo njalo lokuthi akulakhula, imikhuhlane lobudli sikhathisonke. Umhlobo wenhlanyelo ye*three-way ledouble-cross hybrid* ulomzali oyedwa oyisingle-cross hybrid. Umzali lo

ukhula kuhle njalo unika isivuno esikhulu. Kodwa loba kunjalo umlimi kufanele abone ukuthi inhlanyelo ye*three-way ledouble-cross hybrid* iyakuthola konke okudingakalayo ukuze ikhule kuhle.

## Izitshengiselo zomumbu *weHybrid*

Umumbu *wehybrid*

- olombala munye insimu yonke;
- uvuthwa sikhathisinye;
- wonke mude okulinganayo; (Umfanekiso 5)
- wandise ukupha isivuno esikhulu kulamaOPVs ikakhulu nxa uthole konke okudingakalayo ukuthi ukhule kuhle.

Ukuvuthwa sikhathisinye lokulingana komumbu *wehybrid* kwenza imisebenzi efana lokuvuna ngemitshina ibelula njalo yenziwe ngasikhathi sinye umlimi angazalahlekelwa yisivuno.

Umlimi angathatha inhlanyelo yama*hybrid* esivunweni sakhe sanyakenye ayihlanyele, umumbu wakhona kawukhuli ulingana njalo isivuno sangakhona siyehla. Ukugcina inhlanyelo esivunweni sama*hybrid* igcinelwa umnyaka olandelayo kakukhuthazwa ngoba isivuno

siyehla kakhulu. Sehla ngesilinganiso esingamatshumi amathathu kusiya ematshumini amahlanu ekhulwini (30-50%).

## Okuhle nge*Hybrid*

Inhlanyelo *yehybrid* ilesivuno esiphezulu kulamaOPVs. Abaqeqetshi kwezokulima bathi *ihybrid* ipha isivuno esedlula esamaOPVs ngesilinganiso esilitshumi lanhlanu ekhulwini (15%) (Umfanekiso 6). Kodwa eminye imihlobo yamaOPVs acubunguliweyo iyenelisa ukupha isivuno esilingana lamahybrid angahambelani lomango wonalowo kusiya ngendawo lomumo womkhathi.

## Umumbu wamaOpen-pollinated varieties (OPVs)

AmaOPVs yinhlanyelo etholakala ngemva kokuhlanganisa abazali (*inbred lines*) abedlula itshumi. Amanye amaOPVs asacutshungulwa ngabaqeqetshi bezokulima



**Umfanekiso 5. Umumbu *wehybrid*. Amahlanga ayalingana njalo alombala ofananayo**

okweminyaka ethile aselamabizo awethiwayo. Isivuno samaOPVs singagcinelwa inhlanyelo nxa kuyikuthi insimu yamaOPVs ikhatshana lamanye amasimu omumbu kumbe nxa inhlanyelo ithethwe emahlangeni aphakathi

**kwensimu.** Inhlanyelo le iyenelisa ukupha isivuno esilingana lesabazali. Inhlanyelo yamaOPVs ayilingani ensimini njengeyehybrid (Umfanekiso 7) njalo ipha isivuno esiphansi loba ingaze ithole ukudla okweneleyo. AmaOPVs alesivuno esingcono kulehybrid endaweni ezilomhlabathi ongelakudla lanxa izulu lingananga kuhle.

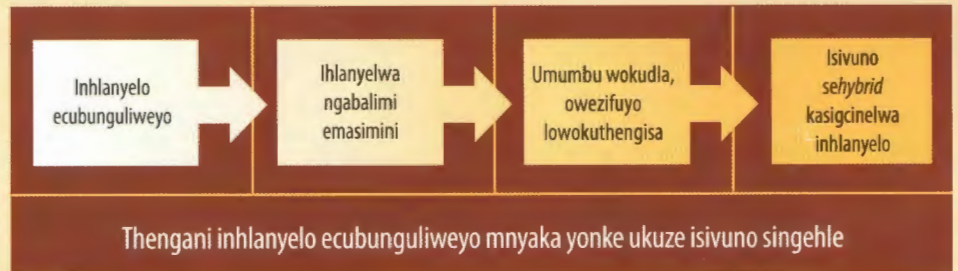
### Amanyathelo okulinywa kwenhlanyelo

Nxa umlimi elima inhlanyelo yehybrid kumbe eyamaOPVs ukhuthazwa ukuthi alandele amanyathelo amathathu alandelayo (Umfanekiso 8).

Inyathelo lokuqala ngelokuhlanyelwa kwenhlanyelo yosendo (*breeder's seed*). Le ihlanyelwa ngabaqeqetshi kwezokulima inhlanyelo (abacubunguli). Inhlanyelo ephuma lapha inlutshwana kodwa ilohlonzi. Inhlanyelo le ilinywa endimeni

**Table 1.1: Umlimi anganquma njani ukuthi alime inhlanyelo yehybrid kumbe eyamaOPVs**

Umlimi angalima inhlanyelo yehybrid nxa	Umlimi angalima inhlanyelo yamaOPVs nxa
<ul style="list-style-type: none"> <li>• ekhangelele ukuthola isivuno esingaphezu kwamathani amabili kuhakela (2t/ha) kumbe sithi amasaka alitshumi lanhlanu ku ekha eyodwa (15bags/acre)</li> <li>• imali enengi athenge ngayo inhlanyelo izaphenduka ekuthengiseni isivuno esiphezulu sehybrid</li> <li>• elima esigabeni esilezulu elinengi; insimu yakhe ivundile njalo esenelisa ukuthenga imivundiso (fertilizer) lemithi yokubulala ubudli</li> <li>• esenelisa ukuthola inhlanyelo yehybrid ehambelana lesigaba sakhe</li> <li>• ethola inhlanyelo ngesikhathi</li> </ul>	<ul style="list-style-type: none"> <li>• engakhangelelanga ukuthola isivuno esingaphezu kwamathani amabili kuhakela (2t/ha)</li> <li>• imali enengi athenge ngayo inhlanyelo yehybrid ingasoze iphenduke ekuthengiseni isivuno somumbu</li> <li>• elima esigabeni esilezulu elilutshwana njalo engenelisi ukuthenga imivundiso lemithi yokubulala ubudli</li> <li>• engenelisi ukuthola inhlanyelo yehybrid ehambelana lesigaba sakhe</li> <li>• engatholi inhlanyelo ngesikhathi</li> </ul>



**Umfanekiso 6. Ukulinywa kwehybrid**

encinyane ukwenzela ukuthi abacubunguli benelise ukuyinanza bekhangela ukuthi akulampoko ezivela ngaphandle ezingona umhlobo lokuthi amahlanga wonke afanana xathu. Ngumlandu kamacubungula ukulondoloza umhlobo wenhlanyelo yakhe.

Inyathelo lesibili ngelenhlanyelo yokusungula (*ifoundation seed*). *Ifoundation seed* ivunwa kungalinywa inhlanyelo yosendo. Inhlanyelo yosendo ilinywa khatshana lezinye indima zomumbu. Ilinywa ngonanzelelo ukwenzela ukuthi umhlobo ungaphambaniseki. *Ifoundation seed* ilinywa ngabacubunguli kumbe abamakampani enhlanyelo. Abamakampani enhlanyelo banika abalimi abakhethiweyo *ifoundation seed* ukuthi babalimele inhlanyelo ezathengiselwa abalimi, *icertified seed*.

Inyathelo lesithathu njalo kuyilo elokucina ekulimeni inhlanyelo nge*certified seed*. Amakampani



### Umfanekiso 7. Umumbu wamaOPVs kawulingani

enhlanyelo enza isivumelwano labalimi abakhethiweyo ukuthi babalimele *icertified seed*. *Icertified seed* itholakala kungahlanyelwa *ifoundation seed*. *Ifoundation seed* kumele ilinywe ngonanzelelo emasimini ehlukaniswe okusemthethweni ukuze umhlobo wenhlanyelo ungaze waphambaniseka. *Icertified seed* evunwa lapha yiyo

eyeliwayo ifakwe emasakeni ithengiselwe abalimi ukuthi balime umumbu wokudla lokuthengisa.

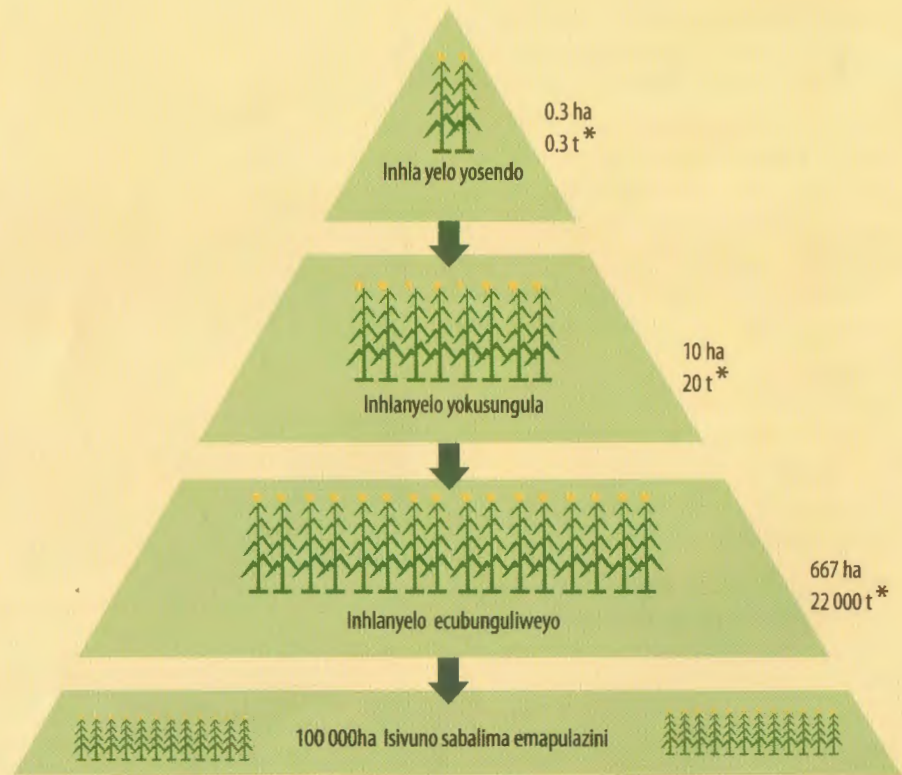
Inani lenhlanyelo elitholakalayo liyanda nxa usuka kunyathelo lokuqala usiya kwelesibili lelesithathu. Inyathelo lokuqala linika inhlanyelo yosendo enlutshwana. Inyathelo lesithathu



kumele linike inhlanyelo enengi ukuze abalimi benelise ukulima umumbu wokudla lokuthengisa (Umfanekiso 8).

### **Okukhangelelweyo ekulinyweni kwenhlanyelo yeCertified seed**

Kulemithetho ebekwe nguhulumende eqondane lokulinywa kanye lokuthengiswa kwenhlanyelo. Le imithetho yiyo esetshenziswa ukuhlola inhlanyelo yomumbu ingakathengiswa. Isetshenziswa lugatsha lukahulumende olubona ngenhlanyelo. Ekuhlolisiseni inhlanyelo ugatsha lwenhlanyelo lukhangela okunengi okugoqela ukoma, ukuhlanzeka, ukwenelisa ukumila, ukukhula, imikhuhlane lobudli enhlanyelweni. Emazweni amanengi inhlanyelo yomumbu kumele ihlolwe itholakale ilungile ingakathengiswa. Ukuhlolwa kwenhlanyelo kwenza ukuthi kuthengiswe inhlanyelo elohlonzi njalo engelamkhuhlane. Amanye amazwe ayavumela inhlanyelo yamaOPVs ukuthi ithengiswe ingahlolwanga. Kodwa kuyabe kumele ilotshwe esakeni layo ukuthi ikhethiwe njalo izamila.



\*Ingxenywe ephakathi laphakathi yenhlanyelo le iyalondolozwa igcinelwe ukulima inhlanyelo yeminyaka ezayo

**Umfanekiso 8. Amanyathelo alandelwayo ekulimeni inhlanyelo**

Ukwenqabela ukuthi abalimi bathenge inhlangane engalunganga, ugatsha lwenhlangane luhlola inhlangane ikhula emasimini langemva kokuvunwa. Abahlola amasimu bakhangele ukuthi abalimi bahlanyele belandela imithetho ebekiweyo; indima yenhlangane ikhatshana lamanye amasimu omumbu lokuthi umumbu ozimilela wodwa ensimini usutshuniwe. Nxa abahlola amasimu bengasuthisekanga ngesimo sensimu yenhlangane bangaquma ukuthi isilimo sitshiswe, kumbe banqume ukuthi sivunwe sibe ngumumbu wokudla oya esipheleni, kumbe njalo bathi imisebenzi ethize kayenziwe khonokho masinyane (amazwe alemithetho etshiyeneyo).

### **Ukulinywa kwenhlangane yomumbu yamaOPVs**

Abalimi abahlala khatshana lezitolo ezithengisa inhlangane bangasizakala ngokulima inhlangane yamaOPVs ngoba isivuno sakhona singasetshenziswa njengenhlangane umlimi angazalahlekelwa

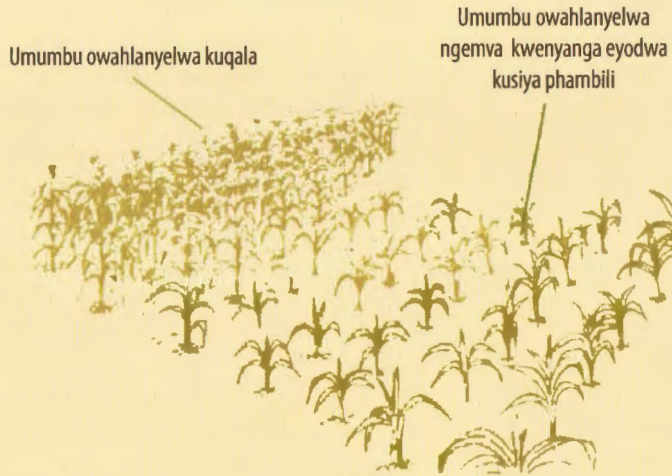
yisivuno kangako. **Umumbu wamaOPVs ungalinywa, uvunwe ubuye usetshenziswe njengenhlangane kuze kube yiminyaka emithathu elandelayo umlimi engalahlekelwanga yisivuno okuyangaphi.** Abalimi abakhuthazwa ukuphindaphinda inhlangane yamaOPVs okweminyaka eminengi ngoba inhlangane le iyabe isiphanjaniwe zimpoko ezivela kweminye imihlobo yomumbu okwenza ukuthi ingasaphi isivuno kangako.

Ukulima inhlangane yamaOPVs kulula nxa siqathanisa lokulinywa kwehybrid ngoba kuhlanyelwa umhlobo owodwa kuphela womumbu njalo akula kukhutshwa kwezitshakala. Loba kunjalo, ukusungulwa kwenhlangane yamaOPVs lokulondolozwa komhlobo kufuna unanzelelo olunjengolokulima inhlangane yehybrid.

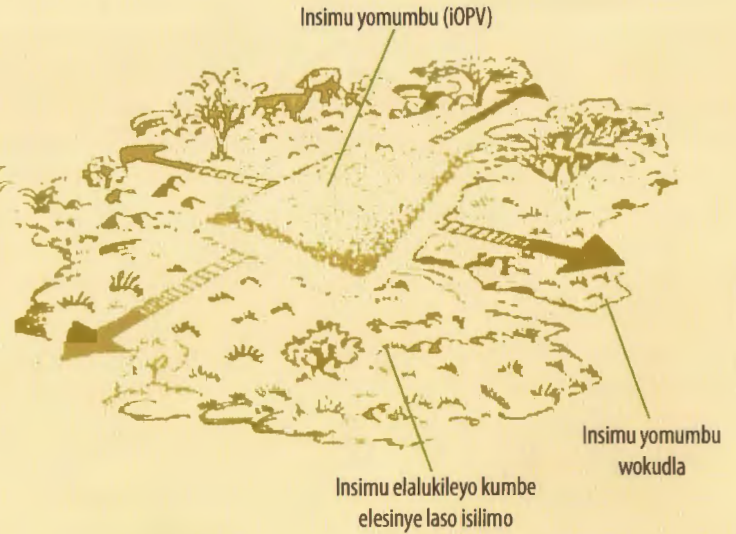
Indima yenhlangane yamaOPVs kumele ingaze yakhithikelwa zimpoko ezivela kwamanye amasimu omumbu. Lokhu kungenziwa ngendlela

ezimbili –ukwehlukana amasimu kumbe ukutshyanisa isikhathi sokuhlanyela. Indima yenhlangane yamaOPVs imele ibekhatshana lamanye amasimu omumbu okwezibanga ezingamakhulu amabili lamatshumi amahlanu kusiya kuzibanga ezingamakhulu amathathu lamatshumi amahlanu (250-350m) kugombolozela insimu yonke. Ekutshyaniseni isikhathi sokuhlanyela umlimi uhlanyela indima zakhe zomumbu zitshiyane ngamaviki amane kusiya kwayisithupha (4-6 weeks) ukwenzela ukuthi umumbu wakhe utshakaze ngesikhathi esitshiyeneyo. Lokhu kwenzelwa ukuthi umumbu ungathathelani impoko. Umfanekiso 9 uchasisa ukuthi umlimi kufanele ahlanyele njani ukuze indima yenhlangane ingoniwa zimpoko ezivela kwamanye amasimu omumbu.

Nxa umlimi engenelisi ukwehlukana indima zomumbu esebenzisa indlela ezimbili eziqanjweyo angagcina inhlangane emunjini ovunwe phakathi



a) Ukutshiyanisa isikhathi sokuhlanyela



b) Ukwehlukanisa amasimu

**Umfanekiso 9. Ukutshiyanisa isikhathi sokuhlanyela lokwehlukanisa amasimu**

kwensimu. Umumbu ophakathi kwensimu yiwo ongafinyelelwanga zimpoko zomumbu ezivela kwamanye amasimu. Insimu le kumele ibe ngaphezu kwehakela (1ha) ubukhulu.

### **Ukuvuna, ukomisa, ukuhulula lokulondoloza inhlanyelo**

Ukuze alondoloze umhlobo wenhlanyelo, umlimi kufanele avune iziqu ezedlula amakhulu amahlanu (500) zenhlanyelo yamaOPVs. Abalimi bakhuthazwa ukuthi bavune umumbu wabo amakhasi angavele ome. Ngalesisikhathi inhlamvu zomumbu ziyabe zilobumanzi obuyisilinganiso esilitshumi lesithupha kusiya ematshumini amabili ekhulwini (16-20%). Umumbu kumele uhlutshwe amakhasi, ukhethwe kusale iziqu ezilinganayo, kukhutshwe obolileyo, ongavuthwanga lolomkhuhlane. Iziqu ezikhethelwe inhlanyelo kumele zichaywe elangeni zonyiswe, ziphenduphendulwa njalonje inhlamvu

zomumbu zize zibe lobumanzi obuyisilinganiso esilitshumi lane ekhulwini (14%). Abalimi abanengi bande ukuchaya umumbu esizeni esiyisigcayo esisindwe ngesamende. Nxa indawo enjalo ingekho abalimi bangasebenzisa iphepha elikhulu *leplastic* emnyama.

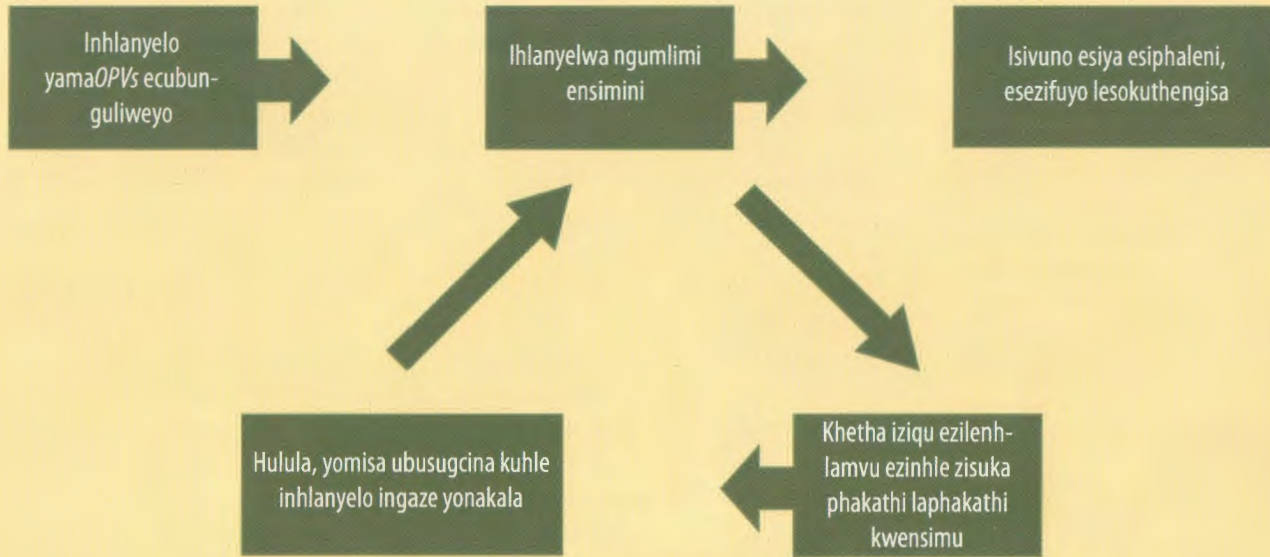
Umumbu ungoma ufike ebumanzini obuyisilinganiso esilitshumi lane ekhulwini (14%) usungahululwa. Ukuze umlimi azi ukuthi umumbu wakhe usuwomile lokuthi usungahululwa angahlola ngalindlela: hulula isiqu somumbu; hlanganisa inhlamvu ezilikhulu lesawudo igram eyodwa; ngemva kwemizuzu emihlanu, isawudo nxa lizwakala lilunama, umumbu kawukomisisi kumele ubuyeke uyechaywa; isawudo lingasala lilokhe lizomele, umumbu usungahululwa.

Ukuhulula umumbu ngezandla kulungele ukuthi inhlamvu azicezuki kakhulu, kodwa indlela le iyaphuza.

Nxa umlimi esebenzisa umtshina wokuhulula akufanelanga ukuthi awugijimise ngamandla. Inhlamvu zingacezuka. Umumbu ohululiweyo kumele weliwe, kukhethwe ocezukileyo lobolileyo ulahlwe.

Inhlanyelo kumele ivuvuzelwe imithi evikela imbovane lemikhuhlane. Abalimi bengakavuvuzeli imithi le kumele babale lokulandela okulotshwe emagabheni emithi abayabe beyisebenzisa ngoba imithi le iyingozi, ingabalimaza. Inhlanyelo yonke kumele ifakwe umuthi ngesilinganiso esiqondileyo njalo akumelanga ukuthi idliwe ngabantu kumbe izifuyo umuthi uze uphele amandla. Inhlanyelo ingagcinwa emasakeni kumbe iyinqumbi endaweni epholileyo, engelabumanzi njalo engahlatshwa lilanga. Inhlanyelo kufanele igcinwe isiyome yafika kusilinganiso esilitshumi lambili ekhulwini (12%) ukuze ihlale ingonakalanga okwesikhathi eside lokuthi imile kuhle nxa isihlanyelwa.

### Ukuzilimela inhlanyelo yamaOPVs



Inhlanyelo yamaOPV ungayiphinda okweminyaka emithathu ubusuqalisa kutsha futhi ngecubunguliweyo

Umfanekiso 10. Ukulinywa kwamaOPVs lokulondoloza inhlanyelo

