

AGRONOMY

BEKANG CHIN LEH ENKAWL DAN:

Sik leh sa mamawh zawng: Bekang hian a chi tiah atanga, a seng hun thleng in boruak 15°C atanga 32°C thleng a mamawh a. Boruak hi 10°C aia hniam emaw 40°C aia a san chuan a chi tiah ate, a thanna atan te, a par leh chi insiam ah te, a chi quality te nasa takin a nghawng thei ani. Mizoram boruak hi lum lutuk lo vawt lutuk lo a nih avangin bekang chinna atan a tha tawh ani.

Ruahtui a mamawh zat chu kum khatah 60-65cm a ni a. Hemi aia ruahtui a tlak tlem chuan tuipek(irrigation) angai ang. Ruahtui tam lutuk hi ruah sur tlem ai in a pawl zawk. A chhan chu lei hnawng lutuk hian a chi leh a tiak a tilawng thin a, a hnu leh zelah pawh a zung a bawh(root nodule), a chaw siam tu ber, a awm tha thei lova, thlai a than theih loh bakah a rah pawhin a chhiat phah thin ani. A par lai emaw a par hma deuh va khua a khi chuan a par leh a rah no a tla thin. A rah puitling tawh pawh ruah in a nan huh chuan a fang quality in a chhiat phah bawh thin.

Hlo Thlawh__(Critical period of crop-weed competition)-Tum hnih kuta thlawh a tawh viau va, chu chu chin atanga ni 15 na leh ni 45 na velah ni thei sela, emaw a tiah atanga kar 5 na ah.

Leilung mamawh zawng: Leitha, hnah tawih tamna lei dur tha, sawntlung leime deuh lam, leithawl deuh hlek, sakhat tul lo leh boruak pawh a

luh theih nate an ngeih ber. Lei a tui hawk tling an ngheih loh avangin tui luang ral zung zung thei tur zawnga ruahmana siam a tha. Bekang hian lei thur an ngeih lova, lei thur zawng tehna a neutral, ph 6.5-7.5 inkar a ngeih ber a, a chin na tur lei thur zawng hi ph 6.0 aia a hniam chuan chinai thi thlai chin hma ni 7 velah lo theh lawk tur ani.

Leitha pek: Bekang hi engang leiah pawh a chin mai theih zel a, amaerawh chu a thar hlawk theihna tur chuan leitha chawm a ngai. Fertilizer te chu lei hrutkhwar ah thlai chi aia thuk ,inch 2-3 vela thukah phul tur ani. Leitha pek tur zawng zawng hi thlai chi thlak ruala leia leh pawlh vek emaw, lei hrut khwar ah a hmma sawi tak ang khan pek tur ani. 20:80:40(NPK) leh 40kg S, 25kg ZnSo₄ hectare 1 hmun atan pek a tawh.

Bekang chi hi *Rhizobium* culture a bual hmasak a tha bawh. Thlai chi kg 1 ah 15g vel a tawh. Tui tlem te leh *rhizobium* hi pawlh a thlai chi nuaisa hi daihlim ah dah in, pho hil phawta chin tur ani. Nisa a pho hauh loh tur ani.

Thlai chin dan- A tlar a chin anih chuan tlar leh tlar hi feet 1 a tawh a, bi leh bi inkar hi 2-4inch a tawh bawh ani. A bi thuk zawng hi 2 inch pel lo bawh sela. Thlai chin na lei hi buhpawl in emaw khuh ila a tiak tha duh deuh.

Thlai chi dah that- Thlai chi te chu pho ro that tur ani a. A chi tur atan chuan a hnawng pai zat hi za ah 10% bakin a sang tur ani lo. Dahthat dawn hian

Thiram(fungicide) a sawisak phawt tur ani a, Thiram 3g leh thlai chi 1kg pawlh tur ani.

Tel Antam Chin leh Enkawl Dan.

Tel antam hi thlasik laia chin chi(rabi crops) ani a, leilet ah emaw phaizawlah an ching deuh ber thin ani. Mizoram ah pawh hian kan ching ve thin bawk a, amah erawh chu phairam hmundang te ang chuan kan la chin uar ve lo hle ani. Tel antam hi Rape and mustard kan ti ber a, heng ah pawh hian chi hrang hrang ala awm ani.

Sik leh Sa: India ramah hian tel antam hi thlasik laiin an ching ber a, khawvawt deuh 18⁰C-25⁰C hnawng vak lo, a par lai phei chuan ruah tla hauh lo se duhthusam ani. Ruahsur, khawhnaung leh chum zing/khawdur vangin aphids a tama, thlaiin a chhiat phah vek thei. Ruah vantla ringa china hmunah a par hmaa tumhni vel ruahsur vangin a thar hlawk phah thei hle. Khawvat lutuk leh vurtla erawh a hlauawm.

Leilung: Leithawl(light soil) kan tih tiauvut emaw lei bek/nghetlo lam chi ho ah hian a tha duh a. Tuitling emaw tui chim te hi a ngeih lo hle. Tel antam chinna tur chu uluk taka buatsaih a ngai a, vawi 3-4 vel leh nawm a, hrut dip leh tih rual that a ngai a. A theih hram chuan Kharif thlai seng zawh velah september-october thla velah thuk taka hruta lei leh phawt a tha ani. Thlai chi tuia chiah hmasaka chin hi a tiah that phah thin.

Thlai Chi mamawh zat: Hectare khat hmun atan kg 10 vel a tawk. Thlai dang nena chin kar thlak tur anih chuan kg 5-6 vel a a tawk ani.

Thlai chin dan: Tel antam chi hi theh(broadcast) emaw lei lehna a hrut khwar(furrow) ah a tlara chin hi tihdan ani a. Furrow hi thuk lo te a siam tur ani. A chi thlak zawhah nasa vak lova a lei hi hrut rual tur a ni. A tlara chin dawn chuan a tlar inkar hi 1-1.5ft nise , a bi inkar hi inch4-6 vel nise a tha. Tel atam hi thlasik thlai dang te nen pawh a chin theih(intercropping).

Thlai chi Damdawia Bual:

Kan thlai chi neihte chu damdawia bualsa a nih loh chuan Apron 35WS (Metalaxyl) hmanga bual tur ani a, a chi kg 1 atan 6 gm a tawk. Hei hi Downey mildew leh White rust natna veng tura hman ani.

Hlo Thlawh:

A tlangpui thuin hlo an thlo meuh lova, a tul chuan tumkhat thlai chin atnga ni 20 velah hlo thlawh tur ani. Lo hnim dan a zir in ani.

Leitha Pek: Tel antam pawh hi thlai dang ang thovin leitha kan pe meuh awm love. Leitha chawm chuan a tharin a hlawk phah hle ani. Ran zun-ek leitha leh hnimhnah tawih leitha hectare khat a zauvah qtls 20-30 emaw theih ang tawk a tam pe thin ila a tha. Fertilizer ah chuan a hnuaia tarlan ang hi pe ila, thlai thar a lo hlawk zawk em em ang.

Nutrients	Pek ngai zat (kg /ha)	Fertilize r pek tur	Fertilize r pek tur Zat(kg/h a)	Remar ks
Phaizawl ruah vantla rinna ah				
N	40	Urea	87	SSP aia DAP kan hman chuan kg 76 a tawk a, Urea kg 57 pek tel a ngai thung.
P ₂ O ₅	35	SSP	220	
K ₂ O	15	MOP	25	
Phaizawl tuilak a chawmna ah				
N	60	Urea	130	SSP aia DAP kan hman chuan kg 87 a tawk a, Urea kg 96 pek tel a ngai thung
P ₂ O ₅	40	SSP	250	
K ₂ O	40	MOP	66	

Tlangram ruah vantla rinna ah				
N	60	Urea	130	SSP aia DAP kan hman chuan kg 65 a tawk a, Urea kg 104 pek tel a ngai thung
P ₂ O ₅	30	SSP	190	
K ₂ O	30	MOP	50	

Urea, SSP leh MOP te hi leileh zawh dawn lamah leia leh pawlh vek tur a ni. SSP aia DAP kan hman pawhin a pek dan a dang chuang lo. Chutiang a nih loh pawhin SSP leh MOP(P&K) zawng zawng leh Urea zatve lei leh zawh rualin leia leh pawlh nise, Urea(N) zatve dang chu thlai chi thlak hnu ni 30-40 ah pek leh tur.

Chinai Thi Pek:

Chinai thi(calcium carbonate) qtls 5 antam hmun hectare khata zauvah thlai chin hma ni 15 vela lo pek lawk nise, leiah leh pawlh vek bawk tur a ni.

Tui Pek:

Lei hnawm leh hnawm loh a zirin tui pek tur ani a. Khua a rova, tui pek ngaia kan hriat chuan a par lai emaw kawm a insiam tan laiin tui vawikhat pek tur.

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CHINAI THI (SLAKED LIME)

- 1) Lei thur leh thur loh kan hriat dan ber chu a pH kan endik atangin a ni a, pH level hi 1-14 thlengin a awm a, pH 7 hnuai lam zawng hi a thur(acidic) ani a, pH 7 chunglam zawng hi a al(alkaline) kan ti thung a ni.
- 2)Leithur(acidic soil) tih zia awm nan chinai thi hman zat tur chu a pH level a zirin a danglam thei a, a tlangpui in 1-2ton/hectare hi hmang ila a tawk viau, hemi hian lei pH level tehna unit 1 in a ti sang thei a ni.
- 3)Chinai thi hman hian lei a ti thur lova, pH level ati sang in leithur tawh ati al leh thei zawk a ni.
- 4)Kan leilung, pH level leh kan thlai chin a zirin kum khat ah vawikhat emaw kum 2-3 danah vawi khat hman a tawk viau a ni.
- 5) Chinai thi hi thlai chinna tura lei kan sawngbawl lai hian pek a fuh ber a ni.
- 6)Chinai thi te hi an zawp ral ve mai mai lova, chuvangin lei chunglang atanga 6-8inch vela thukah tal pek thin tur a ni.
- 7)Chinai thi te hi an thawk muang in, thlai chin hma ni 30 vel tala hma in lo pek lawk tur ani a. Chumi hnu ah thlai chi thlak te, leitha te pek chauh tur a ni.

8)Lei tih that nan chinai thi hman zat tur chu 500kg/hectare a tawk viau a. Hei hian leithur a ti reh zo loa, amaherawh chu thlai te tan chaw tha calcium(Ca) leh magnesium(Mg) a pe thung a ni.

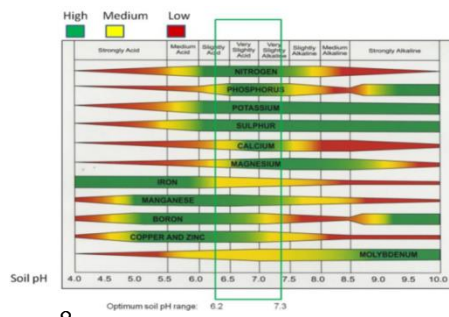
9)Tin(acre) 2.5 hmun ah Chinai thi bag 10 emaw tin(acre) 1 hmun chinai thi bag 4 kan hman hian lei thur a tih reh lova, thlai tanna chawtha a pe pha chauh a ni.

10)Chinai dip tha tak hi a thawk rang a mahse a daih reilo a, chinai hraw deuh hi a thawk muang a, a daih rei thung ani. Chuvangin chinai dip tha tak kan hman chuan pawlh zin deuh a, a hraw deuh kan hman chuan pawlh khat deuh mai tur a ni.

11) Chinai thi te pawh hi insecticide angina a hman theih ve tho a. Rannung thatna chu ani lova, rannung vennis hman chi zawk a ni.

13) Lei neutral ah emaw lei al ah chuan chinai thi pek hian awmzia anei tam vak lova, chuvangin soil testing tih a, kan lei pH level hriat hmasak hi a fin thlak ber a ni.

pH level in leia thlai chawtha (nuitrients) awm a nghawng theih dan



Thlai te hi tha taka thang liana rah chhuah tur chuan chawtha(nutrients) chi 16 lai an mamawh a chungte chu:

Carbon(C), Hydrogen (H), Oxygen(O)- Boruak, tui leh lei atangin thlai ten an la thei.

Nitrogen(N), Phosphorous(P), Potassium(K)- Thlai chawtha pawimawh ber te, primary nutrients an ni a, thlai ten an mawmawh tam/zual bik te an ni.

Calcium(Ca), Magnesium(Mg), Sulphur(S)-Thlai chawtha pawihmawh tak, Secondary nutrients ho te an ni. Primary nutrients ang em em chuan an mamawh na a sang velo thung a ni.

Boron(B), Copper(Cu), Zinc(Zn), Iron(Fe), Maganese(Mn),Molybdenum(Mo), Chloride(Cl)- Heng te hi micro-nutrients ho an ni a, thlai te tan chaw pawimawh nimah se, an mamawh tam lo hle a. Amaherawh chu , heng micro nutrients tel lo leh pakhat pawh hi a thlai in a tlakchham chuan nghawng thui tak a nei thei si a ni.

DAL CHIN LEH ENKAWL DAN

Mizo –Dailuah

English-Lentil

Hindi-Masoor Dal

Botanical Name-*Lens culinaris*

Family-Fabaceae

Dailuah/Dal hi Asia khawmualpui a cheng mihring te tan chuan chawhmeh kan ei nasat ber te zing ani a. Mizo te pawh hian kan ngaina in kan ei nasa em em a, a hrisel mai piahlahmah taksa tana chaw tha a pai tam em em bawk a. India ram hi khawvela dal tharchhah kawngah pahnhihna a hauh mek ani. Mizoram ah chuan tih tham in kan la ching meuh awm love. Heti khawpa chawhmeh pawimawh leh kan ei nasat nisi hi kanla tharchhuak ve thei lo a, kan ei zawng zawng hi state pawn atanga chawh luh vek a ni a. Ei leh bara intodelh tur chuan hemi kawngah hian kan harhchhuah a pawimawh tawh takzet a ni. Agriculture Department te, KVK te, ATMA ten Mizoram hmun hrang hrang ah anlo chin tir chhin tawh a, India ram state dang te ang bawh in tha takin Mizoram ah ngei kan thar ve thei tih an finfiah tawh bawh a ni. Chuvangin, dal hi a pawimawhna te hrethar lehin uar leh zuala kan chin a hun tawh hle ani.

Dal chin leh enkawl dan tlangpui-

Leilung duhzawng: Dal hi lei thur lam 5.5-6.5ph ah a tha duh ber a, Mizoram leilungah chuan kan ching thei vek tih na a ni. Tui tlin theihna ah a that theih loh avangin , tui inthlit fim zung zung theih naah chin a tha.

Sik leh sa: Dal hi thlasik thlai a ni a, September - October thla tir lam thleng hian an ching ber thin.

A chi ngai zat: Dal chi hi 30kg/hectare emaw 12kg/acre chin a tawk a ni.

A chi sawngbawl- A chi tuh hma in systemic fungicide-Bavistin in bual hmasak tur a ni a, dal chi 1kg zel ah fungicide 2gm a tawk. Hei hian a chi atanga natna awm thei lakah a venghim dawn a ni. Rhizobium emaw PSB packet 1 leh dal chi 10kg nen bual hmasak hian a thar a hlawk thin bawh hle a ni.

A chin dan- Tlar mumal taka siam tur a ni a, a tlar leh tlar hi feet 2 emaw tala inhlata siam nise tin, a bi leh bi hi 15cm a hlat ah a chi tuh tur a ni.

Leitha mamwh zat: Hectare 1 hmun ah bawngkek leitha 2-3 tonnes nen lei chu leh chhuah hmasak vek tur ani a. Hemi bak ah hian nitrogen 20kg, Phosphorous 40kg leh Sulphur 20kg hectare 1 hmun atan hman bawh tur a ni.

Chinai thi pek: Chinai thi(slaked lime) 5qtls/hectare emaw 2qtls/acre thlai tuh hma thla 1 vel la awm a pek tur a ni.

Tui pek: A chi tuh atanga ni 45 hnu ah tui pek tur ania, a dawt leh ah a par lai leh a rah insiam lain tui pek bawk tur a ni.

Hlo thlawh: Vawi hnih hlo thlawh tur ani a. Dal chi tuh a tiah atanga ni 25-30 hnuah vawikhat hlo fai taka thawlh tur ani a, a dawt leh chu ni 45-60 ah fai takin thlawh leh bawk tur a ni.

A seng hun: a variety a zirin tuh atanga ni 110-115 ah an seng tlangpui a, a rah kawm alo eng that tawh hnu ah seng mai tur a ni.

A seng dan: Dal chu a kung lei seh chinah tan chum a, fimkhur taka a rah til lo thei ang bera lak khawm tur a ni.

A thar zat- Variety chin a zirin thar theih zat hi a inang lo thei a, a tlangpuiin hectare 1 hmun ah 15-20 quintal a thar theih.

HMARCHA NATNA LEH EICHHETU ENKAWL DAN

Hmarcha hi enkawl uluk a ngai hle a. ruahtui tam kumte, dama chinte hian a rah a tawih duh hle. Chuvangin, kan thlai chi te hi damdawi bual sa anih loh chuan Agrosan, Thiram emaw Ceresan hmangin chin hmaa bual tur ani. Damdawi hi 2gm leh hmarcha chi kg 6 bual nan a tawk.

A kunga hmarcha rah tawih Fruit rot emaw Anthracnose natna kan hmuh chuan a venna leh tihdamna atan Bordeaux Mixture emaw Captan 2gm leh tui litre khat nen pawlhin kah tur.

Hmarcha hnah kir hi a tam duh hle, kan hmuh chuan paih nghal tur ani a, natna thehdarhtu rannung thah nan Rogor 30 EC 2ml emaw Imidacloprid emaw Thimethoxam + Cyantraniliprole emaw Diafenthiuron 2ml tui litre 1 nena pawlhin kap ila natna darh zel tur a veng thei ani.

Rannung thenkhat Chilli Thrips leh Aphids hi a hnawksak hle a, Malathion 3ml leh tui litre khat a pawlhin kah tur ni.

SAWHTHING NATNA LEH EICHHETU ENKAWL DAN.

Soft rot/Rhizome rot(tam/tawih)- He natna thlen tu chu fungus chi khat *Pythium aphanidermatum* ani a, sawhthing natna hlauhawm tak leh buaipui awm ber niin, lei atang leh a chi atanga natna inkawichhawn theih ani. He natna hi hmun hnawngah leh lumah a tam zual bik em em a ni. He natna lanchhuah dan hmasa ber chu a hnah upa lam hmawr chu lo eng dalin a hnah sirah chauh a eng thla phawt a, engmaw chen a hnah lai chu a la hring thin, ni reiloteah a hnah pumpui a lo eng chhuak vek thin. A hnah no zawkah a natna hi kai darhin a kung pum deuh thaw alo eng a, a thi ro mai thin. A kungah chuan lei seh chin velah tui deuh purin a val a, a val chu lo thang lianin a kung a ti tawihin a tinghet lo a, a tlusawp mai thin. Sawhthing takah a natna hi kai darh zelin, nem tui deuh purin a tawih chhe ta thin ani.

Bacterial wilt(vuai)- He natna hi fur lain a hluar a, a kung lo val kalhin a kung chung leh hnuai lamah a kai darh thin. A natna lan chhuah dan ber chu a hnah upa lam sir chu a lo eng kir deuh a, a hnah alo uaiin, a kung chunglam hnah noah a kai chho thin. A rei hnu ah chuan nasa takin a hnah a lo eng a, a vuai ta mai thin. A kung han phelin thil dum ri ruang angin a awm thlur sung thin. Vuai natna hi

tawih nem nena a danglamana ber chu, a kung emaw a sawhthing hi zawi te in hmet ila thil tuihnang var deuh a lo chhuak thin. A kung emaw sawhthing zai bun hi glass no a tui thianghlma chiah hian thil tui var alo chhuakin a pawlh nu nguai zel ani. A tawih rim pawh a chhe thei bik hle.

Shoot/rhizome borer(a ti ngettu)- He rannung hian July leh October thla inkarah a tichhe ber thin. A rannung puitling hi zana eng bawm chi phengphehle(moth) ani a, a thla hmawr tawna teh hian 15-20mm vela lian ani a. A thla hi serthlum rawng niin, a dumin mawi takin a in tial thliah a. A pangang(larva) in a kung hreuhin a eichhia a, chu chuan a kung ti eng in a ti vuai thin ani. A hreuhna kua atang hian thil nawi lo chhuak hmuh hian awlsam takin he rannung hi a awm tih a hriat theih ani.

Rhizome Fy(tho chi khat, ke sei tak nei)- He rannung hi khawlum leh hnawngah an awm duh hle a, a puitling thla hmawr tawna tehin 13-15mm vel leka lian ani. He tho hi sawngthing bul lang laiah te tui in, atui chu pangang ah lo chang in sawngthing chu an eichhia in an ti tawih ta thin ani. A kung lo vuaiin a thi mai thin.

A enkawl dan-

1)Chin/lin hma a tha, March-April thla chhung ah chuan chin hman hram tur. Lei thawl leh tui luan ral zung zung theih na chin a tha.

2)A chin hma ni 20-30 vel ah a chin na hmun tur leh phut vek tur ani.

3)Leitha NPK kan pe thei lo anih pawh in Bawngek leitha hectare khat ah 10tonnes pek tur ani. Neem cake pek tel pawh a tha.

4)A natna hi lei a awm chi a nih avangin , a tam tawh na hmun ah chuan chin loh a him ber. Vaimin leh buh nena chin karthlak(crop rotation) tur ani.

5)Sawhthing chi 30-50gm a rit, hrisel tha mit pakhat tal nei hman tur ani. A chi siam sa hi damdawi Mancozeb 3gm emaw Carbendazim 2gm emaw Ridomil 2gm leh tui litre 1 pawlh a minute 30 aia tlem lo chiah tur ani. Chiah zawhah thur chhuah a, daihlim ah chappharh a tih ro tur ani. Nisa pho loh tur. a ro velah phun theih nghal. A chi chiah hi a tam tur reilote ven na chi khat chauh ani tih hriat a tha.

6) A tam hi natna(*Pythium spp.* leh *Ralstonia solanacearum*) avangin a awm thei a, rannung (rhizome borer leh rhizome fly) vang te pawhin a awm thei bawk.

7) *Pythium* avanga awm anih chuan a tawih rim a awm lo a, *Ralstonia* vanga tam a nih erawh chuan rimchhe thei hle.

8) A rim awm lo anih chuan tui litre 1 ah 2-3gm Azoxystrobin emaw Metalaxyl + Mancozeb in ni 7 emaw 14 danah a natna tam dan a zirin vawithum thleng kah tur.

9) A rim awm chi a nih chuan tui litre 1 ah 3gm Copper oxychloride in ni 7 emaw 14 dan ah a natna tam dan a zirin vawithum thgleng kah tur.

10) A rim awm leh awm lo kah na hi damdawi dang daih a nih avangin a natna hriatchian a pawimawh hle ani.

11) Shoot borer (Sawhthing tingettu rannung) vanga tam a nih chuan tui litre 1 leh Cypermethrin emaw Chlorpyrifos 3ml pawlh a, ni 10 dan ah vawihnih kah tur.

12) Rhizome fly (Tho chikhat) vanga tam anih chuan tui litre 1 leh Dimethoate emaw, Chlorpyrifos emaw Quinalphos emaw Monocrotophos emaw Phasphamidon 2.5ml pawlh a, ni 7-14 danah vawihnih atanga vawithum kah tur.

VERMICOMPOSTING **(Vawk ek leh Ar ek hmanga changpat ek leitha siam).**

Vermicomposting hi Changpat hmanga thil tawih chi hrang hrang leitha a siam dan tihna a ni. Kan huan leh lo a hnawmhnawk paih mai tur atang khan Leitha awlsam takin kan siam thei a ni. Changpat te hian hnimhnah leh hnawmhnawkte eiin an paitawih hnuah an e chhuak leh a, he changpat ek hi leitha niin thlai than chaktir theihna a pai tel a ni. Tin, thilnung tereuh te te mit a hmuh tham loh lei-tithatu apai tel bawk a, thlai ti chhe thei tu rannung laka ven theihna a nei bawk ani. Chuvangin changpat ek hi *Rangkachhak Dum(Black Gold)* tia vuah a ni hial reng ani. Changpat hmanga leitha siam chhuah hi a sakhat in amur tha a, leithat na chi hrang hrang siam tha in a ti pung thei ani. Thlai kui tiah nan a tha bik in thlai kung chawm nan pawh a tha bik hle ani. Vermicompost hian hriat a hlawh chakin, tunlai organic farm siam tena an hman tam ber alo ni ta a ni.

Vermicomposting atana hmanraw tul te

Ran ek ah chuan bawng ek hi an hman tlanglawn leh uar ber ani a, amaherawh chu vawk ek leh Ar ek atang te pawh hian an siam ve bawk thin ani. Mi tam zawk hian anla hmelhriat loh avangin, kan in tihhmuh a ngai nasa leh zual bik hle ani. Vawk ek leh ar ek te hi bawng ek te ang in thil vang ani lo a, chhungkaw tin deuh thawin thingtlang lamah te chuan vawk leh ar kan vulh ani. Hemi anih vang

hian vawk ek leh ar ek hmuh a awlsam hman tangkai dan pawh nasa lehzual a kan in zirtir a ngai ta a ni. Vawk ek/Ar ek, thlaikung/hnim hnah sahsawm te leh changel te hi vermicompost siam nan chuan kan mamawh dawn ani. Thlai kawrnei chi leh kawrneilo chi kung seng zawh hnu a pawlh hian vermicompost thatna a tipung in a tichak bik ani.

Changpat hi chi hrang tam tak an awm a. Chungte chu *Eisenia foetida*(changpat sen), *Eudrilus eugeniae*(zana vakchhuak chi), *Perionyx excavatus* leh a dangte an ni. Heng zingah hian changpat sen chi hi an in thlahpung chak a, leitha an siam chak bik in an tha bik hle a. Tin, a chunglang a piang ei thin an nih avangin a chung atangin leitha siamin a hnuaiah an siam thla zel a, chuvang in changpat dang te ai in an tha bik bawh hle a ni.

A piangphung(*Eisenia foetida*)

- 1) A taksa sei zawng : 3-10cm
- 2) A taksa rihzawng: 0.4-0.6g
- 3) A puitlin hun chhung: Ni 50-55
- 4) A leitha siam theih zat : Changpat 1000nos. in thla 2 chhungin 2 qtls.
- 5) A tui tam dan: Ni 3 chhungin pakhat
- 6) A tui atanga a pian hun rei zawng : Ni 20-23

A sawngbawl dan:

A tlangpuiin Vermicompost hi chhuata chhunvum chi leh khur siama buatsaih a ni a. Chhuata chhunvuma vermicomposting siam hi chu lei chhuatah emaw cement chhuatah 6x2x2 ft a kan compost hman tur chu chap tur a ni a. Hei hi enkawl leh buatsaiha awlsam hle ani. Tin khur hmanga siam dawn chuan 5x5x3 ft cement concrete-a siam tur a ni. Khur hi compost hmanrua kan duh anga dah khat tur a ni. Khur hmanga siam hi leitha tam tham tak tak siam dawn chuan a tha zawk a ni.

Siam dawna thil tulte:

- 1) Kan siamna tur hmun chu hmun vawt, hnawng tha leh daihlim a ni tur a ni.
- 2) Hnimhnah ro/changel kan hman tur te chu uluk taka sahnawi tur a ni.
- 3) A hmasa berin Bawng ek/Vawng ek/Ar ek leh hnimhnah ro te chu 3:1 in chawhpawlh a, Ni 15-20 chhung dahtawih deuh hlekin tur a ni.
- 4) Hemi zawh hian bawng ek leh hnimhnah kan chawhpawlh a kha 6X2x2ft. a phah tur a ni.
- 5) Bawng ek leh hnimhnah ro kan hman turte chu Bawng ek hmun 10 a thena hmun 3 anga hman tur a ni.
- 6) Kan leitha siam tur hnimhnah leh bawng ek te chu leitha kan siam duh hnem dan a zirin kan mawmawh ang.

- 7) Kan leitha siam tur chapah khan bawng ek chap a, a chungberag changpat sen chi 1000 vel dah tur ani.
- 8) Changpat dah zawh velah hian tui leih tur ani.
- 9) Kan leitha siamna hmun chu a hnawn that reng theih nan nitin tui vawi khat tal pek tur a ni a. Polythene emaw buara in khuhphui tur ani.
- 10) Vermicompost chu a tlangpuiin ni 50-60 velah a hmantheih a ni.
- 11) Bawnggek tharlam chungah kan leitha thar chhuahte chu hrikfai hmain darkar 24 kan dah phawt tur ani a, hei hi leitha atanga changpat thliar hnan theihna tur ani.
- 12) Kan leitha thar chhuahte chu kan hmanrua hman hmun li a thena hmun thum a ni tlangpui a ni.

Vermicompost a lei thatna awm chi hrnag hrang te:

Changpat ek leithaah hian heng NPK kan tihte bakah hian thatna dang tam tak a awm ani. Thlaiin an ei mai theih chi a ni a, kan hman kum la la hian a thatna pai zawng zawngte chu thlai ei theih turin a chhuak vek thin.

- | | |
|-----------------|-------|
| 1) pH(A al dan) | 6.8-7 |
| 2) OC(%) | 11.88 |
| 3) OM(%) | 20.46 |

4) C/N	11.64
5) N(%)	1.5-2
6) P(%)	1.25
7) K(%)	1.05-1.2
8) Calcium(%)	1-2
9) Magnesium	0.7
Iron, Copper, Zinc etc	

Pek zat tur:

Vermicompost pek zat tur chu thlai tena an mawmawh danah a innghat a ni.

Thlai

Buh leh thlai

Theikung

Pots

A pek zat tur

5-6t/ha

3-5kg/plant

100-200g/pot

Vawk ek leh Ar ek hmanga siam dan

Bawng ek aia Vawk eke maw ar ek kan hman dawn chuan a hnuaia mi ang hian vawk ek leh are k sawngbawl hmasak tur a ni ang.

1)Vawk ek chu CaSO_4 4% in chiah hmasak phawt tur ani a, hei hian ran ek thur leh al dan a ti neutral dawn a ni.

2)Neutral pH ah hian changpat an awm thei a, thurlutuk leh al lutuk an awm theilo a ni.

3)Ni 5 chhung chiah hnuah, vermicompost siam dan pangaiin siam chhunzawm leh mai tur a ni.

4) CaS04 hi Calcium Sulphate ani a, 4 % calcium sulphate siam dawn chuan tui litre 1 zel ah 40gm CaS04 pawlh mai tur ani. Hemi 1 litre solution hian vawk ek/ar ek 5-10kg thleng ah hman tur ani.

5)Vawk ek ai ah ar ek kan hman dawn chuan CaS04 hi 8% a hman tur ani. A dang step chu a in ang vek a ni.

Sl.no	Manure	pH	N	P	K
1.	Bawng	6.9-7.1	0.6	0.4	0.5
2.	Vawk	9.66	0.8	0.7	0.5
3.	Ar	6.5-8	1.1	0.8	0.5

ANIMAL SCIENCE

AFRICAN SWINE FEVER (ASF)

ASF hi vawk natna inkaichhawn awl tak a pui atanga a note thleng pawh a kai theih a ni. Nat dan chi hrang hrang hmangin a bei a, a bik in khawsik sang emaw taksa atanga thisen chhuak hial te pawn a awmtir thin a ni. He natna avanga nunna chan theihna hi za ah za dawn anih avangin vawk vulhte te nunphung a tibuai in sum leh pai thlengin harsatna a siam a ni. Ornithodorus chhungkaw thlah zing a mi saphihrik chikhat hi he natna keng darh tu a ngaih a ni.

ASF natna thlentu

ASF natna thlentu hi DNA virus, Asfarviridae chhungkaw zinga mi a ni. A virus hi a darh chak ber te zinga mi a ni. Khawvel hmun hrang hrang ah a tai darh thei. Ornithodorus chhungkaw thlah zing a mi saphihrik chikhat hi he natna keng darh tu a ngaih a ni.

Engtia in thlahchhawn theih nge?

1. Vawk damlo
2. Vawk damlo chiu na hmanrua atangin
3. Sanghal hri vei
4. Kan farm chhung leh a vel

5. Chaw pek tura natna awm
6. Khawl vela natna lo awm
7. Kawr leh pheikhawka natna lo awm
8. Saphihrik atang te in

Natna hrik dam theih hun chhung

- ◆ 4 degree C ah kum 1 leh thla 2
- ◆ 37 degree C ah ni 11 atanga ni 12
- ◆ 56 degree C ah darkar 1
- ◆ -20 degree C ah kum 2
- ◆ -70 degree C ah kum engemaw zat.

Natna lanchhuah dan

Vawkin he natna hi a kai atanga ni 5-15 hnuah a natna a lang chhuak thin.

A rang ber chi: Khawsik sang (40.5-42° C), vunduk, thaw hah, luak, khawthalo emaw ek khal, no chhiat, hnar atangin phuan a chuak , an thokang thei lo thin. Ni 1-7 hnu ah an thi vek thin (100% mortality). A dam chhun te pawhin a natna an pai renga, an taksaah a lan chhuah hun a awm leh thin.

A muang deuh chi: Kar engemawzat an dam a, no chhiatnate a thlenthei a, Vawk 30-70% in an thihpui thung.

A benvawn natna: Natna lanchhuah dan a inang lo thei viau maia, rihna tlahniam thutn, khawsik, thawhah, ruh chaklo, khupruh vung, hmulphurh chhiate in an

awm thin. Thla tam tak hnuah a natna a langchhuak thin.



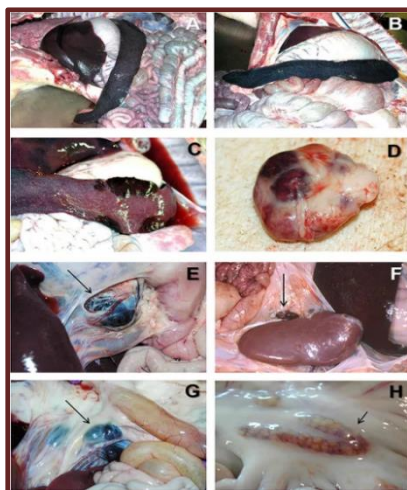
ASF vanga vawk thi tawh taksa landan

1. Beng, hmui, awm, dul leh kehmawrte hi a dukthluah thin.

2. An taksa chhungah tuitling hmuh tur a awm thin

3. Kawchhung hmun hran hranah thi chhuak a awm.

4. La (spleen) leh a thal a vungin a duk thin



Hrilenna hmuna hmalak dan tur

ASF lenna hmun hi Infected zone/area/premises a ni a, ASF hri a leng a ni tih finfiah anih hian a lenna hmun atanga km 1 (boruak a teh tur) bial hi infected zone ah puan a ni. Hemi hmunah hian a hnuaia tarlan ang hian hma lak tur a ni.

Infected Zone /Area

- (i) Hri lenna hmunah hian Vawk lakluh leh lakchhuah khap tlat a ni.
- (ii) Heng hmun atanga vawk ni 30 kal ta chhunga hralhchhuah an lo awm anih pawhin natna lo kai ru thei an nih avangin chhuichhuah vek tur a ni.
- (iii) A hrilenna hmun atang hian vawkchaw, damdawi leh vawkvulhna a tana hmanruate lakchhuah loh tur a ni.
- (iv) Vawk talh leh a sa zawrh khap tlat a ni.
- (v) Hrilenna hmuna lirthei lut leh chhuakte disinfectant hmanga tih thianghlim tur a ni.
- (vi) Hrilenna hmun hi mipui tlawhpawh phalloh tur a ni a, ke a kalpawhna pawh khar tur a ni.
- (vii) Choka/Restaurant ningnawi pek loh a him ber. Pe lo theilote chuan minute 20 tal chhumso tur.
- (viii) Vawksa them leh a silna tui etc. vawk pek loh tur.
- (ix) Vawk thi reng reng khamah leh kawr

ah te paih mai lovin khur thuk tak (6 ft)
ah chinai emaw, bleaching phul hnu ah
phum bo tur a ni. Gloves leh shoe cover
te pawh phumtel tur a ni.

(x) Vawk ruangphurhna lirthei hman ah
bawlhhlawh chhuaklo thei ang ber a
ruahman tur a ni. Lirthei hrang hrang
hmang lo in lirthei hman bik neih a tha
hle. Heng lirthei te pawh hi
tihthianghlim leh vek tur a ni.

xi) Vawk chaw pekna hmanrua, an mutna
an zun leh ek ah natna hrik hi a awm
theih avangin Disinfectant hmanga
tihthianghlim vek tur a ni.

xii) Hri vei dahna vawkin ruakte uluk taka
tihfai tur a ni. Tihfai dan hi kawng 2 a
kalpui tur a ni.

a) Preliminary cleaning & Disinfection:
Disinfectant in uluk takin kahchhuah
vek tur. Darkar 2 hnuah tui, sahbon
leh brush te hmanga nawhfai tur. Hemi
hnuah disinfectant a kah chhuah leh
vek tur a ni.

b) Secondary cleaning & Disinfection:
Vawk vulh chhunzawm leh na atan a
hman dawn chuan ni 10 hnu ah a hma
a disinfection tih ang hian tih nawn leh
tur a ni. Secondary disinfection tih leh
ngei tur a ni. A hmun ngaia vawk vulh
thar leh tur chuan thla 6 ral hnu ah
chhunzawm leh chauh tur a ni.

African Swine Fever (ASF) vanga vawk thi ruang sawngbawl dan leh phum dan tur

Khur thuktaka laih tur.

1. Khur mawngah chinai phah/dah tur.
2. Chumi chungah vawk ruang dah tur.
3. Chinai in vawk ruang khuh leh tur.
4. Leivung a chhilh leh hnu ah -
5. A chunglangah chinai bawkin khuh leh tur.
6. A ruang sawngbawltuin fimkhur takin keah shoe cover (polythene) bun tur, kutah glove bunin a khawih tur a ni.
7. Ruang phurhna motor emaw ruang zawinna hmanrua hmanga hmun hran a phum ngai a nih chuan vawk thi ruang kha disinfectant a kah hnuah polythene/sarang in tuam tur.
8. Disinfectant Sprayer/a kahna pawh ngun takin sil fai tur.
9. Shoe cover/polythene leh gloves te hi sanitize hnu ah hal ral tur a ni a/emaw khur chhungah phum tel tur. Chumi hnuah kut fai taka sil tur a ni.



Mipui hriselna atan hlauhawm?

ASF hi mihring tan hlauhawm anilo.

ASF hi engtia lo dan theih nge?

Vaccine siam a la nihloh avangin enkawl d
amna tur damdawi a la awmlo

ASF natna lakah engtin nge kan inven ang

1. Awareness
2. A ruka vawk tawlh luh loh

3. Khawtlang inthurual
4. Dan bawhchhia kan awmin Police emaw Veterinary department ah a rang lama report
5. Natna laka raldotu (immunity) tihchak an mamawh ve thin avangin, rulhut hlo, vitamins leh minerals te a khat tawka lo pek thin tur a ni.
6. Saphihrik laka inven nan vawh in bul vel te cypermethrin emaw deltamethin (pawlh dal sa) hmangin kah thin a tha.
7. A tlem berah nikhatah wawi 2 tal kan vawh hriselna te enthlithlai thin a tha
8. Natna awm leh awmloh emaw thi thut te awm thei anih vangin in ring reng a tha
9. Chiangkuanglohma riau annei nih cuan Vety lama mithiamte rawn vat tur
10. Vawh hrisel leh hrisello dah hran tur
11. Mihring/ran/hmanrua tanga kaichhawn theihna lak ata daidanna siam tur
12. Farm chhunga lut leh chhuak chungchangah fimkhur hle tur
13. Thil ei bang emaw sanghal nena an inhnimhnaih theih lohna turin farm luh kawngka te chu ven fimkhur hle tur

Tihfai leh tih thianghlum dan

1. Ran khungna huang te chu [1% sodium emaw calcium hydroxide emaw 2% Caustic soda solution] hmangin tih fai

thin a tha.

2. Hmanraw hman thin leh lirthei lut leh chhuak te chu [Sodium hypochlorite (0.03%), 1% Formaldehyde (Formalin) leh/emaw Virkon S or B-904 (1:100) hmangin tih thianghlim/tihfai thin tur
3. Farm enkawltu chuan vawk an khawih/hnaih hma in an thawmhnaaw hak leh hmanrua te chu tih thianghlim hmasak phawt thin tur.

BROILER ENKAWL DAN

Mizo te hian ar vulh kan in tihhmuh chho ve zel a, awmze neia kan vulh thiam a hun ve tawh ta hle mai. Hemi tur hian ar vulh tur kan thlan dan atanga kan hralh chhuah hun tur thlengin ruahmanna felfai tak kan neih a tul hle a ni.

A. Broiler hi engnge ni?

Broiler hi Fryer an ti bawh a, ar kar 8-10 a upa, 1.5-2 kg a rit, tihrawl nem tak, a sa ei atana vulh thin hi Broiler an tih chu a ni. Broiler chu a nu emaw a pa emaw a ni thei.

A that bikna te:

1. Bultan nan sum sen a tlem.
2. Kar 6-7 chhung bak vulh a ngai lo.
3. A vulh nan hmun a ngai tam lo.
4. An chaw ei hi ran dang te aiin than nan an hmang chak zawk.
5. Sum sen hmuh let a awl.
6. Broiler sa hi mitin mil sa a ni.
7. Mihring tan chaw tha leh tangkai a ni.
8. A ek hi thlai tan chaw tha a ni.
9. Naupang te pawhin an enkawl thei.
10. Kum khat chhungin ar tam tak a vulh puitlin theih.

B. Broiler Breed chi hrang hrangte: Starbro, Hypeco, Tegel TM 70, Hubchix, Keggbro, Pearlbro samrat, Pearl Vikram, Anak 2000, Unibro, ISA

Vedetta, Ross broiler, Lohmann broiler, Indian River, Hybro, Peterson, Avian broiler, Pilch , ILB-80, Chabro, B-77, CA-42, IBB-83, Vencob.

C. Ar vulh na tur hmun thlan dan :

1. Midang te tana hnawksak leh rimchhe lo tur hmun thlan a tha hle.
- 2.Chenna in nen inhnaih lutuk lova sak nise.
- 3.Hmun rualrem, nikang tha leh thengthaw a ni tur a ni.
- 4.A ek thenfai zung zungna leh bawlhhlawh paihfaina hmun ngaituah tel a tha.
- 5.Ar in chuan khawchhak – khawthlang (East and West) lam hawi, a dung in chhim leh hmar ep thei tur hmun thlan a pawimawh. (Hetiang hawia ar in kan sak theih chuan zing ni chhuak leh tlai ni tla tur a dawng thei dawn a, ruah tuiin a theh tlem bawk.)

D. Ar in sak dan tur: Broiler vulh na tur in sak dan hi chi hrang hrang a awm thei a, tin, hmanraw hman te pawh chi hrang hrang a awm thei bawk. In tha taka dah leh fimkhur taka enkawl an nih loh chuan, an nih tur ang an ni pha lo thin a, chuvang chuan ar in sak hi kan uluk a ngai em em a ni. Ar in sak len zawng tur hi ar kan vulh tam dan a zirin ni mai sela. Broiler ar pakhatin feet khat bial zel an mamawh a, ar in pakhatah ar 1000 ai tam dah loh tur ani.Lei chi seh atangin feet 1.5 a sang leh thukin lungrem nise, ar in chhuat chu a pawn lamah 1.5 feet velin filawr sela,hei hian sazu leh rul te luhna tur a dang thei ani.a chung hi feet 3-4 tal a filawr tur a ni a, hei

hian ruah leh thli lakah a veng a ni. Ar in bang san zawng hi duhthusam chuan feet 6-7 a sang ni sela, a bang chanve hi net emaw hman a tha. Ar kum/thla inang lo dah pawlh loh tur a ni, ar inang lo dah khawm hian natna an inkaichhawng awlsam bik a ni. Ar in pakhat aia tam kan neih chuan ar in leh ar in inhlat zawng hi feet 35-40 vel ni thei se.

E. Ar in a boruak luh leh chhuahna:

Ar in boruak luh leh chhuahna tha tak hi ar than chak nan leh hrisel nan a pawimawh em em a, ar in boruak chhia, carbonmonoxide leh Ammonia gas te ar ina an chamban loh nan a chhuahna tur tha tak siam sak a pawimawh hle. Boruak chhia a tam lutuk chuan thawkna kawng natna a siam thei a, an than a ti thu bawk thin a ni. Ar in bang a net kan hman chuan , ar in pawn lamah duh huna zial fel leh mai theih tur buara emaw silpoulin vuah tel a tha a ni.

F. Eng mamawh zat:

Broiler ar chu thang chak tura beisei an nih angin, an than nan chaw an chuk reng a pawimawh a, chaw an ei reng na tur chuan eng an hmuh that a ngai a ni. Lak tirh atanga kar thum an nih thlengin eng chhun-zan zawma chhit sak tur a ni a, kar thum atanga kar sarihna thleng hi darkar 23 eng chhit sak tur a ni. Broiler za tan bulb pakhat khai a tawk viau. Broiler hian temperature a hnuaia mi ang hi an mamawh.

Ar upat zawng Temperature mamawh zat

Kar 1 na	95° F (35° C)
Kar 2 na	90° F (32° C)

Kar 3 na	85° F (29° C)
Kar 4 na	80° F (26° C)
Kar 5 na	75° F (23° C)
Kar 6 na	70° F (20° C)
Kar 7 na	65° F (17° C)
Kar 8 na	65° F (17° C)

G. A buchip zual lai a hriattur pawimawh te:

Broiler ar note te hi ni khat atanga kar khat an nih thleng hian an thi duh bik em em mai a, a enkawl dan dik tawh loh vang te leh an taksa atanga tui chhuak tam lutuk vang leh riltam vang te a ni duh hle.

- a).Ar note dahna tur chu arte te in kan thlen hma in lo buatsaih fel diam a, a lum dan tur ang thlapin lo tihlum lawk tur a ni. Ar note kan dahna tur bawm (Brooder) lum lutuk vang te, boruak thianghlim tlem lutuk avang tein arte nguai leh chau an awm thei.
- b).Brooder chep lutuk emaw ar in chhung lum that loh vangin arte an inbawhkhawm a, arte an thi duh thin.
- c).Thlasik lai chuan tui in tur vawt lutuk pek loh tur a ni.
- d).Ar note te chu nikhat aia tam chaw an ei loh chuan an tui in turah glucose D pawlh thin tur a ni.
- e).Ar te kan lei dawn in kan fimkhur tur a ni a, hmui leh ke piangsual, mittel, mawng huh te thlang lo ila.

- f).Brooder chhungah chuan chanchinbu hlui phah hian an ek then leh chaw nawl ruh leh a ti awlsam.
- g).Tui leh chaw pekna hi dah tam a tha zawka, tin, tui inna leh a chaw pekna te chu inkar thlaka dah tur a ni. Ar note 100 tan tui leh chaw pekna 3 ve ve zel a tawh thei tura ngaih a ni. Tui hi engtik lai pawhin chhawpsak reng a pawimawh. Ar te'n an rah leh ek khum mai mai theih loh tura tui dahna buatsaih a tha. Tin, nipui lai chuan tui an mamawh tam a, pek tam thin tur a ni.

H. Chaw pek dan tur leh pek zat tur:

Ranvulh reng renga a hautak lai ber mai chu a chawa kan in senso na hi a ni. A pek dan tur leh a pek zat tur te uluk tak leh felfai taka kan bithliah chuan kan senso a tlem phah thei a ni. Chaw tha “Balanced Feed” kan pek hian a than a ti tha a, an nihtur ang ni pha thei a ni.

Ar len leh tet, upat dan azirin chaw chi hrang hrang an buatsaih a, chungte chu:

a).Broiler Starter Ration: He ration hi lak tan tirh ni atanga kar thum an nih thlengin pek tur a ni.

b).Grower Ration: Kar thum an nih atanga kar sarh an nih thlenga pek tur a ni.

c).Broiler Finisher Ration: Kar riat atanga hralhchhuah ni thlenga pek thin a ni.

Ar buchip zual laia pek tur Prestarter Ration hi Mizoramah chuan a lar vak lo a, Starter Ration kan pe nghal tawp mai a, duhthusam chuan prestarter ration hi pe thei ila, hei hian an than a tichakin an puitlin hnu ah pawh an rit duh bik a ni.

Broiler chaw pek zat tur hi hetiang hi a ni:

Upat zawng (Kar)	Ni khat a pek zat tur (g)	Kar khat chhunga eiral (g)
1	17	119
2	41	287
3	65	455
4	91	637
5	115	805
6	144	1008
7	171	1197
8	188	1316

I. Broiler chaw lei dawna hriattur te:

a).Broiler thanna hi a chawah a in nghtat thui hle a, senso tam dawn mahse chaw tha tak lei hram tum ila.

- b).Ar chaw hlui leh hmuar pek thin hian natna an kai awlsam bik a ni.
- c).Ar chaw chu a quality a tha tur ani. A tlawm zawk nih avanga quality tha lo leh chhe zawk lei loh tur a ni.
- d).Company thaa kan hriat thin te pawhhian an chaw siam quality an ti danglam ve thin a, duhthu a sam loh chang pawh a awm ve thin a ni.
- e).Ar chaw chu a dip lutuk tur a ni lo. A dip lutuk chuan ar hmui chhungah a hlawmkhawm duh a, chaw an chuk duh loh phah ve thin.
- f).Ar chaw hi a hmuar duh hle thin a, lei khawl teuh lo ila. A tam berah kar 2 chhung vel an ei khawp lei khawl hi a tawh em em a ni.

J. Natna laka inven dan:

- a)Ar In leh hmanrua te vawnfai reng tur a ni.
- b)Chaw tha leh tui thianghlim chauh pek tur a ni
- c)Ar thi reng reng a rang thei ang bera lak hran a, phum bo emaw hal ral tur a ni.
- d)Ar dam lo leh hrisel lo te chu dah hran a, mithiam te rawn vat zel tur.
- e)Ar in chu a ro tha reng tur a ni a, arte tui tih buak te rang taka then fai tur a ni.
- f)Sazu luh theih lohna tur in ar in buatsaih thin a pawimawh.
- g)Natna laka invenna damdawi te an tui inturah pawlh thin tur.
- h)Ar inchuk ching te lak hran a, an hmui chunglam tan a tha.
- i)Ar in chhungah ar enkawltu bik lo chu luh fo loh tur a ni.

j).Ar dahna atana hman tawh ar in te chu Insecticide hmanga tifa a, ar in chhung te chu khuaih fai leh ziahfai thin tur a ni.

k).Bawlhhlawh leh hnawmhnawk reng reng te chu tifa zung zung thin bawk ang che.

Hri danna pek dan:

Sl. No	Natna hming	Vaccine pek hun	Pek dan tur
1.	Ranikhet (Ar pul hri)	5 th day (F-strain)	Far khat mit leh hnarah
2.	Gumboro/IBD	7 – 9 th day	Far khat mit leh hnarah
3.	Ranikhet (Ar pul hri)	30 th day (F-strain)	0.3ml i/m or s/c
4.	Fowl pox (Ar hmai huh)	Pigeon Pox Vaccine (Live Virus) Kar 2 a upa ah	Feather follicle method or wing web method
5.	Fowl pox (Ar hmai huh)	Fowl Pox Vaccine (Freeze Dried) Kar 6-8	Feather follicle method or wing web method

Natna inkai chhawn dan:

1. Artui atangin
2. Ar dam lo In atangin
3. Artui awp keu na (hatchery) hmun atangin
4. Boruaka natna hrik awm atangin
5. Ar hrik, mihring leh bungraw thianghlim lo, thosi leh hrik chi hrang hrangte atangin
6. Ar chaw leh tui intur thianghlim lo atangin.

Ar natna lanchhuah dan tlangpui te:

- ☐ 1. Rihna tlahniam
- ☐ 2. Kawthalo.
- ☐ 3. Che sawn tha duh lo.
- ☐ 4. Zeng.
- ☐ 5. Thawhah/ thaw ri berh berh.
- ☐ 6. Ke vung.
- ☐ 7. Thak/ hmul tlakawlh.
- ☐ 8. Hmul pawr chip chep.
- ☐ 9. Mit leh hnar bawr atui awm reng.

VAWK ENKAWL DAN LEH AN CHANCHIN TLANGPUI TE

Vawk chungchanga hriattur pawimawh te

A nu hur hmasak ber hun	: Thla 6-7
Vawkpa chi thlah theih hun	: Thla 8
Vawk hur rei lam	: Ni 2-3
Vawk hur zin zawng	: Ni 21 danah (19-23 days)
Rai chhung	: Ni 112 - 114 (days)
Taksa lum zawng	: 102 °F (101.8 - 104.6°F)
Thawk ran zawng	: 8-18 per minute
Marphu ran lam	: 55-86 per minute

Vawk vulh hlawkna

1. Vawk hian ran dang zawng zawng aiin a chaw ei a sa atan a let chak.
2. An thau awl ber bawk.
3. Kuthnathawk mite tan vawk thau hi thazung tha tak ani.
4. A In sak leh bul tanna a hautak lo.
5. No a hring hnem thei a, vawi khatah No 6-12 te anei thei.

6. Vawk Note an puitling hma em em bawk.
7. Vawkpa pakhat in a nu panga vel a vil thei.
8. Kum khatah vawkpuiin No vawi thum (3) a nei thei.
9. A pumrua a zira ei tlak ngah ber an ni.

A hmun thlan dan

1. Ni kangna hmun.
2. Hmun awih hret, ek leh zun thli hman nghal mai theihna tur.
3. Motor luh theihna.
4. Tui hna tha tak awmna emaw tui lak awlsamna hmun.
5. Khawpui atanga hla lutuk lo ni thei se.
6. Ran chaw atana hman theih tur Bal, Pangbal, Kawlbahra leh thil dang chin theihna hmun.

Vawk Nu/ Vawkpui Thlan

Vawknu chi thlah tur kan thlan dawn a thil hriat tur thenkhat lo tarlang ila:

A lan dan: A pian zia, a kum phu tawk a ruangam.

A thlah tu te: A hringtu vawkpui leh a thlahtu vawkpa hnute hmun neihzat, an no neih thin zat, no an dam leh damloh te, thanguang chi leh hrisel an ni thei em tih te hriat a pawimawh. Vawkpuiin no neih a awlsam em, no a nei zing em, tih te leh a Note chu lak hran rual anihin (Ni 56) engtia rit nge a nih tih te hriat a tha.

Vawkpa chi thlahtu thlan: Vawkpa chi thlahtu chu a thlahtute record a that angai. Hnute hmur a ngah tur a ni a, Vawkpa chu a pa riau tur a ni a, a kum phu tawkah a lian tha em, a pianzia a tha bawh tur a ni. Hetiang hriat theih nan chuan vawkpa chu thla 4-6 a upa anih angai thin.

Vawk chaw pek dan

Thla hnih an lo tlin chuan hralh chhuah theih an ni. Chi thlah atana vulh te erawh chu hetiang hian chaw an pek theih:

Vawk upat zawng (Thla)	Vawk rih dan tlangpui	Chaw nikhata pek zat (kg)
2-3	15-27	1.0
3-4	27-40	1.25
4-5	40-50	1.50
5-6	50-60	2.0

Vawk natna langsar zualte

1. Pneumonia 2. Enteritis 3. Swine Erysepelas
4. Brucellosis 5. Swine Fever 6. FMD
7. Cysticercosis 8. Vawk Phar

1. Pneumonia (Chuap natna): Vawk thla li(4) hnuai lamin an vei duh bik. An khua a sik vak a, a san berah 107 °F te an kai pha thin. Chaw an ei tha

peih lo a, khuh leh thawhah an nei thin bawk. He natna thlentu hi Bacteria emaw, Virus emaw, Chlamydia emaw ten an thlen thin.

2. Enteritis: Vawk pumpui leh ril lam a khawih duh ber. Chaw tha lo ei avang tein a lo in tan thin. He natna thlentu hi Bacteria chi khat E. Coli an tih hi a ni. Vawk an kua a tha lova, chaw an ei peihlo tial tial a, a thih phah mai thin.

3. Swine Erysepelas: He natna hi nipui chho, fur lai velin Bacteria chi khatin a thlen thin. Vawk an khua a sik a, chaw an ei tha peihlo a, an pang a durhin a vual thin. Enkaw! vat loh chuan vawkin a thihpui thei hial a ni.

4. Brucellosis (Vawk no chhiat): Bacteria chi khatin he natna hi a thlen thin. Vawk nu in No a chhiat a, No thi sa te a hring thin. Vawkpa tilmu te a vung a, ke hnung lampang te a zeng thei bawk. Vawkpa in chi an thlah theilo bawk. Enkaw! dam a harsa a, tihral mai a tha zawk a ni.

5. Swine Fever (Vawk pul hri): He natna hi Virus chikhatin a thlen. Vawk an ngui a, chaw an ei tha peihlo a, an khua a sik vaka (107 °F), an ek a tuiin a khal a, an mit te a vung a, an beng ah te, dul leh kapkar ah te thisen zam chat ang mai hian a sen tuar thin.

6. FMD (Vawk ke/ Ka na): He natna hi Virus chikhatin a thlen. Vawkin chaw an ei tlem a, an khua a sika, an ke tin kar te alo vung a, an hmu! leh

lei te a durhin a pilh thei bawk. Vawk Note in a thihpui thei.

7. Cysticercosis (Vawk Bawl): He natna hi (*Taenia solium*) rulhutpuiin a thlen ber. Mihring leh vawk inkara he natna hi lo chhuak thei a ni. Mihring ek atangin Vawkin akai a, an tisa ah chuan he rulhutpui tui-te (Cysts) a lo darh thin. Hei hi vawk bawl kan tih thin chu a ni. Heng vawk bawl mihringin kan ei hian kan kai a, rulhutpuiah alo chang leh thin. Tuiso 120 °C vela sa ah rei tak chhum angai a ni.

8. Vawk Phar: He natna hi hrik (Ecto-Parasites) vang a ni. Vawk an thak a, an hmul te a til a, luphut ang deuhin an vun te a var tuak thin. Enkaw! hma chuan an dam hma thei.

Heng natna te hi kan vawk vulh lai ten anlo vei thei a, a rang lama Veterinary Doctor hnai berrawn a finthlak ang.

Vawk Kah Rai (Artificial Insemination)

Vawk Kah Rai awmzia chu Vawkpa chi laka, Vawkpui hur chhula an hur lai taka, Artificial Insemination Catheter hmanga kah luh tihna a ni.

Vawk Kah Rai That Bikna Te

- 1) Vawk chi tha zawk neih theihna a ni.
- 2) Vawk inpawl avanga inkaichhawn theih lakah a him.

- 3) Vawkpa pawl avanga kawng awp, ke tliak,
inhliam a awm ve theilo.
- 4) Sum leh pai senso a tlem zawk.
- 5) Vawkpa kal harsatna ah te harsatna a awm velo.
- 6) Vawkin thiah leh a neitute buai a ngai velo.
- 7) Vawkpa chi tha bik thehdarh nan a tha bik a ni.

Vawk Kah Rai Hun

- 1) A hur atanga ni thum tuk emaw tlai lam emaw
ah.
- 2) A bawlhhlawh chhuah hnuah
- 3) A zahmawh chhung sen vanglai tak a ni.
- 4) A zahmawh pawn thur hnu, a lo vuai hnuah a tha.
- 5) Vawkpui chungah pawh a chuan, a dawh vung
vung duh hun (standing heat) laiin. A chaw ei lai
ni lovin.
- 6) A zahmawh khawih a a mei an kan tauh tauh
emaw, a beng a tun ar hunin.

VAWK PUL HRI CHI KHAT/PORCINE REPRODUCTIVE AND RESPIRATORY SYNDROME (PRRS)

Porcine Reproductive and Respiratory Syndrome, India a la awm ngai meuh lo chu a vawikhatna atan June 2013 khan Mizoram ah hmuhchhuah a ni ta mai hi a pawl hle a, tunah pawh Mizorama district then khatah he natna kaihhnawih avang hian vawk tam tak an thi tawh tih kan hre theuh tawh awm e. Eng ang takin nge he natna hian min nghawng dawn tih hriat a ni lo nachungin, vawk vulh a tui mi tam tak te, he natna avang hian hnung tawlh mai lovin he natna hi enge a nih tih hre Chiang ila, engtia enkawl chi nge a nih tih chian lehzuah a tha awm e.

PRRS natna thlentu hi Virus chi khat arterivirus a ni a ram dang atanga he natna hi rawn lut a ni. He natna hian vawkpui bikah note chhian a thlen a, vawk dangah erawh chuan thawhah leh khawhsik sang tak a thlenin chu chu vawk tam tak thihna thlentu a ni. Natna inkaichhawn awlsam tak ani. He natna hrik hi boruak, ek leh zun, chil, chaw leh chaw pekna thianghlum lo ah te hian a awm thin a vawk dangah awlsam takin a inkaichhawn theih a ni. Inpawl/A.I (Kah rai) atangin a kai theih a, vawkpui rai laiin a note ah a kai thei bawk. Tin,

kawng tam takah mihring te hi he natna tidarh tu kan ni thei bawk.

PRRS natna hi kawng hrang hrang in a langchhuak a,a natna lan chhuah dan thenkhat han tar lang ila:

Vawk note leh vawk thanglai ah

- i)Khawsik sang tak an nei (Normal 102°F)
- ii)An chau in chaw an ei duh lo/ei tlem
- iii)Kil khat ah an tawm khawm
- iv)An hnar leh beng kawm leh taksa hmun thenkhat a lo pawl/sen thin
- v)Vawk note tam tak thihna thlentu a ni.

Vawkpui a PRRS natna lanchhuah dan

- i)Note chhiat
- ii)Note thisa a hrin
- iii)Note chau/chaklo tak a hring a, hun reilo teah an thi leh nghal mai thin
- iv)Note chhiat ho chu thi in a bualin,an pum chhungah thi/tui a tling nasa thei hle

PRRS avanga vawk thi te taksa a danglamna awm te:

- i)An beng kawm/vun rawng chu a pawl tak in a trial thin
- ii)An chuap a vung in a puar a, thi a tling thin
- iii) An thalbe a vung dum vek thin
- iv)An la a vungin a thi thin a thi khar a awm avangin a lang tial dum thet thet thin (infarction)

v) Note chhiat ho chu an vun rawng a sen dukin an dulah thi/tui a tling thin.

A tlangpuiin vawkin PRRS a lo vei chuan an taksa a duk thliah thluah a, an beng te a durhin a lang pawl ruih thin. Chuvangin PRRS hi Blue ear disease tih te pawn an sawi thin. Vawk pul hri ve tho Classical Swine fever ti a kan lo hriat lar hmasak zawk nen a natna lan chhuah danah inanna a awm theih avangin he natna chi hnih te hi a ngaihrawlh theihna tam tak a awm thei a mahse PRRS natna hi tunlaia leng mek a ni a, a natna lan chhuah dan kan han tarlan atangte hian a thliar hnan dan kan thiam theih mai in a rinawm.

Treatment: A damdawi dik tak hmuh chhuah ala nih hrih loh avangin a natna lan chhuah dan a zirin treatment hi pek mai thin a ni. A vei te leh enkawl dam tawh a ngaih te hi he natna thehdarh tu tha tak an nih avangin a vei mek leh vei ni a rinhlelh te chu suat zel a tha ti ila kan sawi sual awm love.

Inven/Him Dan: Biosecurity/Vaccine hi a inven dan tha ber chu a ni a mahse a Vaccine a ber siamchhuah a la nih loh takah chuan tihian inven lo tum ve ta ila

- 1) Ram dang vawk hriat chian loh man leh vulh chin loh
- 2) PRRS atanga fihlim lo vawk man loh
- 3) Vawk farm/vawk in leh a chhehvel fai taka vawngin tlawh pawh mai mai phal lo ta ila a

chhan chu mihring te hi natna theh darhtu kan ni
ve thei

- 4) Vawk kah rai (AI) tih dawn in a chi thianghlim
leh thianghlim loh chian a tha
- 5) Kan vawk vulh te uluk taka en ngun a PRRS kai
an awm chuan a rang thei ang bera suat
- 6) PRRS vanga thi te chu phum anih loh chuan
halral thin tur
- 7) Kan vawk in leh a chhehvel te disinfectant, tuisen
te a uluk tak a silfai thin tur a ni.
- 8) PRRS hri vei ni awma rin vawk damlo te chu
Veterinary Dispensary/Hospital/Veterinary Doctor
te hriattir van a finthlak.

A tawp berah chuan PRRS hi mihring tan a
hlahhawm em tih leh a sa ei mihring tan a
hlahhawm em tih hi rilru a zawhna tam ber a ni thei
awm e. He natna thlentu virus chi khat arterivirus hi
enveloped virus niin a len zawng chu 45-88mm vel
a ni a hmun vawt ah (-70°C) he natna hrik hi thla 4
chhung vel a active/natna a thehdarh (infectivity)
thei a hmun lum (56°C) ah chuan he natna hrik in
natna a thehdarh (infectivity) hi a tla hniam tawh
thin a ni. Khaw lum ah he natna hrik hi a dam rei
thei lo tihna a ni ber awm e. Mihring tan erawh a
hlahhawm hranpa lo a, he natna hrik hi 56°C Celsius a
min 30 chhungin a thi thei ani.

Invenna/Vaccine la nei hrih lo mah ila
PRRS natna kan hriat chian a, invenna kawng chi

hrang hrang te kan tih chuan kawng egemaw chen
chu PRRS natna hi kan veng thei dawn a ni.

SAZUPUI (RABBIT) VULH DAN TLANGPUI

Sazupui hi a sa ei atan te, a hmul leh a vun
thil dang siam chhuah leh atan te vulh ani ber.
Senso tam vak lova vulh theih a nih vang leh
khawlum leh vawt ah pawh an vulh puitlin theih
avangin Mizoramah pawh a vulh chi hle.

Hriattur Pawimawh te

Puitlin hun	: Thla 5-6
No pai chhung	: Ni 30-32
Kum khata no neih zat	: Tum 4-5
No neih theih zat	: 6-7
Hmul to tan	: Ni 4
Mit keu hun	: Ni 10-14

Sazupui hi a sa ei chi leh a hmul meh chi a
then theih a ni.

A sa ei chi

A sa ei chi hi chi hrang hrang an awm a thla
2-3 ah ei an tling mai thin. A sa ei chi lar deuh te
leh a puitling rih zawng

1. New Zealand white	: 3 Kg
2. Soviet Chinchilla	: 3 ½ Kg
3. White Giant	: 4 kg
4. Grey Giant	: 3 ½ Kg

A hmul meh chi

German Angora leh Soviet Angora te hi chi larzual an ni. Hmun vawt deuh lamah an tha duh a hmun lum lutuk 35°C aia lumah chuan an tha fumfe lo. Kum khatah tum li vel an hmul a meh theih a Kg ½ vel a tling thei.

A In sak dan

Sazupui hi lei a kua hreuh a leichhunga bu siam chi anni a amaherawhchu bawm emaw in siamsakah pawh tha takin an vulh theih. Sazupui pakhat tan Feet 2 bial a tawh a tin a no hruai lai tan Feet 4 a thuk Feet 2 a zau leh Feet 2 a sang a tawh thawkhat hle. Thing emaw thirlen emaw hmanga a bawm siam theih a ni. A no neihna lai tur chu a phuiin a hul tha tur a ni. Tin, chaw pekna, zun leh ek thenna tha tak a awm bawh tur a ni.

Chaw pek dan

An piantirhah hnute hnektir tur a ni a, an lo len deuh hnuah hnah nem pek tel tur. Kar 4-5 hnuah an lak hran theih a tah chuan hnim hnah chi hrang hrang thlai bul leh zung wheat vai te favai te a chawm tur a ni. Sazupui hian ni tin chaw gram 120-150 vel an mamawh a a no hruai chuan gram 350-380 vel an mamawh. Tui thianghlim an mamawh reng bawh. Hun bi nei taka nitin vawi 2 chaw pek a tha.

Natna langsar zualte

Coccidiosis (Santen): He natna hi a damdawi pek lawk a ven theih a ni. An in thianghlim taka enkawl

leh an zun leh ek nen a inchiahpiah lo tur a tih hian
a veng hle bawk.

Mange (Vunphar)/Ear Canker (Beng Natna):
Heng hi natna hrik chikhat in a thlen. He hrik hian
vun a ei chhe thin. Damdawi hnawih chi (Ascabiol)
hman tur a ni.

Pneumonia (Snuffles/Pneumonia): He natna an
vei chuan an hnar atangin bawhlawh a chhuak a an
hahchhiau reng bawk. Penicilin leh Streptomycin
hmanga enkawl tur a ni.

Sazupui Vulh Thatna te

1. Thla 2 chhungin Kg 2 a rit an tling thei
2. A sa a hrisel in a rim a thiang bawk a, cholesterol
a tlem avangin thisen sang nei tan ei a pawl hran
lo
3. A vun a nem tha a, a thianghlim a, a zang tha a,
tui a pawm lovin a ro awl bawk

VACCINATION SCHEDULE

BAWNG NATNA HRI LAKA VENNA

Natna Hming	Vaccine Hming	Pek hun/Bawng upat zawng	Dose (ml) leh chiu dan tur	Ven hun chhu ng	Pek leh hun
Ke leh Ka na hri (FMD)	IVRI Polyvalent Cell Culture Vaccine	Thla 4 chungla m	5-10 Vun kar	Thla 6	Thla 6 dan zelah
	FMDV (Hoeschst)	Thla 4 chungla m	5-10 Vun kar	Thla 6	Thla 6 dan zelah
	FMDV (BAIF)	Thla 4 chungla m	5-10 Vun kar	Thla 6	Thla 6 dan zelah

	Raksha (Indian Immunolo gicals)	Thla 4 chungla m	3 Vun kar	Thla 6	Ni 22 naah chiu nawn chumi hnu ah thla 6 danah
Brucello sis	Brucella abortus cotton Strain-19	Thla 4-8	5 Vun kar	No vawi hnih neih thlen g	
Anthrax	Anthrax Spore Vaccine	Thla 4 chungla m	1 Vun kar	Kum khat	
Black Quarter (BQ)	BQ Vaccine (Polyvale nt)	Thla 4 chungla m	5-10 Vun kar	Kum khat	
Haemor rhagic Septicae mia (H.S)	H.S Oil Adjuvant Vaccine	Thla 6 chungla m	2-3 Tihraw l	Kum khat	

H.S & B.Q	H.S & B.Q combined Vaccine (BAIF)	Thla 6 chungla m	4 Vun kar	Kum khat	
	Freeze Dried Goat Tissue Vaccine (GTV)	Thla 6 chungla m	1 Vun kar	Thla 14	

VAWK NATNA HRI LAKA VENNA

Natna	Chiu hun	Vaccine/Chiu dan
Swine erysipelas (Pang durh)	Kar 3-4, kar 3-6 hnuah nawn tur, chuan thla 6-9 dan ah	Swine erysipelas vaccine 1ml s/c
Swine fever (Vawk pul hri)	Kar 6-8, kum khatah vawi khat	Lapinized swine fever vaccine 1ml s/c
Foot and mouth disease (Ke leh ka na hri)	Kar 6-8 weeks, thla 6-9 dan ah	2ml S/c or I/m FMD Vaccine

AR NATNA HRI LAKA VENNA

Natna Hming	Vaccine	Pek Hun	Pek dan
ArPulHri/Ranikhet Disease	F	Ni 3-4	Far Khat mit/hnar ah
	R ₂ b	Kar 8-10	Vun kar/tihrawl ah chiu
	Lasota	Kar 15-16	100 doses/Tui Litre 3 ah
		Kar 40-42	100 doses/Tui Litre 6 ah
Fowl Pox (Ar hmai huh)	Pigeon Pox Vaccine (Live Virus)	Kar hnih a upa	Feather follicle method/wing web method
	Fowl Pox Vaccine (Freeze Dried)	Kar 6-8	Feather follicle method/wing web method
Infectious Bursal Disease (IBD) (Broiler tan)	Gumboro live vaccine	Kar 3-7	Far hnih Mit/hnar ah
	IBD killed vaccine	Kar 3-7	0.2ml vun karah
Infectious Bursal Disease	IBD intermediat e vaccine	Ni 14-18	0.1ml tua pawlh

(IBD) (Layer tan)		Ni 28- 32	0.1ml tuaia pawlh
		Ni 42- 46	0.1ml tuaia pawlh

VAHMIM (JAPANESE QUAIL) VULH VE CHHIN TEH

Vahmim (Japanese quail) hi Japan ramah chuan an chinna a rei tawh hle a chuvangin a hming pawh a put chhan a tih theih awm e. Vahmim hi gm 150-200 vel a rit a ni a, ram Vahmim a tiat vel a, a rawngah pawh in ang tak a ni. Tin a sa pawh sava sa ang a ni. Japanese ho chuan Vahmim tui hian natna chi hrang hrang leh Tuberculosis (TB) natna te a tidam thei tiin an sawi thin.

Vahmim hi a tui tam theih leh sa tui tak a nih avang te leh mahni intodelh nan leh chhungkaw eizawn nan pawh a vulh chi tak a nih avangin India sorkar chuan ram chhungah sumdawnna atana lalut turin State Animal Husbandry Department tin te a fuih. Mizoram hmun thenkhat ah te pawh vulh pungin ei atan leh eizawna atan an la lut mek a ni.

Vahmim chanchin tlangpui te:

A vulh dan leh enkawl dan hi Mizote thiam zawng tak a ni a, a sa pawh hi sava sa ngaina hnaw kan nih avangin Mizo zingah chuan hralh tla hle tura ngaih a ni.

1. Vahmin puitling pangai rih zawng : gm 175
2. Tui tan tirh hun: Chawlhkar 6-7 a upa
3. Tui vanglai hun: Chawlhkar 10
4. Tui hun: Chawhnu dar 3:00 atangin khaw thim hun thleng
5. A tui rih zawng: 10 mg, a var leh a uk

Vulh a awlsam bikna te:

1. Vahmim te hi ram lum tak leh vawt takah pawh an awm thei ve ve a. Tin ar natna chi hrang hrangte hi an vei ve loh avangin a ruala tam deuh pawhin hmun zimteah an vulh theih a, khawpui hmuna cheng leh mihring tamna hmunah pawh an vulh ve theih zel a ni.
2. Vahmim te hi an than chak bik avang hian an manhla bik em em a, a note pianghlim gm 6-10 a rit hian chawlhkar 6-7 ah hian gm175-220 a rit an tling thei a ni. Tin kum khat chhungin a tui hi 300 a tling thei bawk.
3. Vahmim hian thauna lam chi a pai tlemin, chaw tha (protein) a pai tam a, Vitamin a pai tam avangin naupang tan te, nu naupai tan leh damlo tan chaw tha tak a ni bawk.

Hmun ngai zat

Vahmim hi a hrana in sak saka vulh chi a ni. Ar in angin a sak theih a ni. A note pakhat chawlhkar thum a upa a nih thleng hian cm 75 bial a zau hmun a mamawh a, chawlhkar 3-6 a upa a nihin cm 150-175 bial a mamawh. An puitlin hunin cm 200-350 bial a mamawh a ni. An in tihlum nan electric bulb watt 40 chhit a tawk. An buhchip lai chawlhkar hnih a upa an nih thleng chuan chhun zan zawma bulb hi chit sak tur a ni. An lo len deuh hunah chuan zan lamah chit a tawk.

Favai emaw thing zai nawi emaw cm 10 vela chhah dahsak tur a ni. Vahmim note chu chawlhkar thum a upa a lo nih atangin a nu leh a pa an hmul rawng atangin a hriat hran theih. A nu chu a pa aiin a awm hmul a tial nasa zawk a vulh zawm zel tura kan duh chu awlsam takin a thliar hran theih a ni.

Vahmim chu chawlhkar 4-7 inkara upa an lo nih tawh chuan a hralh theih tan. Vulh thau leh duh chuan bawmrang ah a dah theih a ni. Bawm ft 3 bial vel ah hian hralh theih emaw ei theih tawh 90-100 inkar a dah theih a ni. Chaw tha tak pek leh ni eng leh boruak tha tak an dawn chuan an thang duh em em a ni. Tin, a nu leh a pa bawm hrana dah hian an than a rual tlang lehzual a ni.

Enkaw! dan tlangpui

Vahmim te hi anmahni thua tlattir mai lova, awmze fel tak neia bawm chhunga khung khawm a, eng tha tawh, chaw ei tur, tui leh boruak lum leh vawt nuam tawkah dah chuan an inthlah pung chak hle a ni. A chaw atan broiler chaw-a kan pek thin ang starter, grower leh finisher te hi hman ve mai tur a ni. Chawlhkar hnih chhung an buhchip lai hian chaw tha (starter feed) pek ngei tur a ni.

A chaw pek dan tur

1. Chawlhkar khata upa an nih chhungin kar khatah gm 2 pakhat tan

2. Chawlhkar hniha upa an nih chhungin kar khatah gm 4 pakhat tan
3. Chawlhkar thuma upa an nih chhungin kar khatah gm 8pakhat tan
4. Chawlhkar li a upa an nih chhungin kar khatah gm 16 pakhat tan
5. Chawlhkar ngaa upa an nih chhungin kar khatah gm 20 pakhat tan
6. Chawlhkar ruka upa an nih atangin kar khatah gm 25 pakhat tan pek zawm zel tur.

An than dan tlangpui

1. Chawlhkar khata upa a nihin gms 14
2. Chawlhkar hniha upa a nihin gms 28
3. Chawlhkar thuma upa a nihin gms 56
4. Chawlhkar lia upa a nihin gms 112
5. Chawlhkar ngaa upa a nihin gms 140
6. Chawlhkar ruka upa a nihin gms 175

Hralh tur chi a vulh kan nih chuan chawlhkar sariha upa an nih hian hralh vek a, a note thar vulh leh mai tur. A tui tura vulh kan nih chuan, chawlhkar sawm a upa an nih hun lai hi an tui tam hun lai tak a ni a, kum khat leh a chanve aia rei/upa vulh leh a, a note dang thar vulh leh zawk tur a ni.

VAWK RAI LAI LEH RAI HNU A ENKAWL DAN

Vawkpui rai lai reng reng enlawi uluk a ngai. Inpawltir hun atanga no an neih hma hun chhung hi rai/pregnancy period/gestation period tih a ni. Inpawl tir hnu a Vawkpui a hur leh tawh loh chuan a rai ngei a ni tih a hriat theih. Vawkpui a lo hur chuan inpawltir ni hi Kalendar/Diary ah emaw chhinchhiah ngei ngei tur a ni. Hemi kan tih chuan No a hrin hun tur a chhutchhuah theih a, a lo inrinlawk theih thin a ni. Vawkpui rai hun chhung hi Ni 114 (Thla thum Kar thum leh Ni thum) a ni a mahse hei aia hma emaw tlai hret ah pawh No an hring thei. Hemi hun chhung zawng hian Vawkpui hian a No pai hre rengin ama taksa in a mamawh a enkawl bakah a chhul a awm No engemaw zat a enkawl ve reng thin. Chuvangin, Vawkpui rai hun chhung chuan chaw tha, Vitamins leh Minerals pek uar a tha, a bikin No an hrin hma kar hnihna a pek uar bik a tha. Hei hian Vawkpui hnute tui a tihtam phah thei a ni.

NO HRIN HMA A VAWKPUI LO ENKAWL DAN

1. Vawkpui rai chu a hran a khung/dah thin a tha.
2. No a neihna hmun/In chu antiseptic/ tuisen/ phenyl a uluk taka lo silfai lawk thin tur ani.
3. Buhpawl/Buara thianghlim chhawp thin a tha.
4. Hemi hun chhung hian chaw tha, Vitamin leh tui thianghlim pek thin a tha.

VAWKPUI NO VEI LAN/HRIAT DAN

1. Vawkpui Serh a lian/vung
2. Vawkpui serh a lang sen
3. An awm hle hle thei lo/tei sek
4. Chaw an ei tlem
5. Vawkpui hnute hmur a tang tan a darker 24 chhungin hnute tui a hmeh/sawr chhuah theih.
6. No neih na tur Bu an chhep thin.

NO HRIN LAIA VAWKPUI ENKAWL DAN

1. Darkar 1-6 chhungin Vawkpui in No a hringfel tlangpui thin.
2. Vawkpui tamzawk chu buaipui hranpa ngai lovin awlsam takin No an hring.
3. Thlasik hun laia No hring te chu vawt lutuk laka venhim a tha.
4. No hrin harsat emaw No hring chhuak thei lo Vawkpui an awm chuan a thiamte rawn vat a tha.
5. Vawkpui chhul chu a tla fel em tih uluk taka en thin a tha.
6. No a hrin zawh hnu ah Vawkpui chu tui lum pip pep intir/chhawpsak thin tur ani.
7. No a neih atanga a Ni hnih na ah Vawkpui chu zawi zawi in a chaw ei thin ang pangai pek tawh tur ani.
8. No an hrin zawh hnuah Vawkpui hian natna chikhat Metritis Mastitis Agalactia (MMA) Syndrome hi an vei duh hle a, hetiang natna hi Vawkpui in an lo vei chuan an tho thei lo a, an pang a lumin an khua a sik thin. Mi thiamte rawn vat a finthlak.

FISHERY

PADDY CUM FISH CULTURE (Buh leh Sangha khawi pawlh)

Paddy cum Fish Culture hi Integrated Fish Farming hnuai a peng pakhat a ni a, a awmzia chu leilet buh chinna bial a sangha khawi tel tihna a ni. History kan en chuan kum 2000 kal ta atang tawh khan Chinese ho chuan hlawhtling takin an lo khawi pawlh tawh thin. Hun a kal zel a, Indonesia, Thailand, Vietnam, India leh ram hrang hrang ah alo darh chho ta zel a. Mizoramah chuan kum 1981 khan Champhai leilet zawlah hlawhtling takin buh leh common carp an lo khawi pawlh tan a, tichuan Serchhip, N.Vanlaiphai, Kolasib etc ah te pawh an lo ching chho ve ta zel a ni..

Paddy Cum Fish culture tih hmasawnna tur atan chuan leilet bial tih danglam leh tui khung dan chungchang te, sangha tha chi khawi leh chaw pek dan chung chang thlengin zir thiam a ngai a, tih dan tha leh tunlai ber hmanga tih ve te leh tih dan tha hriat ve a tul a ni.

Hetianga buh chin leh Sangha khawi kawp nan hian ruahtui tlak tam tawkna hmun kumkhat chhunga thla 4 atang a thla 6 emaw tal leilet hmuna tui a awm theihna hmun thlan tur a ni. Tin, fur laia tuilian in buh hmun a hrut buai lohna hmun thlan bawk tur a ni. Hlum lei, sawntlung lei, ram tha lei, lei thaw leng lo hmun thlan tur ani.

Leilet buatsaih dan:

1. Leilet bial tlang feet 1½ emaw feet 2 emaw a sang, a chung zawl feet 1 vela chhah, awitlan tawk a siam tur a ni. Leilet bial san zawngte, sangha khur thuk zawngte, leilet bial tlang bang awn zawngte hi uluk leh diktak a siam tur a ni.
2. Leilet bial tlang lian leh rinawm tak phui taka tui tlin theihna, chhung lam atanga tui luangchhuak emaw pawn lam atanga tui luanglut tur dang thei a siam angai a. Tui kawngka hmun hnih khatah tui khungna leh paihna tur siam bawk tur ani. Heng kawngkate hi sangha lut leh chhuak tur dang thei tur a tha tak leh phui taka siam tur a ni.
3. Hmun lum zawkah te chuan bial chhungah khan buh chin lohna tura thuk lai bik siam thin a ni. Chu chu tui sahkang ngaih laite, tuitlem leh khawro laia sangha tawm khawmna tur a ni.

Paddy cum Fish culture tih dan hrang te:

1. **Synchronous system/Simultaneous culture:**
Buh chin rual a sangha khawi tel a ni mai a. Buh hi kan tum ber a nih avangin buh chin dan milin sangha khawi chu kan lo zep rem ve mai tur a ni. Buh leh sangha an in chhawr/hmang tangkai tawn a, sangha in buh ti chhetu rannung leh pangangte an ei a, buh kunga mi rannung, hnim leh thil to te te an ei bawk a. Sanghate hian dil mawng an nawr chet reng avangin hnim to tur a veng. Chu bakah bial chhunga sangha che velin buhbal te ti chein buhin

boruak a hip that theih phah bawk a. Sangha ek leh thildang an taksa atanga an paihchhuah te buhin a lo thatpui bawk a. Heng vang hian buh peng pawh a lo tam phah thin. Buh chinna a sangha dah/khawi tel avangin buh thar 10-15% in a pung thei a ni.

Paddy cum Fish culture ah hian buh leh sangha tana leitha (manure & fertilizer) pek tur chite a pek kawp theih. Mahse pesticide& weedicide te erawh Sangha tan a hlauhawm avangin hman chi a ni lo thung.

2. **Sequential system/Alternate culture:** Buh chin leh sangha khawi tih chhawk hi a ni a. Buh chinna bialah buh seng zawhin sangha an khawi theih tihna a ni. Hetia tih hian bial thuhmunah a ruala buh chin leh sangha khawi dun that lohna pumpelhin bial thuhmunah tho a hranpa a buh chin leh sangha khawi thatna a ti pung a ni. Buh seng zawhah leilet bialte chu siam that ngai te siam zawhah tui khungin sangha dil atana buatsaih zui a ni a, leitha (manure & fertilizer) pawh sangha dila pek dan tur anga pek tur a ni. Hetih hun hi chinai thi pek hun a ni a, buh seng zawhah buhkung leh a bulte paih fai vek tur a ni, chu tilo chu a lo tawihin dil tuite chu sangha khawina atan a tlak lovah a siam thei a ni.

Buh phun dan:

Leilet bial te chu buh chin nan uluk takin buatsaih tur a ni a. Buh chin tur kha hmun hranah kuitiah hmasak phawt a, phun tham anih hunah phun tur a ni. Buh phun zawhah a tawkin tui kan dah lut anga, Tichuan bialchhung zawng zawng chu Sangha note dah theihna alo ni tawh ang. Paddy cum Fish culture a buh chin tur atan chuan tui tam in a chim pawha tuar thei resistant variety a nih a ngai. Tin, rannung leh natna te pawh lo awm se, sangha a awm ve tlat a vangin chemicals a hman ngam dawn lova, chuvangin tui chim leh natna tlanglawn deuhthe chu a tuar thei tur a ni.

Sangha note dah dan: Buh phun sawn atanga ni 15-20 hnuah buhte chuan zung an lo kaih nghet tan a, leilet bial chhung chu Sangha nun theihna tur a tua lo awm tawh hunah sangha dahluh mai tur ani. Entirnan leilet hectare khat a zauah sangha no 8000 chhuah dawn ta ıla a hnuai a mi ang hian chhuah mai tur ani.

Sl. No	Sangha chi hrang dah tur te	Za zela chhuta sangha dah tur zat (%)	Sangha no dahluh tur zat
1	Catla	15	1200
2	Rohu	20	1600
3	Mrigal	20	1600
4	Common Carp	20	1600
5	Silver Carp	25	2000
	Total	100	8000

Heng bakah hian minor carps te, catfish te, tilapia te pawh an khawi theih bawh a ni. Tin, sangha chi kan neih remchan dan a zir in sangha chikhat chauh pawh a khawi theih bawh. Hnimhna ei chi sangha te chu leilet buh hmunah chhuah loh tur a ni.

Buh phun atanga seng hun thlengin rannung thahna hlo hmanloh hram a tha. Buh chu a lo hmin chuan seng mai tur a ni a, buhseng lai hian bial chhunga tui paihkam deuh angaih thin avangin, Sangha hralh tham te chu hralh mai a tha a, a la te deuh te erawhchu dahthat rih mai tur a ni.

Leitha pek dan: Leitha pek dan hi chi hnihin a sawi theih, buh chin nana leitha pek leh sangha khawi ngaihtuah a leitha pek. Buh tana leitha pek tur chu bialah buh chawm nan a pek a ni a, sangha chawmna tura leitha pek tur te erawh chu sangha tawmna khur kan siamah khan pek ve mai tur a ni. Buh tana leitha pek hmasak turte chu buh tuh/phun rual a pek tur a ni a, a hnua pek tur te chu tlem te te a thensawm in sangha tana hlauhawm lo tura pek tur a ni.

Leitha pek tur zat hi leithat leh thatloh danah leh kan buh chin turah a innghat a, lei dinhmun zirchian phawt a a result atanga leitha pek a tha a ni.

Hectare khata zau buh hmunah leitha Urea kg 104, DAP kg 65 leh MOP kg 50 pe ila a tha tawh a, then sawm a thlatin pek tawh mai tur a ni. Sangha kan khawi bawh chuan hetiang hian pek tur a ni.

Sangha awmna biala leitha pek dan tur.

Sl. No	Pek turte	Pek dan tur	Pek turzat Kg/ha
1	Bawngek	A tirah	2000
2	Bawngek	Thla tin	1000
3	Urea	Thla tin	25
4	Ammonium Sulphate	Thla tin	30
5	Calcium Ammonium Nitrate	Thla tin	30
6	Single super phosphate	Thla tin	30
7	Triple super phosphate	Thla tin	8

Mizoram leilung hi a tlangpuiin a thur a, chuang chuan chinai thi pek a ngai thin. pH hniam leh san dan a zirin chinai thi pawh hetiang hian kan pe thin tur a ni.

Sangha khawina biala chinai thi pek dan tur

Tui/Dil pH	Chinai ngai zat (Kg/ha)
Leithur nasa tak (Highly acidic) 4-5 pH	2000
Leithur nasa vaklo (Moderate acidic) 5-6 pH	1200
Leithur deuh hlek (Slightly acidic) 6-6.5 pH	1000
Lei al/thur dan tawh chauh (Neutral) 6.5-7.5 pH	400
Lei pH >8.6 a nih in	Nil

Sangha Chaw pek : Sangha buk rihzawng 2-3% BW pek thin tur ani. Sangha te an lo thanlen hian an chaw mamawh te a lo pung ve zel a, hectare khat hmunah favai leh oilcake zat leh zat (1:1) a chawhpawlh pe ila a tha. Tin, thlasik laiin sangha ten an chaw mamawh a tlem a ni tih hriat bawh atha.

Buh biala sangha khawi thar hlawk dan hi nasa takin a danglamin a in thlau thei a, a thar hlawk leh hlawk loh emaw a thar zat hrim hrim pawh hi tui, lei that dan, ni eng hmuh dan, organic manure tam danah a innghat lian hle. Hei bakah a sangha chi (species) leh buh variety a zirte, tui tlin thuk leh pawn dan a zirte, lo neituten thlai leh sangha an ngaihven leh enkawl danah te a innghat lian hle. Theihtawp chhuah a buh leh sanghate

enkawl chuan a thar tam thei bik hle a, enkawl dan a zir a ni ber. Sanghate an chhuah bo ven nana bial tlang siamthat, sangha tawmna tur khur bang tih rinawm, tui luhna leh chhuahna te mumal taka siam that fo tur a ni.

Buhchin leh Sangha khawipawlh hlawkna :-

- (1) Buh mal ngawta chin aiin Sangha nen a khawipawlh hi buhin a ngeih zawk. Common carp te hi lei nawr reng chi an ni a, buh hmun kan thlova, hlobet kan paiha, lei kan hai phut buhin an ngeih ang bawkin sanghaten hlobet leh buhbulte an nawr a, lei an tihdanglam kha buh in a that phah a, a thar hlawk phah thin a ni.
- (2) Sangha hian buh tichhe thin rannungte, an tui keu hlim pangang (Larva,nymph) te an ei thin avangin an tangkai hle a.
- (3) Sangha ek te hi lei titha tu an ni a, buh thar a ti hlawk bawk a ni.
- (4) Tui a thuk lova, Ni eng an hmu tha a, leilet mawng thlengin nizungin a chhun a, sangha khawi chhung reilo mahse dil pangngai aiin Sangha a thang chak bik.
- (5) Hlo thlawh nana tha leh sum sen thin a titem a. Leileta sangha khawi hian senso belh a tlem hle a, buh hmun kha tangkai takin sangha khawi nan kan hmang mai a ni.

(6) Buh kungah te chuan rannung chi hrang hrang
fu in tuih an tla a, chung rannung te chu Sangha
te tan chaw tha tak an ni. Hei bakah hian buh alo
puitling huna buhfang tla leh a seng laia
mihringin kan tih tilhte chu sanghate tan chaw tha
tak an ni bawk. Hengte avang hian kan tuikhuah a
sanghate kan chawm ang em in chawmlo mah ila
buh kara sanghate chu an thangtha in an thau duh
tho ani.

SANGHA DIL A CHINAI HMAN DAN

Sangha dil siam dawn leh a sawngbawl nan chinai hman hi sangha dil siam dawn a thil pawimawh ber tiin a sawi theih awm e. chinai hian tui leh lei quality a tit ha em em a, hei vang hian dil siam tu ten an hmang nasa hle ani. Chinai hmang a dil leilung sawngbawl hian dil a ti thianghlim in sangha tharchhuah tam zawngah pawh nasa takin a pui ani. Chinai hmanga dil sawngbawl hian sangha te eitur leh hrisel nana pawimawh em em sangha chaw (phytoplankton & zooplankton) te insiamna kawngah a thawh hlawk hle ani. Chuvangin, sangha dil siam dawn a chinai hman hi a pawimawh in a tha em em ani.

Sangha dil a Chinai hnathawhte:

Sangha dil a chinai hnathawh ber chu tui leh leilung thur dan (acidity) a ti hniam ani. Hemi bakah chinai hnathawhte chu:

1. Sangha te tha taka an than len theih nan a pawimawh tak dil a sangha chaw in siam (natural food) a ti pung ani.
2. Chinai hmang a dil sawngbawl hian sangha te than len nan a pawimawh tak chaw tha (plankton) te in siam nan a puitu phosphate te a ti tam a ni.
3. Lei thur zawng tehna pH 6.5 hnuai lam anih chuan, phosphate te kha iron leh aluminium ten en an lo inpawlh thin avangin phosphate level a hniam hle a, chuvangin chinai hmanga lei sawngbawl hian phosphate a ti tam in, chu

chuan sangha chaw (plankton) te lo insiamna kawngah nasa takim a pui ani.

4. Chinai hian sangha te than len nan a pawimawh Calcium a pe ani. Tuiah calcium a awm tam tawh loh chuan carbondioxide kha carbonic acid ah lo insiam in, tui alo thur ta thin a ni. pH 5 emaw a aia hniam a lo ni thei a, chhunah erawh chuan thlai ten ni eng nen tangrualin chaw siam nan an hman avangin tui chu alo al leh deuh zawk thin. Dilah chutianga pH inthlak thlengna chhun leh zana alo awm thin avangin sangha tan a tha lovin a hlawuhawm em em a, thih phuk phukna te pawh a thlen thei thin ani.
5. Chinai hian chirh leh thil nawi tam tak tui a lang turte a veng a, leitha atanga sangha chaw insiamna a pui bawh a, thlai than nana tul calcium siam a, he calcium hi sangha ruhte insiamna atan a tangkai hle bawh a ni.
6. Chinai hi lei thur lutuk siamthatna mai ni lovin, sangha dil tui leh lei tih thianghlimna leh natna hrik thenkhat tih rem nan a tha bawh.
7. Chinai hian tui a ti fim bawh a, hei hian dil mawng lam a ni eng lut a ti tam ani.
8. Chinai hian tui a sangha te hip tur oxygen a ti pung.
9. Dil mawngah hian boruak tha lo (toxic gas) a in siam nasa thin a, dil tikang in a mawng sawngbawl theih loh pawhin chinai hmanga dil sawngbawl hian boruak tha lo te hi a ti zia awm thei a ni.

Sangha dil a Chinai hman zat tur:

Dil a chinai hman zat tur hi dil pH a zirin a hrang thei hle a, dil pH a hniam chuan chinai hman tam tur, dil pH a san chuan chinai hman tlem mai tur, a hnuai a kan tarlan ang hian.

Tui/Dil pH	Chinai ngai zat (Kg/ha)
Leithur nasa tak (Highly acidic) 4-5 pH	2000
Leithur nasa vaklo (Moderate acidic) 5-6 pH	1200
Leithur deuh hlek (Slightly acidic) 6-6.5 pH	1000
Lei al/thur dan tawh chauh (Neutral) 6.5-7.5 pH	400
Lei pH >8.6 a nih in	Nil

Chinai hman dan tur:

1. Dil lei lung buatsaih laiin dil mawngah theh tur.
2. Dil ah tui a tlin tawh chuan chinai kha dil a thehluk hma darker 3-4 tal tin/bel ah tui nen chawhpawlh hmasak tur, chumi hnu ah rualkhai takin dil ah thehluk tawh mai tur.
3. Tui ph zingkarah a hniam thin avangin zing hmatak a hman atha.
4. Sangha dahluh hma in chinai kan hman tur zatve chu dilah phul tur a ni.
5. A bak zawng chu tum 3 emaw tum 4 emaw vel a hman tur a ni.

Dilah sangha chaw a lo pun theih nan Chinai hman bakah leitha bawngkek leh leitha dang (Inorganic fertilizers) Ammonium sulphate, Single Super Phosphate leh Calcium Ammonium Nitrate (NPK) te hman a tul tel bawh a ni.

Chinai chi hrang hrang te:

Leithur tih reh kan tum hian kan tih ber chu Leithur siamtu H^+ ions leh Al^{3+} ions te neutralize turin basic cations Ca^{2+} leh Mg^{2+} te kha leiah kan zuk telh belh a ni ber.

1. Calcium oxide or Quick lime
2. Calcium hydroxide or hydrated lime or slaked lime
3. Calcium carbonate or Agriculture lime
4. Dolomite.

Calcium hydroxide (chinai thi) kan tih mai hi a man a tlawm mai bakah awlsam tak a hmuh theih anih avangin hman tlanglawn ber ani. Chinai thi hi tui nen a pawlh hian a so bawrh bawrh thin avangin fimkhur tak a hman tur a ni.

Tlangkawmna:

Chinai hmanga dil sawngbawl in a tum ber chu dil pH tih san ani, chumi chuan dil tui a lei nawi leh thil nawi dangte lakah dil a ti thianghlim in ni eng dil ah tha takin a luh theih phah thin a, chu chuan sangha te than lenna turah kawngro nasa takin a su ani. Chinai tangkaina tam tak kan sawi

tawh ang khian, zir miten chinai hmang a dil
sawngbawl hi a tha zawk ani tih an zirchhuak a,
Sangha hlawk tak leh hrisel tak a thar tur chuan
chinai hmanga dil sawngbawl hi sangha khawitu ten
kan tih makmawh a ni.

HOME SCIENCE

BAMBOO SHOOT: OPPORTUNITIES AND PROCESSING

Thuhmahruai

Mau/Mautuai hi kum 2500 AD liam ta daih tawh khan Chinese hovin an lo ei tawh a, Tang Dynasty (618-907) leh Ming Dynasty (1368 – 1644 AD) hunlai atang tawh khan mihring taksa tana a thatzia an lo hre tawh a ni.

Japan ramah chuan Mautuai hi “*King of Forest Vegetables*” an ti hial a ni.

Mautak tuai, Tuaiterek, Nal tuai, Raw tuai, Raw thing (Thing tuai) te hi Mizoram a kan hmuh te chu an ni deuh ber.

Khawvel ah hian Mau chi hrang 1250 (species) awmin 22 million hectres vel a zau hi khawvel an awh a ni.

Mau te hi a tlangpuiin tropical, sub-tropical leh temperate zone (Europe leh Western Asia te tellovin) ah te an awm duh bik a ni.

India pawh hian a resource neihthat ber te zing a mi chu Mau ngaw hmun (Bamboo forest) hi a ni.

India ram a tharchhuah Mau za a sawmnga (50%) te hi North Eastern region leh West Bengal lam a thar chhuah an ni.

An danglam dikna (Unique features)

- 1) Antartica khawmual tih loh ah chuan an awm thei deuh vek a.
- 2) Kum khat a ruah tla 750mm – 2000mm thleng in an tuar chhuak thei.
- 3) Khawvel a thing thang chak ber niin datkar khat ah 5cm (5cm/hr) emaw Ni khatah 1.5 meter (1.5m/day) in an thang thei a, thla 4 – 6 an nih hian an an nih dan tur ang zawng zawng an ni hman vek thawh.
- 4) Boruak chhia (air pollution) siam tha zung zung tur hian Mau te hi an tangkai em em bawk a.
- 5) China tih loh ah chuan India hi khawvel a Mau ngaw hmun (Bamboo forest) nei zau ber kan ni.
- 6) Mautuai hian Tur a pai ve a, mahse a tur pai Cyanogenic glycosides hi kan chhumna ah a thi vek a, a hlauhawm lem loh a ni

Area production in North Eastern India

Sl. no	States	Area (sq.km)	%Forest Area
1.	Mizoram	9210	49.1
2.	Assam	8213	34.5
3.	Arunachal Pradesh	4590	6.7
4.	Manipur	3692	21.2

5.	Meghalaya	3102	19.8
6.	Tripura	939	16.9
7.	Nagaland	758	5.3

Source: CFTRI

**Nutritional value of cooked Bamboo shoot in
1 cup (155grams)**

Sl.no	Nutrients	Value (in grams)
1.	Calories	64
2.	Protein	2.5
3.	Fat	4.5
4.	Carbohydrates	5
5.	Fibre	2
6.	Potassium	680
7.	Sodium	6
8.	Vitamin E	9% Daily value (DV)
9.	Vitamin B6	14%
10.	Vitamin K	3%

A tlangpui a kan taksa atana an that na te:

- 1) Mautuai hi taksa rihna tih hniam (weight loss) nan a tha hle a, thau chhia (LDL Cholesterol) a tihnam thei a ni.
- 2) Potassium a pai tel vangte hian lungphu leh blood pressure a thunun tha hle bawk a.
- 3) Dietary fibre a pai tam avangin ek khal vengin chaw pai tawih (digestion) a pui a, ril atanga tur leh bawhlawh paih chhuah puiin ril leh tai a ti hrisel bawk.

- 4) Taksa in natna a do let theihna khawl (immune system) a tichak bak ah natna do let kawngah taksa apui tha a ni.
- 5) Copper leh iron an pai tel hian (RBC) a siam chak a, thlum (sugar) a pai tlem avang hian zunthlum nei tan pawh insum lutuk a ngai lem lo.
- 6) China ram ah chuan nachhawknah leh pan leh hliam ti dam tu atan an hmang thin.

Mautuia chi hrang hrang a siam chhuah te

- 1) Mautuai pickle (Bamboo shoot pickle)
- 2) Mautuai Tauh (Chutney)
- 3) Mautuai Jam
- 4) Mautuai Rep (Dehydrated)
- 5) Mautuai chial tui a vawnthat (Canned bamboo shoot)
- 6) Mautuai sweet (Candy)
- 7) Tuai thur (Fermented)

Keini Mizo te hi chuan a chhum han, bai thak, hel kan, sa um nena bawl, vaipa den leh pickle te hian kan ei tlang pui a ni.

Mautak tuai Pickle siam dan

- 1) **Bawlhlo ngai te:** Mautak tuai - 1 kg (15-20 pum)
- 2) Purun var – 1 bawr
- 3) Sawhthing – Bung tawi te
- 4) Purunsen – 1 pum (medium size)
- 5) Aieng – 1Tsp

- | | |
|----------------------------|----------|
| 6) Hmarcha dip sen | – 1 Tsp |
| 7) Antam tel (mustard oil) | – 300ml |
| 8) Jeera powder | – 1tsp |
| 9) Vinegar /Citric acid | – 2Tsp |
| 10) Pickle masala powder | - 2-3Tsp |

A Siam dan:

- 1) Mautuai chu fai tak a sila, sin te te a chan hnuah tui chi al so ah 5-10 mins vel chhum so bawrh bawrh tur.
- 2) Chumi hnuah chuan a tui chu thlit hul a, thlangra fai ah dah daih pahin chap hul deuh tur.
- 3) Tel chhuan sat lai chu ti hniam deuhvin purun var, Sawhthing leh purunsen den sawm te chu thlak a an buang deuh hunah aieng, jeera, pickle masala powder, hmarch dip te chu thlak leh a, uluk tak a chawh leh tur (2 minutes vel).
- 4) Tel ah chuan mautuai dah hul ho kha thlak leh a, spices te nen a inchawhpawlh theih nan uluk taka chawh tur.
- 5) 5-10 minutes vel chhuan hnuah vinegar telh leh in mei tih thih tawh tur a ni.
- 6) A daih hunah bur fai ah dahthat in duh hn hunah ei theih tawh mai dawn a ni. (hmun dai vawt lam a dah a fin thlak)

Tlangkawmna

Khawvel hmasawmna kal zel ah hian thing leh mau te pawhin an tuar a, kan sik leh sa thlengin nghawng nasa tak a nei a ni.

Chumi a nih reng lai chuan kan dam khawchhuah
na tur in ei leh in tha kan taksa in a mamawh ang
zel a ei a ngai ve tho a ni.

Mautuai hian kan taksa hrisel na atan chaw tha tam
tak a pai a, a vanglai na na na chuan duh tawk tawk
a ei theih turin bazar leh ram a khawrh mai tur in a
awm thin a ni.

A tuina piah lamah a hriselna vang zawk a ei hi a
fin thlak hle.

POST HARVEST MANAGEMENT & VALUE ADDITION OF DRAGON FRUIT

Thuhma

*Dragon fruit hi Central America, Mexico & South America ram te hi ching hmasa pawl an ni.

*A kung hi cactus anga zam, tuihnang ngah tak, a var emaw sendang in zan lamah a par chhuak a, a rah hi Kiwi thei amg in chi te tak te te, a kawr tih loh chu a chi te nen ei theih vek an ni.

*Phillipines ram ah chuan kum khat a an thar chhuah hi 25tones/hectare a ni.

*July leh October thla inkar hi thar chhuah vanglai a ni.

Dragon Fruit chi hrang te :

Dragon fruit hi chi hrang hrang pali an awm a, Mizoram ah chuan a sendang leh a var ho hi kan chin uar deuh te an ni.

- 1) *Hylocereus Undatus (Red Pitaya)* – A kawr sen, a chhung var chi
- 2) *Hylocereus costaricensis (Costa Rica Pitaya)* – A kawr sen , achhung dum
- 3) *Hylocereus selenicereus* – A kawr sen, a chhung sen no.
- 4) *Hylocereus meianthus (Yellow Pitaya)* – A kawr leh a chhung eng chi.

Dragon fruit taksa tan a thatna te :

- 1) Antioxidant (flavanois, phenolic acid leh betacyanin) chak leh tha tak an awm a, heng te hian kan taksa a timur (cell) te lo chhe hlui tur a

- veng mai bak ah siam that zung zung hna an thawk a, cancer natna te pawh a veng thei a ni.
- 2) Thau awm loh na (free fats) thei an nih avangin BP sang, diabetic leh rihna tlak hniam tum te tan pawh thei tha tak ani.
 - 3) Fibre an pai tam avang hian thil ei inkar ah pawh rei tak ril tam lovin mi a siam thei a ni.
 - 4) Prebiotic tha tak a nih na hian kan kawchhung a bacteria tha mi te a lo tipung chak a ni. Ril leh pai tawihna lam ah pawh nasa takin a lo pui zel a ni.
 - 5) Vitamin C an tha hnem na hian taksa raldo khawl a enkawl that bak ah nasa takin a tichak a ni.
 - 6) Taksa a iron level ti sang tu tan an tangkai hle a, hei hian taksa a oxygen in pe kual zung zung tur in a pui bawh a ni.
 - 7) Magnesium an awm tam avang hian tihrawl leh thluak ten mumal takin hna an thawk thei a, blood sugar leh pressure sang lutuk tur te a lo veng zel bawh a ni.

Nutrient content in 100grams

Sl.no	Nutrients	Amount (gms)
1.	Calorie	60kcal
2.	Protein	1.2 g
3.	Fat	0 g
4.	Fibre	3 g
5.	Vitamin C	3% of RDI

6.	Iron	4% of RDI
7.	Magnesium	10% of RDI

Source: *United States Department of Agriculture 2019*

Post harvest management pawimawh na :

Kum tin Horticulture thar chhuah 1/3 hi chhe ziah ang a chhut an ni. (*Rosalina co.,2021*) A tam zawk hi a seng/lawh hnu leh a hralh chhuah hma in a chhe tlangpui. A dang te hi transportation leh a dahna uluk loh vangin an chhe thin bawk a ni. Post harvest infrastructure that tawh loh vang pawh in thlai thar chhuah te hian an tuar hle thin a ni.

1) An mahni nih na rim, lan dan, thlum/thur dan leh rawng te nen bo lova vawnthat

2) Ei tlak leh thil dang atan sawngbawl chhunzawm theih tur a vawn that.

3) Ei leh seng inkar a tichhe theih tih tlem/bo.

4) Awm tawh loh hnu/ a vang thawh hun (off season) atan a lo dahthat.

Thlai/thei thar te an chhiat hma nachhan

Thlai emaw thei thar hlim te hi :

- 1) An la nung,
- 2) An la thaw thei,
- 3) An mahni ah lum na an la pechhuk thei,
- 4) An hnawng pai a la chhuak thei,
- 5) An dam lo theih bak ah,
- 6) An thi leh thei a ni.

Heng a hnuai a mite hian kan thlai leh thei thar chhuah te min tih chhiat sak tu an ni:

- 1) Biological factor – Enzymes.
- 2) Improper handling and – Transportation & Storage condition.
- 3) Microbial spoilage – bacteria, mold emaw fungi in an ei chhiat.

A ven dan tur tlangpui:

- 1) Thali leh thei te hi chhe awlsam ve tak an nih avangin a kung atanga lawh leh dahthat na thleng a kan uluk leh fimkhur a tul a ni.
- 2) Kan lawh dawn chuan boruak daih/vawh lai ber a lawh hi a tha a, lawh zawh hnuah chuan dahthatna turah bawm hlai/zau tha ah dah nghal in,hmun lum lo/ni chhun loh na lama dah hram hram a tha bawk.
- 3) Lawh sa te chu bengmuk loh a, tawt lutuk a dah loh bawk tur . An huh emaw hnawn laia lawh loh a tha bawk, hei hian a ti tawih hma duh a ni.
- 4) A tawih leh nget , rannung ei na awm te chu dahthat hmian thenfai a, dah hran vek a him bawk, hei hian a dang chhe/thawih kai zung zung tur nasa takin a veng thei a ni.

Dragon Fruit Juice (RTS) 2kg atan

Dragon fruit hmin tha
Sil fai a, kawr kheh
Chan sin a her sawm
Her sawm te chu tui 2 lt leh chini ½ kg pawlh a chuan
Citric acid 10g tel a 5 minutes vel chuan chhonzawm tur
A chung phuan paih fai
Bottle fai ah chhun luh
5-10 minutes vel tui so chhuah hma thleng chuan leh tur
Dah daih
Hmun dai /vawt lam ah dahthat

Dragon Fruit Jam (1kg)

Dragon fruit hmin thar lam
Sil fai a, kawr kheh
Chan sin a her sawm
A tui thlit chhuah
Chini 1kg nen pawlh a, chum so bawrh bawrh
½ teaspoon citric acid telh
Pectin powder 15g/kg pawlh leh a, chuan char char
TSS 65-68 ⁰ Brix a nih thleng in chhuan
A sat lain a dahna tur bottle ah chhun luh
An daih hma chu chin loh tur
Phui taka chin hnua ah hmun vawt/dai lam ah dah tur

Tlangkawmna

Thlai a ni emaw thei pawh nise hrisel tak a thar chhuak leh vawngtha tur chuan tuh/chin lai atanga ei tur atana buatsaih dawn thlenga uluk hian a hril thui em em a. A chi lei na, a hmunhma buatsaih nan, leh enkawl chhun zawm nan tha leh zung tam tak sen ral a ni thin bawk a, heng zawng zawng te hi hre reng in uluk leh zual a thlai leh thei te hi sawngbawl nawn leh tlak tur a hma lak a pawimawh tak zet ani. Chumi a nih loh chuan tha leh sum te seng thawn mai a lo ni dawn a ni.

Hun bi nei an nih avang hian a enkawl, sawngbawl leh vawnthat dan pawh a danglam ve thei a. Apawimawh ber lai erawh chu Ei chhunzawm tlat leh hralh tlak tur a lo buatsaih hi ani.

A tui vang chauh nilovin a hrisel vang zawk a ei hi a fin thlak hle bawk.

FOOD PRESERVATION & PROCESSING

Thuhmahruai

Ei leh in leh hriselna hi thil inkungkaih tlat sawi hran theih loh tawp ani. Kan hriselna lungphum innghahna pawh hi ei leh in ah a ni. Taksa mamawh a phuhruk that chuan taksa a lo hrisel a, hmel a mawi a, a chak tha a, natna a lo do let chak thin. Mamawh tawh kan ei loh erawh chuan tlakchham natna hrang hrang kan nei thei a, chubakah, taksa a chak tawh lova, hri leng a do chak lova, kan nun a nguai thin a ni.

Food preservation awmzia

Food preservation tih chu – eitur thei lam chi emaw thlaihna leh rah lam chi emaw chhelova/tikhawtlai a hunrei zawk dahthatna/vawnthatna dan hi a ni. He vawnthatna dan ah hian a rawngte, rim te, chakna/hriselna te nen an vawngtha tel vek a ni.

Post-harvest technology awmzia leh pawimawhna

Kan buh leh bal, thlai thar chhuah tawh te reng reng hi nakin hun atana sawngbawl/vawnthat/ei theih tur a dahthatna dan hi a ni. A tlangpuiin hmun lum aiin dawt/dai lam a dah te, an mahni hmawna(moisture)kal ral mai tur lo ven/tihtlem te, seng/lawh laia pem/hliam awmlo tur a fimkhur te a tul em em a ni. Heng point pali(4) kan hriat reng atan a pawimawh a ni:

- 7) An mahni nihna (lan dan, hrisel/chawtha pai dan, an nem/sak/khal dan, rawng lan dan leh rim awm dan) te hi bo lova dahthat/vawnthat.
- 8) Ei leh thildang atana sawngbawl tlak tur a vawnthat
- 9) Kan seng leh ei inkar chhunga tichhe thei tih bo/tem.
- 10) Awm tawh loh hun/a vang hun tawh (off season) atan a lo dahthat.

Ei leh in tur lo chhiatna chhante

Kan ei leh in tur te hi chhan awm lo chuan an chhe ringawt ngai lova, eitur kan dahthat/vawnthat dawn chuan a tichhe theitu te kan hriat hmasak a pawimawh a ni. Heng a hnuai a mite hi kan ei leh in tur tichhe thei tlangpui te chu an ni:

- 1) Hrik te reuh te te, mita hmuh tham loh (microorganisms)
- 2) Dawihlo(enzymes)
- 3) Hnawng & hmuar
- 4) Rannung(chukchu, sazu, tho etc.)

Engvangin nge eitur te hi vawnthat/dahthat a pawimawh

- 1) Ei sen loh, chhe tawih ral mai mai tur a tih tem phah.
- 2) A vanlai/awm tawh loh hun (off season) ah pawh ei theih maiin an awm.
- 3) Nitina kan chawhmeh te an tih tam bakah balance diet te pawh min pe thei bawh a ni.

- 4) Siam leh sawngbawl nawn leh duh pawhin awlsam te in a tih thei a ni.
- 5) Hmun hla lamah leh hla lo pawh nisi se ken kualna ah harsatna a awm lo.

A vawnthat dan tlangpuite

- 1) **Temperature sang tak hmangin** –Temperature sang tih chuan chhumso/chhuanso bawrh bawrh tihna a ni. Hetianga sawngbawl hian eitur tichhe theitute chu an thi theia, mahse kawrchha chi (spore forming) ho chu chuan rei deuh an ngai thin.
- 2) **Temperature hniam zawk hmangin** – Temperature hniam tih chuan hmun vawt lam ah tihna a ni. Eitur tichhe thei hrik leh rannungte hi a than te chu hmun vawtah an in thlahpung thei loh avangin hmun vawha dah hi vawnthatna dan pakhat a ni.
- 3) **Damdawi hmangin** – awnthat/dahthatna damdawi hmangt hian kan thil siamte chu hun rei tak chhung a vawngtha thei a ni. Sulphur dioxide, benzoic acid, sodium benzoate, citric acid leh potassium metabisuphate (KMS) etc. Te hi hman thin tlangpui an ni. Heng te hi **Class- II preservatives an ti bawk a ni.**
- 4) **Chini leh chi hmangin** – Chini leh chi te hi eitur vawngthatu atan hman thin a ni. Chini hi 68% vel eiturah awm chuan an lo vawngtha thei a, an thlumna hian a tichhe theitute an lo hip bet thin a, chi hi 15-20% vel eitur ah awm chuan hei pawh hian a lo vawngtha thei reng bawk a ni.

Heng chini leh chi te hi Class- I preservatives an ti bawk.

- 5) **Ni a pho ro (sun drying)** – Ni zung chakna hian eitur tichhe theitute hnawng awn te kha a lo hip ro in chu chuan rei tak chhung eitur te kha a lo vawngtha thei bawk a ni.
- 6) **Tel leh bawlhlo dang (oil & spices) hmangin** – Heng tel leh bawlhlo dang masala kan tih mai te pawh hian eitur an lo vawngtha ve thei a ni. Vawnthat tur te chu tel thahnem takin a lo vawngtha reng a ni.
- 7) **Um hmin (Frementation)** – Um hmin kan tih hian kawng hnihin a awm a- desirable fermentation (curd, cheese etc.) leh undesirable fermentation (thei tawih, bawnghnute chhia thur) te an ni.
- 8) **Bur thianghlim leh fai boruak luh theih lohna (air tight).**

In lama vawnthat theih dan tlangpuite – Ni sa a phoro (sun drying), refrigeration (hmun vawta dah), Chhum sa bawrh bawrh, tel,chi leh chini hmang te in.

Eitur vawnthat dawn a hriattur te – 1) Eitur chu sil fai a, hul thei ang ber a dah tur. 2) Dahna tur chu bur emaw sarang pawh nise a fai/ro tha tur a ni. 3) Pickle lam chi a nih chuan tel thahnem lam a pawilo. 4) Suah chhuah dawn pawhin fian fai leh hul in suah thin tur. 5) Phui tei ang ber a chhin a, hmun dai/vawt lama dah a duhawm leh zual.

Tlangkawmna

Eng thlai pawh hrisel tak a thar chhuak tur leh vawngtha tur chuan kan tuh/chin lai atanga kan seng hun thlenga enkawl dan hian a hril thui em em a. An hnah leh rah hrisel hian kan vawnthat/dahthat zelnat tur ah pawh nasa takin min tanpui thei a ni. Kan vawnthat dawn pawhin an tlawm lai/tam laic huh hi fin thlak hle bawk. Vawnthatna dan hian pickle ngawr ngawr a khaw lova jam, jelly, squash, sauce

Bawlhlo ngaite –

Zohmarchate -1 kg, Purun var – 20-30 nos, purun sen – 3 pum lian, Sawhthing – tam lo te, zeera powder – 1 Tsp, aieng – 2 tsp, pickle masala powder – 3- 4Tsp, vinegar – 5-7 Tsp, musrard oil – ½ lt.

Siam dan –

- 1) Hmarchate te chu an kuang mal zawh a fai taka sil a, chhap hul hnuah rawt/her sawm leh tur.
- 2) Purun var, purun sen, Sawhthing te pawh rawt sawm vek a pawlh in dah leh tur a ni.
- 3) Tel chu chhan sa hnuah purun var ho pawlh kha thlak a, uluk takin chawh a, mei tisan lutuk loh a tha.
- 4) Purun thlak te kha an lo buang tan ah aieng, zeera powder leh pickle masal powder te kha thlak leh auluk tak a chawhpawlh vek tur.

5) Hmarchate rawtdip sa te chu kan thlak leh anga, mei na lutuk lo ah uluk takin kan chawk ang. 5 minutes hnuah nkan suan thei tawh ang.

6) Vinegar pawh chu kan pawlh leh nghal ang, uluk takin kan chawk ang.

7) A daih hunah chauh kan dahna tur bur fai /ro ah kan khung anga, phui takin chhin leh ang.

8) Kan duh chuan ni sa ah pawh kan pho thei bawh.

(Kan duh chuan ei nghal theih a ni)

VALUE ADDITION ON JACKFRUIT (LAMKHUANG)



Thuhmahruai

Lamkuang (Jackfruit) hi thei chikhat hrisel leh man to lo tak, mahse kan ngaihsan em em vak loh thei a ni. A Scientific hmingah chuan *Artocarpus heterophyllus* niin tropical ram kan tih mai Philipines, Thailand leh Vietnam ram ah te an ching uar hle a, amaherawhchu South India khu a rawn chhuahna bul ber an ti bawk a ni.Kan taksa tan hian hriselna tam tak a nei a, hnam fing zawk te chuan **‘Vegetarian mutton’**an ti hial a ni.Mizoram ah chuan Lamkuang hmun (Farm) ang zawng siam a awm em em lova, kawng dung vel a lo rah leh mimal huan a kung hnih thum vel awm hi a ni deuh ber.

Kan taksa tana a thatna tlangpuite

Lamkuang hi kan taksa tana thei hrisel tak anih laiin kan ei tlem ber te zing a mi a ni. A hmin chauh hi Mizo te chuan ei theih/ei tur emaw kan ti thin. Lamkuang ah hian Vitamin A tha hnem tak a pai mai nilovin khuanu duansa antioxidant chi kha Lutein a pai bawk a ni. Fibre (Hrui/zam) a ngah avang hian ek lama harsatna nei a bikin ek-khal thin tan a tha em

em a, ril chhung a thau chhia tangkailo ho tifa tu tha tak ani. Lamkuang hian Sodium pai atlem hle laiin vitamin leh mineral dang a pai erawh chu a tamhle thung a. A hmin tawhah pheih chuan sugar, carbohydrates leh mineral pai te an tam hle bawh a ni.

Lamkuang hian kan hriselna atan tangkaina tamtak a nei a, chung zing a pawimawh langsar zual te chu:

- 1) Lamkuang ah hian fibre leh tui a apai tam avangin puar chhung a rei bik a, chumai nilovin calorie pawh a tam lutuk loh avangin rihna tih tlakhniam duh tan chaw tha tak ani.
- 2) A hmin ang lo takin lamkuang hel ah hian thisen a glucose level sang tur a tihnam thei a, hei hi zunthlum vei te tan chaw tha tak ani.
- 3) Soluble fibre (oats a awm ang chi) a pai tam em avangin cholesterol level tih hniam nan a tha em em bawh a ni.
- 4) Amah a awm hruihram(fibre) kan tih mai te hian kan kawchhung a bikin ril ho a tihfa that em avangin ril cancer tur lakah min veng thei bawh ani.
- 5) UK-a National Health Service te chuan exercise lak that loh aiin thlai rah leh thei ei tlem hian dam hun chung a titawi thei an ti a, mahse he lamkuang hi kan chawhmeh atana vawihnih khat kan hman hian kartluan a thlaira leh thei ei ang bawkin kan

taksa ah hna a thawk thei in kan hun chhung pawh
a ti sei thei an ti ani.

- 6) Chakna tha hrui min pe a, thisen kan taksa bung
hrang a in pump tur tha takin a lo pui a, red blood
cell a ti pung chak bawk ani.
- 7) Asthma vei theihna a tihniam a, tar harna tha tak
ani bawk a, ruh a tihrisel bakah mipa chi a ti nung
tha bawk ani.

Nutritional facts of Raw Jackfruit/100grams

Calories	- 95
Iron	- 1%
Total fat	- 0.6gm
Dietary fibre	- 1.5gm
Sodium	- 2mg
Carbohydrates	- 23gm
Protein	- 2.7gm
Sugar	- 19gm
Vitamin A	- 2%
Vitamin C	- 23%
Calcium	- 2%

Lamkuang pickle siam dawn a bawlhlo ngaite

Lamkuang hel - 500gm, Hmarchapui ro (aSen -
4-5

Theihai hel - 100gm(1 lian), Aieng - 1Tsp

Fenugreek chi - 10-15gm, Hmarcha dip sen -4-
5Tsp

Kala zeera - 50gm, Antam tel - 100ml

Rai/Sarsoi (a eng) - 10-15gm

Vinegar - 10ml , Chi - Duh dan tawka al in.

A Siam dan :

- 1) Lamkuang kawr hriam lai chu vel thlak vek a, a lairil paih a 2-3cm velin intiat thei ang ber a chan tur.
- 2) Tui 1 litre vel chhuangso bawr bawrh ah chuan aieng leh chi tlem thlak a, lamkuang chu chhum so char char a, a hnuai lam a nem tanah suan thlak a, thlithul hnuah ni ah 20-25 minute vel pho leh tur.
- 3) A hran te te in frnugreek, rai, kala zeera te chu tel telovin kan ro a, chumi hnuah chip vak lovin rawt leh tur, bowl faiah dah that leh phawt ila.
- 4) Theihai hel chu silfai a akawr vel in sin te te a chan leh tur, chumin hnuah chuan aieng leh chi nen uluk taka chawhpawlh tur a ni.
- 5) Kan bel mawng chhah deuh hleka tel chhuan sat ah chuan Hmarchapui ro, aieng, hmarcha dip leh spices kan rawt sa te leh theihai aieng leh chi a chiah te, vinegar te nen chuan uluk takin kan chawhpawlh anga, mei sa vak lohvah kan chhuang ang.
- 6) Tel sa a kan thil chawhpawlh ah chuan Lamkuang pho kha kan telh ve leh anga, uluk takin kan

chawk anga 2-5 minutes vel meisa ah kan chhuang ang.

- 7) Mei atanga kan suan hnuah chuan chhin loh vin a daih thleng kan nghak ang, burfai kan dahthatna turah chuan kan dah tawh ang. Ni sa ah duh chuan ni 4-5 vel pawh kan pho leh thei.(ain um that leh zual nan)

A traditional Indian thali platter, a circular arrangement of various dishes. The central element is a mound of white rice. Surrounding it are several small bowls and plates containing different curries and vegetables: a bowl of yellow lentil soup (dal), a bowl of red lentil soup (dal), a bowl of white rice porridge (kheer), a bowl of yellow vegetable soup (sambhar), a bowl of red vegetable soup (sambhar), a bowl of yellow vegetable soup (sambhar), a bowl of red vegetable soup (sambhar), a bowl of yellow vegetable soup (sambhar), a bowl of red vegetable soup (sambhar), a bowl of yellow vegetable soup (sambhar), a bowl of red vegetable soup (sambhar). The platter is garnished with fresh herbs and a small bowl of pickles.

Mihring taksa hi khawl ropui tak anga sawi a ni chawk a, a ropui zia hi tam tak chuan kan ngaihtuah ngai lem lo mai thei. Taksa ropui tak chuan englai pawha tha taka hna a thawh reng theihna tur chuan mamawh tam tak a nei a, chungte chu ei leh in atanga kan hmuh theihthe an ni.

Nitin ei leh in ah hian fimkhur deuh pawh a pawimawh hle a, mimal leh chhungkua pawhin kan thatpui na tur ni lem lo ah hian sum hi kan seng ral nasa em em leh lawi si thin a ni.

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Hetih rual hian kan taksa nena a inkungkaihna kan hriatthiam lohva ei tawk kan hriat loh chuan ei tur tha tak tak hi kan chhiatpui hlah thei thung a ni.

Thali chu enge ?

Thali chu thleng bial a chhunga chaw leh chawhmeh chi hrang hrang awm khawm te hi an ni. Hmun thenkhat ah chuan thleng chungah changel hnah an phah laiin thenkhat ah chuan changelhnah ah chuah an ei thin bawk. Thali ah hian a tlangpuiin chaw/roti tel lovin chawhmeh chi 5-8 vel a tel thin a, heng chawhmeh te hi steel bowl te (katori) ah tlem te te a chhawpchuah thin an ni. Kan taksa tana chaw tha chi kim awmna leh balance diet (complete meals) ni nghal bawk chaw a ni.

Calories content of Nutri Thali

Sl no.	Food Item (in bowl /katori)	Calories
1.	Rice (1 cup)	250
2.	Roti (1 no.)	25
3.	Dal	50 -60
4.	Chicken curry	150
5.	Vegetables subji	30
6.	Curd/Dhahi	40
7.	Gulab Jamun (2 no.)	150

8.	Salad	20
9.	Papad(2 nos.)	50

Composition of Nutri Thali

Nutri Thali/Thali hi sakhuana, awmna ram leh mimal duhdan (veg/non veg) a zirin a composition hi a danglam ve hret hret a, thenkhat ah chawhmeh chi 5 vel a awm laiin thenkhatah chuan chi 10 thleng pawhin a awm ve thin bawk a ni. A tlangpuia Thali chaw a awm thin te chu:

- 1)**Cereals** – Buh/Atta/Suji/Vaimim/Buhtun etc.
- 2)**Pulses** – Dal/Chana/Be lam chi etc.
- 3)**Vegetables / Roots & Tuber** –
Cabbage/mustard/tomato/potato etc.
- 4)**Non-vegetables** –
Arsa/sangha/artui/kelsa/bawngsa/vawksa etc
- 5)**Dairy products** – milk/ butter/badam
milk/Ghee/curds/dhahi/Raita etc.
- 6)**Salad**
- 7)**Pickles**
- 8)**Sweet dish**
- 9)**Papad (papawr)**

Nutri Thali leh kan hriselna

Kan taksa hi a lo hrisel leh chak zawk nan chaw tha chi 5 – Carbohydrates, Proteins, Vitamins, Minerals

leh Fats te hi nitin in kan mamawh a. Heng chaw tha te hian chakna thahrui bakah,than lenna kawng ah pawh an pawimawh em em bawh ani. Nutri Thali ah hian taksa in nitin a mamawh tawh te te chaw tha an awm vek a, rualkhai leh intluktlang (complete meals) taka chaw tha kan hmuh theih na an ni.

- 1) Combination of foods**
- 2) Supplementation**
- 3) Sprouting/germination**
- 4) Fermentation**

**Nutri Thali tih hrisel dan
(Enrichment of Nutri Thali)**

- 1) Buh hlang tawp lovin buhtun/vaimim leh attalam nen ei kawp in B complex vitamins, minerals, antioxidants leh fibre te kan nei thei.
- 2) An tam lam leh len zawng te tih hniam (eg. Roti 2/1 ei belh chuan 80 calories, chaw pawh bowl dang ei belh chuan 150 calories)
- 3) Chi, chini leh tel (butter/ghee/veg oil) lam siam nan tih tlem.
- 4) Up hmin(steam), rawh, ur hmin leh pressure cook a siam te hian an chakna leh that na tam tak an vawngnim bawh a ni..
- 5) A awm hunlai a thlai leh thei thar te (locally grown) siam uar. Hei hi a hrisel zawh mai nilovin chemical hlauawm lakah min veng thei bawh a ni.

Color					
WHITE	YELLOW	RED	PURPLE	GREEN	
Mushrooms, Onions, Cauliflower, Radishes, Eggplants, Garlic	Lemons, Oranges, Pumpkins, Corn, Bell Peppers, Kiwis	Tomatoes, Chilies, Strawberries, Raspberries, Red Bell Peppers	Purple Cabbages, Eggplants, Grapes, Purple Onions	Avocados, Peas, Green Beans, Broccoli, Spinach	
Immune system Protection of stomach Low cholesterol Healthy heart Healthy gut	Low cholesterol Healthy heart Healthy joints Eye protection Preventing cancer	Healthy heart Healthy blood vessels Skin protection Cellular rejuvenation Preventing cancer	Healthy heart Healthy blood vessels Improve your memory Cellular rejuvenation Protecting of the unhealthy system	Protection of stomach Healthy bones Eye protection Immune system Preventing cancer	

Eitur tel lova nung theilo mihringte kan nihna hian
eitur hrisel leh tha neih hlutna hi a ti chiang zual
thin.

Hetiang hi a nih avangin mi tin ten kan chhungkaw
phak tawh theuhvah kan taksa mamawh tawh ei kan
zir thiam a pawimawh hle tawh a ni.

Nutri Thali ang chiah chiah a kan buatsaih thei lo /ei thei lo anih pawhin, a hrisel thei ang ber a kan ei hram hram hi mimal mawh phurhna a ni.

NUTRITIONAL IMPORTANCE & VALUE ADDITION OF PINEAPPLE



Thuhmahruai

Kum 1493 vel atang Lakhuihthei hi South America a an chin tan in an sawi a, Christopher Columbus khan America atangin Europe lamah hawnin an ching pung ta nia hriat a ni.

Thei hrisel tak a ni a, a thlum tui em em mai bakah damdawi lamah pawh hman tangkai a ni.

An scientific hmingah chuan Ananas Comosus L.merr niin Kew, Queen & Mauritius te hi chi lar deuh te an ni.

Lakhuihthei kan taksa tana thatna te

Taksa raldotu (immune system) a tichak tha bakah chakna thahrui a siam chhuak nasa bawh a ni.

@ Beta-carotene awm that vang hian kan mit, sam, vun leh tin tan lo tha em em bawk a, chumai nilovin thawkna lama harsatna(Asthma) nei tan pawh nasa takin a tihnam thei a ni.

@ Hritlang leh khuh damdawi ah tan pawh a tha hle a ni.

@ Ruh leh thling te a tichak thar a, thisen khal zung zung turin atangkai hle bawk ani.

@ Lakhuihthei hi Vitamin C kan taksa tana lakluhna tha leh tam ber a ni a, puitling in nikhata vitamin C kan zahve hi chu lakhuihthei ah hian a awm a ni.

@ Taksa raldotu (immune system) a tichak tha bakah chakna thahrui a siam chhuak nasa bawk a ni.

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@ Ruh leh thling te a tichak thar a, thisen khal zung zung turin atangkai hle bawk ani.

@ Lakhuihthei hi Vitamin C kan taksa tana lakluhna tha leh tam ber a ni a, puitling in nikhata vitamin C kan zahve hi chu lakhuihthei ah hian a awm a ni.

Lakhuilh thei chaw tha paite@ 165g (1 cup)

Calorie	82.5Kcal
Protein	1g
Fat	0.2
Cholesterol	0
Dietary fibre	2.3g
Carbohydrates	19.5g
Calcium	21mg
Potassium	180mg
Magnesium	19.8 mg
Vitamin C	78mg
Vitamin A	10% RDA

Lakhuilhthei Squash siam dan

Bawlhlo ngaite :

Lakhuilhthei Tui	-- 1lt
Chini	-- 1-1.5 kg
Tui	-- 1.3lt
Citric acid	-- 40g
Pineappple colour	-- 1Tspg
Pineapple essence	-- 1Tsp
KMS	-- ¼ tsp

A siam dan :

- 1) Lakhui rah tha leh hmin tha tak kawr vel a, tet dan intiat a chan sawm tur (a lairil paih tur).

Chansawm chu sawr awl nan hersawm a, tui sawr leh tur.

- 2) Chini leh tui pawlh la, a zawp awl nan chhuang sat tur.
- 3) Chini chu a zawp ral hnuah lakhuihthei tui leh citric acid pawlh leh a, dah daih hnuah thlitfim tur a nia.
- 4) Rawng leh rimtui tleh leh a, chumi hunah KMS pawlh leh tur , ngun tak a chawhpawlh leh tur ani.
- 5) Dahthatna tur bur/bottle ah kan chhung lut anga(4cm vela phaiin) , phui taka chhin a, hmum vawt/dai lamah dahthat tur a ni. Tichuan duh hun hunah kan in thei tawh mai dawn ani.

**** KMS pawlh dawn in tui/theitui nen bowl/no ah

- uluk tak a chawhpawlh phawt tur.***

Lakhuihthei tui (RTS) siam dan

Bawlhlo ngaite :

Lakhuihthei Tuihnang (pulp)	– 1 kg
Sugar	– 600-700g
Citric acid	– 10 – 15g
Tui	– 4lt
Pineapple essence	– 1 ½ Tsp
Pineapple color	– 2-3Tsp

A siam dan :

- 1) Lakhui rah tha leh hmin tha tak kawr vel a, tet dan intiat a chan sawm tur (a lairil paih tur). Chansawm chu sawr awl nan hersawm a, tui sawr leh tur a ni.
- 2) Chini, tui, lakhuih tui sawr leh citric acid te chu uluk takin pawlh leh tur.(a zawp ral hma nan chhuan sat tur)
- 3) Rimtui na leh rawng te nen pawlh leh hnuah a chung a mite nen uluk takin chawh pawlh leh anga.
- 4) Thlitfim an ngaih chuan thlitfim a, dahthatna tur bottle fai ah dahthat a, in duh hun hunah in mai theih a ni.
- 5) Kan duh hun hun ah in mai theih tawh a ni.

Lakhuihthei Jam siam dan

Bawlhlo ngaite :

Lakhuihthei Tuihnang (pulp)	– 1 kg
Citric acid	– 1 – 1.5kg
Sugar	– 10 – 15g
Pectin powder	– 3- 4 Tsp/kg
Pineapple essence	– 1Tsp
Pineapple color	– 1Tsp
A siam dan :	

- 1) Lakhuihthei chu vel a, her sawm tur a ni.
- 2) Chini leh citric acid te chu lakhuihthei hersawm ah chuan pawlh a, 15-25 minutes chhuan leh tur a ni.

- 3) Lakhuieh chu a lo hmin deuh hnuah chuan Pectin powder telh leh a, reilo te (ahnang thleng) chhuan leh tur a ni
- 4) Tih rim tui leh rawng mawi na te telh leh ang a, uluk takin chawhpawlh tur.
- 5) A lo hnan thlengin chhuan tur, suan hun chuan novah tui dahin enchhin a, suan chauh tur a ni.
- 6) Dahna tur bur fai ah chuan khat lo deuh in dah la, a daih vek hnuah phui taka chhin a hmun vawt/dai lam ah dahthat tur a ni.

****(Pectin powder awm remchan loh chuan apple zai/chan sawm pawh telh theih tho a ni)***

NUTRITIONAL IMPORTANCE OF LOCALLY GROWN VEGETABLES



Ei leh in : Kan hriselna

Ei leh in leh kan hriselna hi thil inkungkaih tlat a nia, sawi hran theih pawh a ni lo. Kan hriselna lungphum ber pawh kan nitin a kan ei leh in ah hian a innhगत tlat a ni. Kan taksa mamawh chaw tha kan ei chuan taksa a lo chak a, natna chi hrang hrang a lo do let zung zung thin a ni. Mamawh khawp kan ei loh erawh chuan chaw tha thakchham avanga natna chi hrang hrang awm thei te vei/kai a awlsam bik a ni.

Vegetables kan tih chu nge ber nge ni?

Vegetables kan tih chuan thlaihna leh rah, mihring taksa hriselna leh chakna min petu, zing chaw/chhun chaw/zanria a kan ei thin te hi an ni. Thenkhat chuan a par te, a rah te, a hnah te, a kung/kuang te, a kawr te, a bul te leh a chi ho zawng zawng pawh hi vegetables hnuai ah kan dah vek mai a ni. Heng thlaihna leh rah te hi Chuktuah huan (kitchen garden) te, Chawhmeh bazar ah te, kawngpui sir ah te leh super market atang te in kan lei thin a ni.

Thlaihna leh rah kan taksa tana thatna te

Natna te pawh hi mihring tena kan tawrh ve tur a nih rualin, natna tam tak hi chu keimahni siam chawp a ni fo.

- 1) Thlaihna leh rah hian mawm leh thau an pai tlem bik a, thisen a thau chhia (cholesterol) kan tih phei chu an pai ve vak lo ani.
- 2) Kan taksa tana chaw tha (nutrients) pawimawh tak tak Vitamin A,C, K,B, potassium, dietary fibre, folic acid etc. kan hmuh theihna te an ni.
- 3) Thlaihna leh rah a awm fibre te hian thisen a thau chhia lo in khawl tur a veng a, ril te a tifai mai bakah kan taksa tana tangkai tawh lo ek chhuah tur thlengin an lo tanpui a ni.
- 4) Potassium an pai tam hlawm avangin blood pressure mumal tak (normal) mai min neih tir thei a, folate (folic acid) te hian kan thisen a si sen tu tur timur(cell) te an lo siam thar zung zung bawh a ni.

- 5) Vitamin A te an awm that avangin mit leh vun hrisel min siam a, awlsam te te a natna inkaichhawn theih lak ah min veng bawk a ni.
- 6) Pem leh hliam te ti dam zung zung tu atan Vitamin C pai te hi an tangkai em em bawk, ha leh hahni hrisel tak min neih tir thei bawk a ni.

Five Food Groups

Group I – Heng group hi chu chakna thahrui min pe chhuak thei chaw an ni a, naupang thanglai leh hnathawk nasa te tan chuan ei tam pawh a pawh lo(Cereals, roots and tuber)

Group II – Taksa siam thatu leh thanlen tir tu an ni(be lam chi, bawngnhnute,sa,artui)

Group III – Thau/ mawm leh thlum te hi chakna thahrui min petu an ni bawk a, taksa khawlkhalhtu leh lumna min petu an ni(tel,sathau,butter,chini,kurtai)

Group IV – He group hi chuan natna chi hrang hrang laka min venghimtu an ni.Vitamin te leh mineral kan taksa in a mamawh te min petu ber an ni(Thlaihna, **rah leh thei**)

Group V- He group hi chuan an tuina piah lamah kan taksa chhungril lamah nasa takin hna an lo thawk zawk thin a. Kan rilte, pumpui leh kan ek chhuah tur thlengin thenfai hna an lo thawk ve bawk ani(Bawrhsaiabe, changkha, berul,mautuai).

Taksa hrisel zawk kan neih theihna atan hriattur pawimawh te:

- 1) Chaw hun bi taka ei a, eitur chu a tui emaw tui lo emaw pawh nise kan taksa tan chaw tha an nih chuan ei hram hram thin tur.
- 2) Tui in tam leh taksa sawizawi hi eitur tha kan ei tluk zeta kan hriselna atan pawimawh a ni.
- 3) Carbohydrates, protein, vitamin leh minerals te tam na chaw ei a tha bawk.
- 4) Thil kan ei reng rengin chip tak a thial hram hram tur, kan ei tam aian kan thial chip leh chip lovin kawngro a su thui zawk.
- 5) Zing chaw hi tam thei ang ber a ei a, chawchhun tam vak lovi, zanriah pheih chu tlem te ei tawh tur ani.
- 6) Thinrim lai te, taksa hah lutuk lai te, rilru chi ai lai te in chaw ei loh tur a ni a, riltam lutuk in hun reng tak chung awm loh bawk tur.
- 7) Thlum leh al ei ur loh a tha, zuk leh hmuam ruitheih thil ah pawh fihlim a tha ber.
- 8) Ei tur reng reng a tui dan tur ringawt lovin a hrisel dan tur zawk a buatsaih hram a tha.
- 9) Zan mut tawh dawn a thil ei hi taksa tan a hrisel lem lo a ni.

Tlangkawmna:

Chaw tha kan ei a, nunphung hrisel taka kan nun hian natna tam tak kan pumpelth thei a. Kan awmna leilung a zirin, kan chheh velah hian kan hmantur/eitur hi Pathian in a lo dah reng mai a, a hman tangkai leh hrethiam apaingten an hlawk pui thin a ni.

Mixed Pickle (Mixed Achaar)

Ingredients:

- 1) Carrot – ½ kg
- 2) Green chilli – 20-25 nos.
- 3) Lemon – 14-15 nos
- 4) Fenugreek seed(Methi) – ½ Tsp
- 5) Cumin/jeera seed – ½ tsp
- 6) Black pepper – ½ tsp
- 7) Ajwain – ½ Tsp
- 8) Mustard seed – ½ Tsp
- 9) Coriander seed – ½ Tsp
- 10) Saunf/ fennel seed – ½ Tsp
- 11) Kala jeera – ½ Tsp
- 12) Red chilli powder – ½ Tsp
- 13) Kala namak – ½ Tsp
- 14) Turmeric/Haldi – ½ Tsp
- 15) Salt – ½ Tsp
- 16) Mustard oil – 1 lt.

A Siam dan:

- 1) Bawlhlo (ingredients) 4 na atanga 11 na ho
zawng zawng hi tel tel lovin mei ah ur hmui
tur a ni.
A lo daih deuh hnuah den chip leh tur.
- 2) Her dip sa te chu bawlhlo 12 na atanga 14 na
te nen uluk taka chawhpawlh leh tur a ni.
- 3) Carrot, Lemon leh green chilli te chu fai
takin sil a, a theih ang ang a hruk hul hnuah
kan duh dan size in kan zai ang.
- 4) Bur fai ah kan dah lut anga, masala den chip
te nen uluk takin pawlh leh tur a ni.(5-10
minutes vel lo inchiah lawk tur)

- 5) Antam tel (mustard oil) chhuan hmui a, a daih hnuah pickle burah chuan a chim thleng in tel chu leih luh leh tur a ni. (a lo lang emaw, pil tha lo awm chuan fiante fai ro in kan nem pil vek ang)
- 6) Ni ah (direct sunlight ni lo ah) pho hnu ni 4-5 vel hnuah ei theih tawh mai dawn a ni.

****Ni a pho hian a in pawlh thatna thin ve zauh zauh thin tur.***

****Ei dawn hunah fian fai ro a suahchhuah thin tur.***

****Uluk taka kan vawnthat chuan 6-7 months thleng pawh a dahthat theih thin a ni.***

POST HARVEST MANAGEMENT & PROCESSING OF GINGER

Thuhmahruai

Sawhthing hi thlai chi khat pawimawh tak leh enkawl hautak lo a ni. Herb leh spice, damdawi leh chawhmeh tlak chi nikawp a ni. hmanlai atang tawhin damdawi atan an lo hmang tawh a, Asia khawmualpui a chengte hian chawhmeh atan kan uar leh zual bik a ni. Sawhthingah hian chi hrang hrang a awm a, chung zingah chuan –Thinglaidum, Thingria leh Nadia(Kolasib khaw thlang lam ramri dep ho chin deuh) Mizoram ah chaun chin uar deuh te an ni.

Sawhthing chaw tha paite @ 100g zel ah

Calorie	80 Kcal
Carbohydrates	17.8g
Protein	1.8g
Fat	0.7g
Dietary fibre	2g
Phosphorus	34mg

Potassium	415 mg
Copper	0.2 mg
Niacin	0.7 mg
Magnesium	43 mg
Vitamin C	5 mg
Vitamin B6	5 mg
Iron	0.6 mg

Sawhthing sawngbawl dan chi hrang te:

Sawhthing Sweet (Ginger candy)

- 1) Sawhthing thar lam tha thlan chhuah tur
- 2) Uluk taka silfai a, a kawr vel hnuah 3cm cube velin chan sin tu
- 3) Sawhthing chan sa chu 30 minute vel chhuang so bawrh bawrh leh tur.
- 4) A tui chu thlit chhuah a, no chanve vel chu dahthat tur a ni.
- 5) No chanve tui dahthat chuan sawhthing chan sa chu chhuang so bawrh bawrh a, chini leh chi tlem thlak a, uluk tak a chawkin, chhin lovin minute 35-40 vel mei na lutuk lova chhuan char char leh tur.
- 6) Chini chu sawhthing a abet hlawm tan thlengin chawh zel tur.
- 7) Lehkha puan thianghlim phah a, sawhthing chini khawn chu thirfian awng in suah chhuah leh tur
- 8) Zankhua a dah daih a, chumi hnuah chuan dahna tur ah dah that thei tawh a ni.
- 9) Duh hun hunah ei thei tawh a ni.

Sawhthing tui (Ginger Ale)

- 1) Sawhthing tharlam tha thlan a, fai taka sil a, densawma tui sawr tur.
- 2) Puan thianghlim fai takin thlifim la, dah dai rawh.
- 3) Chini leh tui chhuang so la, citric acid pawlh la, thlifim leh la dah dai leh rawh.
- 4) A daih hnuah sawhthing tui nen pawlh la, KMS pawlh leh la, saidawium faiah thun la, phui takin chhin tur a ni.

Sawhthing dip (Ginger ground/powder)

- 1) Sawhthing tharlam tha tha thlan chhuah a, uluk tak a silfai a kawr vel tur.
- 2) Sin te te a chan a, nisa ah uluk tak a pho ro leh tur a ni.
- 3) A ro that hnuah densawm emaw grinder a her mai tur
- 4) A hraw lai te thenfai hnuah uluk takin bur thianghlimah dah that leh mai tur a ni.
- 5) Chawhmeh ah pawh a thlak theih a, hrawk nuam lovah pawh ei mai thei bawk ani.

Sawhthing um (Ginger pickle)

- 1) Sawhthing tharlam tha thlan chhuah a, fai taka sil hnuah chan sin tur.
- 2) Chan sin sa chu an pawnlam hnawnna titem turin pho zawi deuh hlek tur. Antam chi, thinghmarcha, hmarcha dip, tel leh citric acid te chu 10 grams theuh in 250 grams sawhthing chansa te nen chuan uluk takin pawlh tur.
- 3) Bur thianghlima ah dah a, ni ah kar hnih khat vel pho chhuah hnuah ei thei a ni.

Sawhthing kan taksa tana thatna te

Sawhthing hian antioxidant, polyphenol, vitaminC, beta carotene, flavanoids leh tannins, Vitamin E, thiamine, niacin, pyridoxine etc te an pai a. Minerals leh electrolytes ah chuan Iron, calcium, mahnesium, phosphorus, zinc, copper,chromium,sodium leh manganese te an pai a.

@ Heng antioxidants- vitamin C, 6-gingerol, 6-shogaol leh curcumin a paite hian chaw kawng, ka chung, chaw dawt, pumpui, ril te,ril pui leh mawngkaw cancer a veng theia ngauh a ni.

@ Sawhthing hian chaw paithawih a puia, luak chhuak a ti reh thei a, pum nuamlo leh kawthalo tan a tha.

@ Sawhthing hi thlang hrileng leh awmna tan a tha hle bawka a ni.

@ Na chhawk theiin , ruhchuktuah leh tihrawl na atan a tha a, hmeichhe thi nei lai tan a tha bawka, hei hian thia tichhuak tha.

@ Taksa hmun hrang hranga natna hrik inthlahpung tur a veng thei bawka a ni.

@ Thisena thlum a tihnam thei a, thau chhia leh triglycerides a tihnam thei bawka ani.

@Upat lam a thluak chak lohna a tiziaawm thei a ngaih a ni bawka. Sawhthing hian thisen khang hun a tihmuan theih avangin warfarin leh aspirin hnathawh a tibuai thei a, BP a tihhniam theih

avangin thisen sang damdawi ei te ah duh aia
blood pressure hniam a thlen thei.

@ Huat (Allergy) ve theih a, huat chuan vun bawl a
siam thei a ni.

POST HARVEST MANAGEMENT & PROCESSING OF BIRD'S EYE CHILI (ZOHMARCHATE)



Hmarcha hi chi hrang hrang an pian hman,
an rawng leh an thak dan in anglo tak tak an awm a.
Kum 3500 BC atang daih tawh khan an lo ching
tawh a ni. Mizoramah pawh hian chi nga atanga chi
sarih vel chu kan ching ve thin a, chung zingah
chuan ‘Vaihmatchate’ kan tih mai thin, tunhnai
maia ‘Zo hmarcha/Zo hmarchate’ tih a thlak tak hi
kan ching uar deuh ber chu a ni. Hmarcha
tihmatchatu, a tithaktu leh active ingredient hi

Capsaicin a ni. Zo hmarchate te hi an te in an thak tha hle a, an thak zawng tehna ah pawh 50,000 – 100,000 Scoville unit a ni. Saptawng a Bird's eye chilli an tihna chhan chu- he hmarchate hi te reuh te, bial sawl/tung deuh hlek an nia, sava ten a rah hmin hi duh em em a, an tlan a, hmun dangah an putdarh thin avangin Bird's eye chilli tiin an phuah a ni. An scientific hming ah chuan '*Capsicum Frutescens*'_tih a ni.

Post harvest management pawimawh na :

Kum tin Horticulture thar chhuah 1/3 hi chhe ziah ang a chhut an ni. (Rosalina co.,2021) A tam zawk hi a seng/lawh hnu leh a hralh chhuah hma in a chhe tlangpui. A dang te hi transportation leh a dahna uluk loh vangin an chhe thin bawk a ni. Post harvest infrastructure that tawh loh vang pawh in thlai thar chhuah te hian an tuar hle thin a ni.

1)An mahni nih na rim, lan dan, thlum/thur dan leh rawng te nen bo lova vawnthat

2)Ei tlak leh thil dang atan sawngbawl chhunzawm theih tur a vawn that.

3)Ei leh seng inkar a tichhe theih tih tlem/bo.

4)Awm tawh loh hnu/ a vang thawh hun (off season) atan a lo dahthat.

Zohmarchate lawh leh dahthat dawnna hriat tur te:

Zohmarchate te hi eitur chhe awlsan ve tak an nih avangin a kung atanga kan lawh leh kan dahthat na tlanga kan uluk leh fimkhur a tul a ni. An rah chu a hring atangin a eng ah, a eng atangin serthlum rawngah, serthlum rawng atang chuan a sen ah – tichuan an rah chu an lo puitling/hmin tihna a ni.

@ A tlangpuiin an rah puitlin ah hian kan lo/seng thin a, an kungte leh an zarte hi an ram deuh avangin lawh lai pawhin fimkhur a ngai bawk a ni.

@ Kan lawh dawn chuan boruak daih/vawh lai ber a lawh hi a tha a, lawh zawh hnuaa chuan dahthatna turah bawm hlai/zau tha ah chuan dah nghal in,hmun lum lo/ni chhun loh na lama dah hram hram a tha bawk.

@ Lawh sa te chu bengmuk loh a, tawt lutuk a dah loh bawk tur . An huh emaw hnawn laia lawh loh a tha bawk, hei hian a ti tawih hma duh a ni. A tawih rimchhia leh nget te chu dahthat hmain thenfai vek a him bawk, hei hian a dang chhe/thawih kai zung zung tur nasa takin a veng thei a ni.

Zohmarchate leh taksa tana hriselna te:

Zohmarchate te hi thlaira(vegetables) hnuaah mi tho an ni a, chawhmeh a pawlh leh rawtah te kan hman tlangpui a, an mahni ah hian rimpui tak leh thak tha tak an ni. Heng hmarchate hian kan chaw ei an titui a, mitam tak chuanj a tel lovin chaw ei harsa akn ti thin a ni. Kan taksa tana an thatna te chu :

- 1) Thisena cholesterol sang a tihniam thei a, taksa a endorphins tisangin na a chhawk thei bawk.
- 2) Natna hrik tihhlum theihna an nei a, natural antibiotic niin taksaah natna hrik, infection a lo awmin infection awmna laiah thisen tharlam pe chhuakin natna do kawngah nasa takin a pui a ni
- 3) Zunthlum leh rilpui cancer veng theia ngaih a ni
- 4) Taksain natna a do let theihna khawl, immune system puiin hritlangah pawh a tha bawk a, ruhchuktuah na pawh a tiziaawm thei bawk a ni.
- 5) BP sang hian Heart attack/stroke te hi a thlen awlsam em em a, chuvang chuan zohmarchate ei hian nasa takin a lo tanpui chung chung ve a ni.
- 6) Chaw ei tuina tha tak a pai bawk a, luna leh vun thak ho te pawh a ti ziaawm a ni.
- 7) Thisen kal vel (blood circulation) a titha a, taksa atanga bawlhhlawh/tur a lo paih chhuak a, pumpui leh rilin chaw a pai tawih (digestion) kawngah a pui nasa bawk a ni.
- 8) Ka chhungah chil a siam chak a, ka chhung a chil level sang leh sang loh hian kan ka chhung hrisel leh sel loh ah kawngro a su ve thei hle a ni.
- 9) Sam to leh mit a tihrisel tha em em bawk a ni.

Zohmarchate dahthat/sawngbawl dan chi hrang te :

Zohmarchate um (Bird's eye chilli pickle)
Bawlhlo ngaite – Zohmarchate -1 kg, Purun var – 3-4 bawk, purun sen – 3 pum lian, Sawhthing – tam lo te, zeera powder – 2 tsp, aieng – 1Tsp, pickle masala powder – 3- 4Tsp, vinegar – 5-7 Tsp, musrard oil – 1/2 lt.

Siam dan –

- 1) Hmarchate te chu an kuang mal zawh a fai taka sil a, chhap hul hnuah rawt/her sawm leh tur.
- 2) Purun var, purun sen, Sawhthing te pawh rawt sawm vek a pawlh in dah leh tur a ni.
- 3) Tel chu chhan sa hnuah purun var ho pawlh kha thlak a, uluk takin chawh a,mei tisan lutuk loh a tha.
- 4) Purun thlak te kha an lo buang tan ah aieng, zeera powder leh pickle masal powder te kha thlak leh auluk tak a chawhpawlh vek tur.
- 5) Hmarchate rawtdip sa te chu kan thlak leh anga, mei na lutuk lo ah uluk takin kan chawk ang. 5 minutes hnuah nkan suan thei tawh ang.
- 6) Vinegar pawh chu kan pawlh leh nghal ang, uluk takin kan chawk ang.
- 7) A daih hunah chauh kan dahna tur bur fai /ro ah kan khung anga, phui takin chhin leh ang.

8) Kan duh chuan ni sa ah pawh kan pho theih bawh.

(Kan duh chuan ei nghal theih a ni)

Zohmarchate rawtkawi (paste): Zohmarchate tharlam te leh tomato hmin thar lam tha te chu meiah chhum deuh char char a (tomato a kawr a nuai pilh theih thlengin), chumi hnuah hmarchate leh tomato chhum te chu dah daih a, rawt sawm emaw grinder ah her sawm leh tur a ni. Tel tam vak lo chhuan hmuiah chuan chini, chi leh vinegar pawlh a, uluk taka chawh hnuah hmarchate rawtsawm te kha thlak leh a, uluk tak a chawh hnuah thingpui fe thlit na in kan thli ang a, bur fai thianghlimah kan dah tha tawh mai ang. Hmun vawt(fridge) emaw hmun dai laia dah hian an tha rei bik a ni.

Tel (cooking oil) hmangin : Zohmarchate thar lam te chu hul thapin bur fai ah kan dah anga, purunvar (duh chuan nawr keh sawkin), sawhthin, chi leh tel a chim chin thlengin kan leih lut ang. Hmarchate te chu a lo in um hmin hma theih nan hmun lum lam ah emaw ni sa ah kan pho thin ang (nisa a pho chuan chhin loh tur), siam atanga kar 2-3 na velah chuan ei theih tawh a, duh chuan kan dahthat chhun zawm zel thei bawh a ni.

Chi leh tui hmangin : Zohmarchate hi a tai phei chu an tawih duh avangin a dah rei/vawnthat dan pakhat chu – Silfaia, al taka chi al a, tichuan bur phui tha ah a chim chinin tui leih a chhin phui a hmun vawt lamah dahthat tur. Hetiang a sawngbawl

hian rei tak chhung chu a vawnthat bak ah ei nghal theih bawk a ni.

Zohmarchate dip: Hetiang a dahthat hi chu zohmarchate ro/rep tawh sa kha tel telova kan hmu hnuah den chip/rawtsawm leh mai tur a ni. Hun rei tak chhung a dahthat theih a ni. Hei pawh hi hralhsum atan leh choka a hman mai atan a remchang hle bawk a ni.

Ni a phoro/rep ro : Ni a phoro/rep ro hi hmakhawsang atanga tawh a an lo tih thin a ni a, keini Mizo te pawh hian kan ur ve hle a ni. Zohmarchate chauh lo pawh thlainnah leh rah , thei thlengin kan phoro thin a ni. Mahni tichhe awlsam thei tute hnawng (moisture) kan tih mai hi an pai tam avangin ni zung chakna hian an hnawna hi a hip ral a , tichuan an lo ro/rep ta thin a ni. Hetianga phoro/rep hi kumkhat aia tam pawh a dahthat thei a ni. A hring lai ai chuan a ro/rep a harlh in a hlawk zawk bawk a ni

POST HARVEST MANAGEMENT & VALUE ADDITION OF DRAGON FRUIT



Theihai pickle siam dan

Bawlhlo ngaite :

Theihai hel	—	1 kg
Methi/fenugreek seeds	—	10g
Salt	—	100g
Jeera	—	10g

Sauf	–	10g
Hing/asafoetida	–	hmer 1
Hmarcha dip	–	100g
Antam tel (mustard oil)	–	¼ lt.

A siam dan :

- 1) Theihai helte chu uluk taka sil fai a, puanfaia hruk hul tur, chumi hnuah 4-5cm vel a chan chi leh aieng tlem nen chawhpawlh a ni ah darkar 2-3 vel pho chhuah leh tur.
- 2) Achunga spices ho khi mei ah tel tel lovin uluk tak a kan (roast) tur, a daih deuh hnuah rawt sawm vek leh tur a ni.
- 3) Spices ho rawt sawmte leh theihai nisa a pho te chu tel nen uluk takin kan chawhpawlh leh anga, kan dahna tur bur faiah kan dahtha tawh mai ang.
- 4) Nisa / hmun lum lai (ni in direct a en loh na hmun) ah kan dah thin anga, kar 1-2 hnuah chuan ei theih tawh mai dawn a ni.

Theihai Squash siam dan

Bawlhlo ngaite :

Theihai hmin	–	1 kg
Citric acid	–	10g
Sugar	–	1 kg
Water	–	1 lt.
KMS (potassium metabisulphate)	–	¼ tsp

A siam dan :

- 1) Theihai hmin te chu uluk tak a silfaia, hruk hul hnuah a kawr vel leh tur.
- 2) Theihai hnim te chu hresawm hnuah a tuipui (Pulp) chu thingpuife thlitna in thlit chhuah leh tur a ni.
- 3) Tui litre khat kha chini 1 kg nen pawlh leh la, meiah rei vaklo chhuang leh ang che.
- 4) Chumi hnuah citric acid telh leh a chhuangso leh tur ani. (Phuan insiam te awm chuan paih fai vek tur a ni)
- 5) Theihai tui chu hemi chini tui nen hian chawhpawlh anga, dah daih hnuah theihai squash chu novah tlem suah chhuah a KMS pawlh zat tur nen chuan ngun taka chawh a, chumi hnuah squash belah chuan pawlh leh anga, ngun taka chawh tur.
- 6) Squash chu bur hul fai leh thianghlimah I thun ang a, nghet takin chhin la, hmun hul daiah dah I dah dawn nia. I duh hun hun ah in theih tawh a ni.

HORTICULTURE

BAWRHSAIABE CHIN LEH ENKAWL DAN

Botanical Name : *Abelmoschus esculentus*

Family : Malvaceae

Bawrh Saiabe hi Tropical leh Subtropical boruak a chin theih thlai pawimawh tak mai a ni a, a rahno a ei theih bakah kawng hrang hrangin a hman tangkai theih a. A rah hian Iodine a pai hmem in awrpuar tur ven nan te a tha a, a hnah hi santen damdawi ah an hmang bawh thin. A chi ro hian oil 13-22% leh protein 20-24% a pai a. Oil a pai hi sahbawn leh cosmetic thil dang siam nan an hmang bawh thin a ni. A rah tih keh hi bawng hnutetui tih tam nana an hmang bawh thin.

Boruak mamawh dan:

Bawrhsaiabe hian boruak lum lam a mamawh a, vur tla leh boruak vawt lutuk ah chuan an tiak tha theilo a ni. Temperature 25⁰- 30⁰C ah hian an thangtha ber a, hei aia vawt emaw lum lutuk ah chuan an thar hlawk thei lo.

Leilung mamawh zawng:

Leithawl tha leh ban lutuk lo, organic matter pai tam leh tui luan ral zung zung theihna ah an tha duh a, lei thur lam pH 6-6.5 hi duhthusam chu a ni.

Chi mamawh zat: 8-10kg/ha (fur/ kharif) 18-22kg/ha (thal/ nipui)

Phun inkar hlat zawng:

60x30cm (55,000 plants/ha) a zar chi

45x30cm (75,000 plants/ha) a zarlo chi.

Chin hun: June-July (kharif), Feb-March (Summer)

Chin dan: Bawrhsaiabe hi phunsawn aia direct a tuh mai hi a tha a. Theh loh vin a bi te te a tuh tur a ni. Tuh hmaa Bavistin 0.2% a zankhua a chiah hian a ti to hma a, a tiak vuai lakah te a veng bawh a ni. Lei hnawng tawh chauh leh temperature 30⁰C ah a to tha duh a, tuh zawh veleh tui pek bawh tur a ni.

Leitha pek: Leitha FYM emaw compost @ 25 tonnes/ha leh 100kg Nitrogen, 50kg Phosphorus leh

Potash hactare khatah pek theih a tha a. Nitrogen hi vawihnih pekah hmangin vawikhatna chu leilung buatsaih laiin leh a vawihnihna chu tuh hnu thla khatnaah pek tur a ni. FYM/ compost, Phosphorus leh Potash erawh chu phun hmain pek vek tur a ni.

Hlo thlawh: Hnim fai taka enkawl hian thlai thar hlawk leh hlawk lohah kawngro a su hle mai a, kan tuh atanga ni 20 na atangin boruak leh hnim awm dan zirin thlawhfai tur a ni. Hnim a tam chuan rannung leh natna an pun phah thin a ni. Pre emergence weedicide pawh a hman theih a, kan tuh hma ni li ah Basalin @ 800-1000 ml tin khat hmunah hnim to tur ven nan a kah theih a, Lasso @ 2 litres tin khat hmunah tuh atanaga nikhat hnuah a kah thei a, Stomp litre khat tin khatah emaw 750 ml tin khat hmunah a kah theih bawh a, heng bakah hian tuh atanag ni 60 naah thlawh fai a ngai thei bawh hnim awm tam dan a zirin.

Tih tur pawimawh dangte: Urea 2% in a kung ah tuh atanga ni 45 naa kah hian a thar a ti hlawk phah thei a, hemi bakah hian 1% water soluble fertilizer potassium nitrate, karkhat danah vawili tal kah a, tuh atanga ni 30 ah kah tan hian a thar a ti hlawk thei bawh.

Thar zat leh seng: Tuh atanga ni 48-51 hnuah a seng theih tlangpui thin a, a boruak a zirin ni 2-3 inkar danah a seng theih thin. An par atanga ni 70-75 thlengin a variety zirin a seng theih a. A variety zirin thar tam lam a in anglo thei a, tin hnih leh chanve hmunah 150-200q a thar theih a ni.

Rannung ven leh enkawl dan:

Hopper, shoot borer, fruit borer leh a zik eitu maggot leh aphids te hi an tam duh em em a, kut durh hian fur laiin an bawm duh hle bawk.

Enkawl dan:

- An tiah veleh neem cake leiah 250kg/ha in pek a, chumi hnu ni 30 ah pek nawn leh tur
- A kung tiah tirh a par hma in Imidacloprid 0.3ml tui litre khata pawlhin kah tur, a rah lawh hun laiin damdawi kah tawh loh tur.
- Neem emaw pongamia soap @ 0.5% emaw neem seed powder extract (NSPE) 4% a kah tur. A hnah hnuailam pawh kah vek tur a ni.
- Rannung in a bawm chu lakkhawm a paihfai zung zung tur a ni.
- Aphid in a bawm a zik leh a peng dang te chu paihfai tur
- Aphid in a bawm chu Dimethoate 30EC @ 2ml tui litre khata pawlhin emaw Acetamiprid @0.2gm tui litre khata pawlhin kah tur a ni.
- Mites a awm chuan Dicofol 18.5EC @ 2.5ml tui litre khata pawlhin emaw, Acaricide dang wettable sulphur 50 WP @ 3g tui litre pawlhin emaw kah tur.
- Damdawi kah in a hnah hnuailam thlengin kah thin tur a ni.

Natna ven leh enkawl dan:

- Seed treatment hi Captaf/ Thiram @ 0.2% emaw Trichoderma harzianum talc formulation @ 5gm/kg a tih a tha
- Vutbuak natna leh leaf spot natna a lo awm chuan Hexaconazole emaw Carbendazim in ni 10-15 inkarah kah tur
- Fusarium vanga vuai natna lo awm chuan Carbendazim (0.2%) a leiah kah tur
- Alternaria blight natna awm chuan Mancozeb (0.25%) a kah tur.
- Hnah eng kan tih mai rannung vanga lo awm Yellow vein mosaic virus a awm chuan Acephate (0.15%) a kah a, chumi hnuah Imidacloprid (0.033%) a ni 15 dana kah leh tur a ni

ALOE VERA ENKAWL DAN

Botanical Name: *Aloe vera/ Aloe barbadensis*

Common Name: True aloe, Burn plant, Barbados aloe

Family : Liliacea

Aloe vera hi thlai tuihnang ngah leh thlai kumhlun a ni in, za zela sawmkua panga (95%) te hi tui an ni. Eastern leh Southern Africa ram atanga awm tan a ni a, mahse khawvel hmun hrang hrang ah an ching uar hle a ni. A chin leh enkawl a awlsam in nasa zawka chin chi a ni. Aloe vera hi pot leh leiah a chin theih ve ve a, natna leh rannung lakah thlai dang te aain an fihlim zawk a ni.

Aloe vera hmannate:

A. Damdawi chi hrang hrang siam nan: Kang damdawi atan, Sun burn, Hliam (wounds), Chuap cancer a veng thei, Pumpui thalo tan, Zunthlum (Diabetes) tan blood sugar a tihniam thei.

B. Incheina (cosmetic) chi hrang hrang siam nan:

Aloe vera gel, Shampoo, Sahbawn, Lotion, Cream, Face pack etc. Aloe vera hi ei tam lutuk (overdose) chuan kawthalo a thlen theiin, kalte pawh a tichhe thei a, nu naupai lai leh hnute pe laite, naupang kum 12 hnuailam chuan tam lutuk ei loh a tha ber.

Leilung mamawh zawng:

Lei chi hrang hrang ah a chin theih a, tiauvut leh sawntlung lei inpawlh leh lei thur lam tehna pH 8.5 thlengin an tha duh hle. A zung hi a pawnlawi a, tui luanral zung zung theihna hmunah chin thin tur a ni. Pot ah chin anih chuan a mawngah tui luanchhuahna siam a, lung nawi inches 1-2 vel dah hmasak a tha.

Sik leh sa mamawh zawng:

Aloe vera hi hmun lum leh ro lam tuipek tur awmna hmun ah an tha duh hle. Nisa an mamawh hnemin nikangna laiah chin thin tur a ni a, chutih rualin nisa em chhiat lakah ven thin bawh tur a ni. Pot a chin anih pawhin nikanna laiah hun thin a tha.

Khawvawt lutuk leh vur tla (frost) a ngam loin heng lakah hian ven an ngai a ni.

Enkawl zui dan hrang hrangte:

i)Leilung buatsaih dan (Land preparation): Kum hlun thlai anih avangin a phunna tur leilung chu laihphut that a, hnim thlawhfai hmasak thin tur a ni. A zung hi a pawnlawi in tui luanral zung zungna turin tuiluanna tur (drainage) tha taka siam a, phun hmain bawngek leithate nena chawhpawlh a tangkai hle.

ii)Phun dan (Planting): Aloe vera hi variety chi hrang hrang a awm a, March atanga June thla ah an phun tlangpui a, phun hun tha ber chu fur lai a ni in June-August vel thlengin a phun theih bawk. A zung peng (Root Sucker) 15-18cm vel a sei chu leiah hmun thum a then a hmun hnih vel phum tur a ni a, a phun nan hian lei tih pawn (bunds) siam tur a ni. A phun inkar hlat zawng hi a thlur leh thlur ah 36 inches (3 ft.) leh a kung leh kung inkar 31 inches (2.5 ft.) a phun hian acre 1 ah kung 5000 vel a phun theih a ni. A kung a lo hrisel that a, enkawl dan in a zir chuan an upat hnuah an indip awl em em a, chuvang chuan 1mx1.5m inkar dana phun hi duhthusam a ni. Hetiang hian hectare 1 ah kung 6700 vel a phun theih tihna a ni.

iii)Leithapek (Fertilizer Application): Kum hlun thlai anih avangin leitha chi hrang hrang Nitrogen, Phosphorus, Potassium etc. hi a thar hlawk theih nan pek thin tur a ni. Heng bakah

hian chaw tha chi hrang hrang bawngek leitha leh vermicompost a hman theih bawk. Aloe vera te hian an hnah leh zung atangte in chaw tha leh tui an hip thei a ni. Mithiam tena an zirchianna ah chuan Aloe vera hi chemical tello organic fertilizer ah hian a thar hlawk ber a ni.

iv)Tui Pek (Irrigation):Tui an pai hnem avangin khawkheng an tuar thei hle a, mahse phun zawh veleh tui a hnawng tawka pek a tha. An tui mamawh tam lam hi kan chinna hmun lei a zirin a danglam thei a, thlai kung bula tui tling khawp a tupek loh tur a ni. Hei hian a zungte a ti tawih duhin an thih phah thei a ni.

v) Hlo Thlawh (Weeding): Aloe vera hi thlai thang muang leh kum hlun a nih avangin hnim in a dip duh hle. Phun tirh ah chuan vawithum atanga vawili thlawh a ngai a, kum dangah chuan an mamawh a tlem tial tial a ni. Kan chinna hmun chu hnim lakah vawnfai tur a ni.

vi)Thlai dang nena chin pawlh (Intercropping): Aloe vera hi thlai dang chi hrang hrang nen a chin pawlh theih a, nisa a mamawh hnem avangin nisa hlih tur lakah ven hram hram tur a ni. Thlai dang nena phun dawn in an phun inkar hlat zawng (spacing) dik taka tih hian a thar hlawk bik a. Balhla, Jatropha leh thlai hnah chi hrang hrang nen hmun thenkhatah chuan an chin pawlh thin.

Seng dan (Harvesting): A tlangpuiin Aloe vera hnahin inches 8-12 an tlin chuan an puitlingin an

seng theih thin a, thla18-24 chhung hnah puitling chhuah turin an mamawh thin. A seng hun hi a variety a zirin a danglam thei. Chemte hriam tak nena a hnah hnuai lam chu tan chhum tur a ni a, sengna sir atang chuan a rawn chawr no leh thin. Kumhlun thlai anih avangin kumtin a seng theih a, kan phun atanga kum 2-5 inkarah a thar hlawk a, chumi zawh chuan a thar hlawk leh zual nan a bul atanga phun leh tur a ni.

Seng hnu a sawngbawl dan (Post harvest management): Aloe vera hnah chu a kung hnaih takah cut tur a ni a, kan seng zawh hnu darkar 24-72 velah an lo vuai tan thin a, a hnah seng zawhte chu hmunro leh dai ah an tawih loh nan dah tur a ni a, duhthusam ah chuan cement chhuat (concrete floor) ah dah tur a ni. Aloe vera chu hralh tur a buatsaih a nih chuan a fai taka tihfai a, newspaper hmanga tuam that tur a ni.

Aloe vera hnah chhunga awm Gel lakchhuah dawn chuan chemte hriam tak hmanga a sir ah zai (cut) tur a ni a, a hnah hring tellovin a tuihnang chu lak hran tur a ni. Chumi hnu ah Gel chu Juicer/grinder ah tihsawm tur a ni a, hemi zawh hian tui nen emaw, theitui dang nen pawlhin a in theih a, Fridge ah dahthat leh thin tur a ni.

Thar Zat (Yield): Phun leh enkawl dan a zirte, khaw awm dan leh leilung a zirin a thar a danglam thei. A tlangpuiin kumkhatah wawi li (4) a seng theih. Kung khat atangin hnah pathum (3) zel vawikhat seng ah lak tur a ni a, chumi awmzia chu kumkhat chhungin kungkhat atangin hnah sawm

leh pahnih (12 leaves/ plant/ year) a seng theih. Hetiang hian kumkhatah ram acre khat(1) atangin Aloe vera hnah 60000 kg. a seng theih tihna a ni.

Ei chhhetu rannungleh natnate (Pest & Diseases): Nat leh rannungin harsatna lian tham lutuk an thlen lova, Leaf spot (hnah de thet) leh Root rot (zung tawih) natna hi hmun thenkhatah a awm thin. Heng laka ven nan hian kan chinna hmunte kan tifiain tui luankawr tha tak siam thin tur a ni.

A chung a kan sawi ang hian Aloe vera hi thlai enkawl awlsam tak a ni in tangkaina a ngah em em a, damdawi ah leh incheina (cosmetics) chi hrang hrang siam nan an hmang nasa in taksa ah harsatna (side effect) a thlen loh avangin khawvel ram changkang zawkte chuan an ching nasa hle a ni. Sum chang thlai enkawl awlsam tak anih avangin uar leh zual a chin hi a pawimawh a ni. Khawvel ram changkang zawk Australia, U.S.A., leh Europe ramahte an ching nasa in an hralhchhuak hnem hle a, Aloe vera hi medicinal plant zingah pawh mamawhna a sang in, International market ah pawh hralh a kal hle a ni. Kan chenna India ram ngei pawh hi Aloe vera chin nan a tha in, kuthnathawktute pawh kan in zirtir a tul a ni.

ANTHURIUM ENKAWL DAN

Botanical Name	:	<i>Anthurium sp</i>
Family	:	Araceae
Origin	:	Central leh South America

Anthurium hi pangpar kumhlun,ramlum lama chin chi a niin, khawvel ram hrang hrangah an ching uar hle a, Netherland ram hi tun dinhmuna Anthurium thar chhuak hnem ber an ni. A chi hrang 500 chuang awm mahse *Anthurium andreanum* leh *Anthurium scherzerianum* hi a langsar te an ni.

Anthurium par parh lai hi **Spathe** a ni a, a baibing lai hi **Spadix** a ni.

Sik leh Sa duhzawng: Anthurium hian boruak lum lam leh hnawng tamnaah an tha duh hle a. Khaw awmdan, eng leh hnawngten nasa takin Anthurium par leh than danah kawngro an nei a ni. Zan lamah 18.3°C leh chhun lamah 21.2 – 23.9°C hi an mamawh tawk vel a ni.

Eng(light) mamawh dan: Anthurium hi daihlim ngaina tak pangpar an nih avangin nipui lai chuan 80% daihlimah chin tur a ni a, an than that leh an par that dan hi chinna hmun a zirin a danglam thei hle bawk. Boruak hnawn lam 60-80% hi an ngeih tawk bawk. Anthurium chinna chu shade net hnuai a nih chuan boruak luh leh chhuahna ventilation siam a tha.

Leilung duhzawng: Tui luanral zung zung theihna, boruak thawheng si leh tui pai tha thei an mamawh a,organic pai tam leiah an tha duh hle bawk. Anthurium chinna atan hian lei, brick nawi, balu, coco peat, thingzai nawi, bawnggek etc te pawh a hman theih bawk a ni.

Chinpun dan:

- 1) A chi tangin- A chi tanga phun chuan parchhuak turin hun a duh rei deuh.
- 2) A tang tan.
- 3) A zung puak/suckers- A kung puitling atanga peng lo chhuak chu lak hran a, phun sawn tur a ni.

Phun hun: May-June emaw August- September hi phun hun tha ber a ni. Leia phun dawn chuan bed siam a, feet 1 emaw feet 1 leh a chan ve inkar danah phun tur a ni.

Leitha pek: Anthurium hian vawikhata leitha pek teuh ai chuan tlem te te a zing zawka pek hi an mamawh a. Pot a chin a nih chuan 5g complex fertilizer tui 500 ml a pawlhin thla hnihah vawikhat pek a tha. Leitha pek zawh hian tui pek nghal hi a tha a, Nitrogen, Potassium leh Calcium te hi chaw tha mamawh zualte an ni. Calcium an tlakchham chuan a par te an lo dal a, Calcium 5g kungkhat zelah thla khatah pek a tha. An par dawn hnaihah chuan Nitrogen pek tlem tur a ni a, leitha(fertilizer) pek tam lutuk chuan an par a chuai hma bawk.

A kuang leh hnah hlawi: Anthurium te an hrisel zawk nan leh a par quality a that nan hnah pali aia tam zuah loh hi a tha.

Tuipek: Nipui lai chuan nikhata vawihnih pek a tha a, hnawng an mamawh hnem avangin khawro laiin hnawng siam chawp turin a kung bakah lei te chu leih huh reng tur a ni

A seng: Anthurium hi enkawl dan a zirin kumtluanin a seng theih a, kung khat hian kumkhatah par 5-6 a chhuah thei a ni. A kuang leh a baibing lai chu an lo khawng a, a baibing rawng pawh hmun thuma thena hmun khat rawng a lo

danglamin a seng theih a ni, zingkara seng hi a tha ber a ni.

Seng zawh veleh tuia chiah hi tha a, damdawi thenkhat Florallife te pawh a par tlo zawk nan a hman theih a, tin 13°C ah kar 3-5 a dah that theih a ni. Hmun hrana phurh sawn tur a nih chuan a khat tawka phuh huh zeuh zeuh a, a hnawr hi lapaw huh a tuam tur a ni.

Natnate:

1)Bacterial blight: A hnah hmawrah tawih ang deuhin an lo val a, a par parh laite pawh an lo val a, an lo ro a, a rei hnuah phei chuan hnah te an tla kawlh thei.

Ven Dan:

- i) Natna kaite chu paihbo nghal tur.
- ii) Copper oxychloride tui litre 1 ah 2 gm pawlha kar khat danah kah tur.

2)Anthracnose: Anthurium hnahah te, a par parh leh baibing laiah te chuan val dum thliah thliah a lo awm a,a nasat hnuah phei chuan rualkhai lo takin a val nuaih bawh thin.

Ven Dan:

- i)Natna kaite chu paihbo zung zung tur.
- ii) Carbendazim 1 ml tui litre 1 a pawlha kah tur.

3)Root rot: A zung a lo uk a, an lo tawih thin.Tui luanral zung zung theih lohna leh boruak thawleng loah a awm duh.

Ven dan:

- i)Tui tling thei lova siam tur.

ii) An zungte chu thawleng thei ang bera dah tur.

Rannungte:

1) Whitefly: Hnah hnuai lamah leh kuangah te hetiang rannung hi an awmkhawm thin a, pangpar a tuite chu hipchhuakin an lo eng a, an vuaiin a tawpah an thih phah thin.

Ven Dan:

i) Hmun dam lutukah chin loh tur..

ii) Hnimfai taka thlawhtur.

iii) Rannung eichhiat te chu paihbo zung zung tur.

3) **Mites:** Hnah hnuailamah an awmkhawm a, an hnahah chuan chhun han te takte angin an lo ti rang a, a hnuah an lo vuai phah thin.

Ven Dan:

i) Dicofol 0.05% in ni 15 danah kah tur.

3) Thrips: March thlaah awm tanin September thla thlengin an awm thei a, a par parhlai te chu an ti rangin a tui an hip avangin an lo inher danglam ta thin a ni.

Ven Dan:

i) Dimethoate 0.05% emaw Acephate 0.07% a ni 10 dana kah tur a ni.

BALHLA ENKAWL DAN

Botanical Name : *Musa paradisiaca*

Family : Musaceae

English Name : Banana

A to bul: Balhla hi South East Asia atanga chin tan a ni a, India leh khawvel ram hrang hrang ah an ching nasa hle a ni.

Balhla in chaw tha a pai te: Balhla hian taksa tana chaw tha hrang hrang a pai hnem in, chakna tha hrui min petu a ni. Vitamin A,B,C te a pai bakah mineral chi hrang hrang Calcium, Iron, Magnesium,

Sodium, Potassium leh Phosphorus te a pai tel bawk a ni.

A hmanna hrang hrang te:

- 1) Thei tui tak leh hrisel tak a ni.
- 2) Balhla rah la hmin lo leh a tumbu hi chawhmeh ah a hman theih.
- 3) Balhla rah hi thil chi hrang hrang Chips, Soft Drink, Jam etc. siam nan an hmang thin.
- 4) Balhla hnah te hi chaw eina atan a hman theih.
- 5) Balhla kung, hnah leh bul te hi ran chaw atan an hmang bawk.
- 6) Balhla kung atanga hrui (Fibre) lak chhuah hi paper leh bag siam nan te a hman theih a ni.

Leilung duhzawng (Soil): Lei hnawng tha, tui luan ral zung zung theihna hmunah an tha duh bik. Lei thur lam tehna 6.5 - 7.5 pH hi duhthusam a ni. Balhla vuai natna laka veng turin tlema lei al lama chin hian a zia awm phah thei.

Sik leh sa duh zawng (Climate): Balhla hi ram lum leh hnawng tamna ah an tha duh hle a, temperature 10-40°C velah a chin theih a, a tlangpuiin 23° C vel an mamawh in, a variety a zirin a danglam thei bawk. Boruak vawt lutuk leh vur tlakna hmunah chuan a tha thei lo. Boruak lum leh ro na hmunah chuan an thang tha thei lo in, ruahtui tlak tamna hmunah chuan an thang chak bik a ni.

Tihpun dan hrang hrang te:

- 1) **Suckers (a peng):** Sword sucker leh Water sucker an awm a, sword sucker hian thla 11 chhungin rah an chhuah theih a, water sucker hian thla 15 vel rah chhuah nan an mamawh thung.
- 2) **Peepers:** A peng te chi an ti a, hetiang hmanga phun an nih chuan rah chhuah turin hun a duh rei hle.
- 3) **Rhizome:** A peng hman tur a awm loh changin a bulbawk hi a hman ve theih a, Nursery ah tih tiah hmasak in emaw, huan a phun nghal pawhin a tih theih. Rahchhuah tur chuan hun a duh rei ve deuh.
- 4) **Micro propagation:** Tissue culture hmang hian hun reilo te chhungin thlai natna laka fihlim leh hrisel tha tak tak a siam chhuah theih a, thlai thang chak chi te leh thar rang chi tam tak an siam chhuak tawh a ni. Hetiang hmanga thlai tiak siam chhuah te hi an sensitive (der dep) bik em em a, phun hnuah pawh enkawl uluk an ngai bikin a man pawh a to bik a ni.

Phun Dan: Balhla phun hun hi khaw awm dan leh tui awm dan a zir te, a variety a zirin a danglam theih a. Tui leh ruahtui tamna hmunah chuan September-October chhungin a phun theih a, ruahtui tlemna hmunah chuan June-July thla chhungin a phun theih bawk. Tuipek tur tha tak nei tan chuan February-March thla ah a phun theihin, tlangram hmun thenkhatah chuan April thla ah an phun thin. Phun hmain a khur chu 60cm thuk leh zaua laih hmasak

tur a ni a, a khur chu leichunglang hang tha leh bawnggek leh leitha dang nena chawhpawlh hmasak a, a peng chu khur lai takah phun tur a ni. Phun zawh veleh tui pek nghal a tha.

Phun inkar hlat zawng:

- 1) A kung te chi: 1.2 x 1.2m or 1.8 x 1.8m or 2 x 2m.
- 2) A kung sang chi: 2.4 x 1.8m or 2.4 x 2.4m or 2.7 x 3m or 2.5 x 2.5m.

Tuipek: Balhla in tui a mamawh tam lam hi ram leilung a zirte, tui leh khaw awm dan a zirin a danglam thei a. Boruak hnawng leh leilung hnawng tha an mamawh hnem em em a ni. Tuipek dan hi kawng hrang hrang a awm thei a, khawro leh ruahtui tlemna hmunah a kung bula hnim dah hian tui mamawh eng emaw chen chu a pe in a tangkai em em a ni.

Leitha pek: Balhla hian chawtha an mamawh hnem em em a. Nitrogen, Phosphorus leh Potassium hi an than chak nan te, a thar hlawk nan leh hrisel nan te, natna chi hrang hrang laka veng tu atan an pawimawh em em a ni.

Leitha pek dan:

FYM/ Vermico mpost	Nitrogen (Urea)	Phosphorus (SSP)	Potash (MOP)
15kg FYM/ 5kg Vermico mpost khur khatah phun hmain pek tur.	200g kung khatah vawi 3 in 1)100g phun rualin. 2)50g phun atanga thlathumah. 3)50g phun atanga thlarukah.	100g kungkh at ah phun rualin pek tur .	300g kung khatah vawi 2 in 1.150g phun rualin. 2. 150g phun atanga thla riatah.

Enkawl zui dan hrang hrang te:

- 1) Thlawh fai:** Balhla huan a hnim te hian, rannung leh natna chi hrang hrang an thlen theih avangin a fai thei ang ber a enkawl a thlawh fai thin tur a ni.
- 2) A peng paih:** A peng tam lutuk paih then hi Balhla chingtute tana thil tih tur pawimawh tak a ni a. A peng chu tan chhum emaw damdawi leh khawnvartui hmangin hmun thenkhatah chuan an tihlum thin. Balhla hnah ro leh natna in a bawm

te, seng zawh tawhna kung te chu paih fai zung zung a tha.

3) A kung do: Balhla kung te hi thli na lutuk vang te, a bul lam tawih vang te leh Balhla bu lian lutuk vang te in a tlu ve thei a, hetiang lakah hian thing leh mau hmanga do thin a tha.

4) Rih vur: Tui luankawr fel taka siam hi ruahtui tamna hmunah a pawimawh hle a ni. Balhla kung tinghet tur leh a zung te tha taka an insiam theih nan a khat tawka rih vur thin tur a ni.

5) A bu tuam: Hei hian khaw vawt leh nisa lakah te, rannung eichhiat lakah te a veng thei a, a hnah ro te chu balhla bu tuam nan hmun thenkhatah chuan an hmang a ni.

A seng: Balhla hian par chhuah turin thla 9-12 vel an mamawh a, an par atanga thla 3-4 velah rah an chhuah thei a ni. Balhla hi um hmin chi an nih avangin a rah puitlin hnu a hmin hma si in an tuk thin.

A rah seng hnu hian Balhla kung metre chanve vela sang chu an zuah thin a, hei hi *Mattocking* an vuah. Hetianga tih hian a peng la naupang deuh te hnenah chaw an pe in, a peng vuai mai tur lakah a veng thei.

Thar Zat:

1) A kung te chi : 300-400 qn/Ha

2) A kung sang chi : 150-200 qn/Ha

Dah that leh um hmin: Balhla hi temperature 13°C aia sang leh boruak hnawng lam 85-95% RH

a dahin kar 3 vel a dahthat theih a. Heng bakah hian damdawi hmangin hun rei zawk te pawh a dahthat theih bawk.

Um hmin dan hrang hrang te:

- 1) Balhla hi hmun ro leh fai takah a hnah a khuh in a um theih.
- 2) Buara a khungin, rap ah mei a ur in a hmin hma hle bawk.
- 3) Hmun thenkhatah chuan Calcium Carbide hmangin an um thin a, hei hi a tha lovin mihring taksa ah harsatna chi hrang hrang a thlen thei.

Balhla huan Calendar mila enkawl dan.

Thla	Tih tur
February-March	1) Mulching 2) Leitha pek 3) Khurlaih
April-May	1) Phun hun 2) Hnah ro leh natna kaite paihfai tur 3) A peng paih hun
June-July	1) Leitha pek 2) A peng paih hun 3) Vual an tam hun lai a ni a, ven hun a ni
August-September	1) A peng paih hun 2) Hnah ro leh natna kaite paihfai tur 3) Vual ven hun
October-November	1) Leitha pek hun 2) Natna kaite paihfai tur 3) Vual ven tur
December-January	1) Leitha pek 2) Chinai emaw Dolomite pek hun 3) Hnahro leh natna kai te paihfai tur

BORDEAUX MIXTURE SIAM DAN LEH HMANNATE

Bordeaux mixture chu Copper sulphate, Chinai leh tui chawhpawlh hi a ni.

A hmanna leh tangkainate.

Sera natna chi hrang hrang vengtu atan a tangkai hle a, lei atanga serin natna a kai thin te pawh a veng tel thei a ni. Ser tam venna atana hmanraw tangkai tak a ni bawh. Tin, sera natna lar tak a hnah leh raha bawl tek tekrawn awm thin (Citrus canker) ven nan a hman theih a, 1% Bordeaux mixture a kah tur a ni.

Heng bakah hian ser tang ro hlawi hnuahtang natna kai tur laka ven nan 1% Bordeaux mixture avawh 3-5 ni 15 dana kah hi a tha.

Bordeaux mixture siam dan.

- 1) Copper sulphate kg 1 chu plastic bucket ah tui litre 50 nen chawhral tur a ni a.
- 2) Chinai (Quick lime) kg 1 chu plastic bucket hran ah tui litre 50 nen bawh chawhral leh tur a ni.
- 3) Copper sulphate leh tui chawhpawlhna bucket leh chinai leh tui chawhpawlhna bucket chu muang changa bucket hrana chawhpawlh leh tur a ni a, thinga siam tiang hmanga uluk taka chawhpawlh tur a ni.

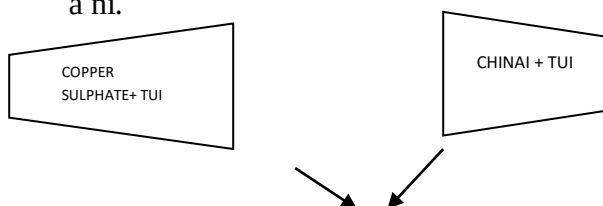
4) Hetianga chawhpawlh hnu hian Bordeaux mixture thur leh thur loh test leh tur a ni a, a thur lutuk a nih chuan a tih al nan chinai pawlh belh leh tur a ni. Bordeaux mixture thur leh thur loh test tur chuan chemte minute reilote Bordeaux mixture ah chuan chiah tur a ni a, chemte ah chuan tuiek ang deuh a lo awm chuan a thur tihna a ni.

Bordeaux mixture siamsa chu hman zawh nghal tur a ni a, hman nghal loh chuan a chakna (Fungicidal property) a hloh thei a, ni 3-5 vel chhe lova dah that dawn chuan chini emaw kurtai kg1 telh tur a ni.

Bordeaux mixture siam dawna hriattur pawimawhte.

1) Bordeaux mixture siam nan thing emaw plastic bucket chauh hman tur, thir hmanga siam bucket ah chuan reaction a awm a, a tuiek duh.

2) Copper sulphate leh tui chawhpawlh leh chinai leh tui chawhpawlh hi bucket hrana tih hram hram tur a ni.



BORDEAUX
MIXTURE

Bordeaux mixture thatnate.

- 1) Natna chi hrang hrang a veng thei.
- 2) Siam a awlsamin a hautak lo.

Bordeaux mixture that lohnate.

- 1) Ser rah a ti hmin har thei.
- 2) Thir hmanga siam bucket hman loh tur.

Bordeaux paste.

Bordeaux mixture nen a siam dan a in ang a, tui tlem zawk nena chawhpawlh a nih avangin a diak (paste) angin a awm a ni. Bordeaux paste siam tur chuan Copper sulphate kg1 leh Chinai kg 1 hi tui litre 10 nena chawhpawlh tur a ni.

A hman nate.

Sera natna kai tangro te chu hlawi (cut) a, chumi hnuah natna laka veng turin a cut na laiah chuan hnawih thin tur a ni. Heng bakah hian

serkung lei atanga metre khat vel thlengin hnawih thin tur a ni a, March-April, August-September leh December-January thlaah te hnawih a tha. Ser kung tih hliam palhah te pawh hnawih a tha, hei hian fungus natna lakah a veng thei.

Bordeaux mixture hi fungus leh bacteria in thlaia natna an thlen thin chi hrang hrang Early leh Late blight te, Leaf spot leh Anthracnose te leh natna theh darhtu ven nan te pawh a hman theih a ni.



HMARCHA ENKAWL DAN

Common Name:	Chilli
Botanical Name:	<i>Capsicum annum.</i>

Family : Solanaceae

A to bul: India ram hi khawvela hmarcha ching hnem ber leh thawncchuak hnem ber a ni a, khawvel ram hrang hrang 90 chuangah hmarcha hi thawncchuah a ni. India ramah chuan Andhra Pradesh hi hmarcha ching hnem ber leh tharchhuak hnem ber a ni.

Leilung mamawh zawng: Leilung hrang hrangah chin theih ni mahse tui luanral zung zung theihna leh tui tlin theihlohna hmunah chin thin a tha, lei thur lam tehna 6-7 pH vel an mamawh tawk a, leithurna hmunah chuan chinai thi a leilung sawngbawl hmasak a tha.

Sik leh sa mamawh zawng: Hmarcha hian boruak lum leh hnawng an mamawh a, a rah puitlin lai chuan boruak ro lam an mamawh thung. North India lamah chuan nipui laiin an ching ber a, South India lamah chuan kumtluanin a chin theih a ni. Ruahtui tla tam lutukah chuan a rahte tlain an tawih duh a, natna ten an tlakbuak hma thin. Temperature 20-30°C hi an mamawh tawk a ni.

Kuitiahna tur nursery siam dan: Kui leh phunsawn hun hi boruak leh tui awmdan a zirin a danglam thei a, nursery bed siam a, ngil taka kui a, polythene emaw buhpawl hmanga khuh leh a tha, 1% Urea a kah hian a tiak hma a, ni 15 dana Copper oxychloride a kah hian thlai tiak thi (Damping off) lakah a veng baw. Kui atanga ni 6-

10 velah a tiak tan a, ni 40-45 velah a phunsawn tan theih a, 1Ha ah hmarcha chi 1.5Kg a tawk a ni.

Phunsawwna tur chu tha taka lehphut a, bawngke leitha te nena chawhpawlh leh tur a ni a, a phun inkar hlat zawng hi a variety a zirin a danglam thei a, 75x75cm, 90x90cm, 60x45cm ah te a phun theih bawk.

Enkaw! zui dan tur hrang hrangte:

1) Leitha pek: Hmarcha hian Nitrogen an tlakchham chuan an thang thei lo va, an hnah upate an lo te in an rawng a lo dal a, Phosphorus an tlakchham chuan an hnah a lo tein an rawng a lo inthlak danglam a, Potassium an tlakchham chuan an hnah hring reng chungin an tein an hnahte an lo kir thin.

Hmarcha hi kumhlun thlai anga chin theih a nih avangin leitha tha taka pek an ngai a, phunsawn hmaa leitha 25-30t/Ha pek a tha. Nitrgen pek nasat lutuk chuan an hnah a thang duang a, an hmin har thung a ni. An par tirh a Nitrogen pek hian a thar a titam in, a hlawk bik. Biofertilizer thenkhat Azotobacter leh Azospillium te hi a chi leh tiak chiah nan leh leia pek atan a tha bawk.

Thlai chi chiah nan 200g Azospillium chu buh chhumna tui(rice water) 200ml nen chawhpawlh 500gm thlai chi chu chiah a, minutes 30 vel daihlmah dahro leh tur a ni.

40g Azospirillum leh tui litre 2 nena chawhpawlh hnuah hmarcha tiak chu minutes 15 vel phunsawn hmain chiah tur a ni a, Azospirillum

chu leia pek dawn chuan FYM emaw compost 20kg leh 2kg Azospirillum chawhpawlh hian ha khat atan a tawk a ni.

2) Tuipek leh hnim thlawh: Phun sawn atanga thla khat chhung hian tui an mamawh tawk pek tur a ni a, nipui lai chuan nikhat kar dana tuipek a tha. Duhthusamah chuan phunsawn atanga ni 30 naah rihvur a, hnimto tur ven nan leh tihdawng turin turin buhpawl emaw sawdust hmanga khuh a tha, sawdust hian rannung lakah a veng thei bawk. Tin, hmarcha hmunte hi fai taka vawnfai a, hnimthahna damdawi hmang emaw a tihfai zung zung tur a ni.

Seng leh enkawl zui dan:

Hmarcha hi phunsawn atanga thlahnihna velah a par tan a, chumi hnu thlakhat velah a rah tan thin. A seng hun chhung hi thla thum te niin, a variety a zirte, enkawl leh boruak awm dan a zirin a danglam thei bawk.

DRAGON FRUIT CHIN LEH ENKAWL DAN

Botanical Name: *Hylocereus sp*

Family : Cactaceae.

Dragon fruit hi kum hlun thei zam chi a ni a. Thei rah hrisel leh mihring tana chaw tha tam tak a pai avangin hmun hrang hrangah chin darh mek zel a ni a, A par hi zanah chauh a parh thin a ni. Dragon fruit hian Protein a pai hnem em em a, zunthlum ,asthma, ruhlam thalo leh lung thalo nei tan pawh a tha em em a, taksa ralveng khawl a tih chak bakah Vitamins C,D,E leh K a pai tel bawk a, thei tangkai leh hrisel tak a ni.

Dragon fruit chi hrang hrangte:

- 1) A kawr leh a chhung sen chi (*Hylocereus polyrhizus*)
- 2) A kawr sen leh a chhung var chi (*Hylocereus undatus*)
- 3) A kawr eng leh a chhung var chi (*Hylocereus (Selenicereus) megalanthus*)
- 4) A kawr leh a chhung purple (*Hylocereus costaricensis*)

Leilung mamawh zawng:

Lei chi hrang hrang ah a chin theih a, lei thur lam tehna pH 5.5-6.5 ah pawh an tha duh hle. A zung hi a pawnlawi a, tui luanral zung zung theihna hmunah chin thin tur a ni.

Sik leh sa mamawh zawng:

Dragon fruit hi boruak lum lamah a tha duh bik a, temperature 20⁰C-30⁰C hi duhthusam a ni. Ruahtui kumkhata 500- 1500 mm tlakna hmun ah a tha duhin, ruahtui tlak tam lutuk chuan a par leh rah

a titawih duh. Nisa lutuk lakah pawh rah tha leh zual tur chuan ven a ngai ve thin.

Enkawl zui dan hrang hrangte:

i) Zamna siam: Dragon fruit hi phun hmaa a zam na tur siam hmasak tur a ni a, duhthusamah chuan concrete a siam hi a tha a, zung an kaih tawh hnua a zamna siam that leh hian a kungin a tuar thei a ni. A zamna hi 4-5 ft tal a sang ni se, a chhipah ring emaw frame dah tur a ni, banah chuan zung an kaih thin a, phun tirha zungkaih hma chuan hrui a tawn beh thin tur a ni.

ii) Phun dan: Phun hmaa khur 30cm x 30m x 30cm a laih a, phun hnua lei chunglang hang tha nen a khuh leh tur a ni, tui tling thei lo tura lei chu tihpawh deuh a tha. Phun inkar hlat zawng hi tlar leh tlar ah 3 metre leh kung inkar 3 metre hi hmun tam taka tih dan a ni. June-July ah a phun theih a, a tang cut 20-25 cm a sei a hman theih.

ii) Leitha pek: Kum hlun thlai anih avangin leitha chi hrang hrang Nitrogen, Phosphorus, Potassium etc. hi a thar hlawk theih nan pek thin tur a ni. Heng bakah hian chaw tha chi hrang hrang bawngkek leitha leh vermicompost a hman theih baw. Dragon fruit hi chemical tello organic fertilizer ah hian a thar hlawk theih hle a ni. Kum khatah vawithum, a par hma April-May, a rah lai July-August leh a rah lawh zawh

hnu October-December ah te leitha pek thin a tha.

iv)Tui Pek: Dragon fruit hian khawkheng an tuar thei hle a, mahse phun zawh veleh tui a hnawng tawka pek a tha. An tui mamawh tam lam hi kan chinna hmun lei a zirin a danglam thei a, thlai kung bula tui tling khawp a tuipek loh tur a ni. Hei hian a zungte a ti tawih duhin an thih phah thei a ni. An zung a pawnlawi a, an par lai leh rah in siam laiin tui pek tur a ni a, ruahtui a tlak that chuan rei tak tui pe lovin an awm thei a ni. Khawro lai chuan karkhatah vawihnih kungkhatah tui 1-2 litre a pek a tha. Tui pek nasat lutuk chuan fungus natna a awm thei bawk.

Seng hun:

Dragon fruit hi a variety a zirte, phunna hmun leh leilung a zirin a thar theih hun a danglam ve thei a. Phun atanga thla 12-15 ah a rah tan thei a, hmun thenkhatah chuan a par atanga ni 28-30 ah a rah a lawh theih thin. May-October ah an par thin a, a aia rei pawh chinna hmun a zirin a ni thei. June-November thlengin a rah a lawh theih thin.

Thar zat:

A variety a zirin a danglam thei a, enkawl dan mumal taka enkawl chuan a thar hlawk bik a, a rah pakhat hi gram 300-800 a rit te pawh a ni

thei. Kumkhatah kung khat atangin 15-25 kg te pawh a thar theih.

LAKHUIHTHEI ENKAWL DAN

Botanical Name : *Ananas comosus*
Family : Bromeliaceae

Origin : Brazil

Lakhuihthei hi thlai chin nuam tak a niin,hlawk zawka thar thei tur chuan a phundan leh enkawl dan uluk a ngai hle a. High density planting chu lakhuihthei zing zawka phun hi a ni. High density planting han tih hian phundan pangngai nena enkawl dan a in ang reng a, mahse ram zau zawng in ang ah pawh a in tharhlawk hleih thei hle a ni.

Sik leh Sa duhzawng: Lakhuihthei hi ram lum uap deuh leh tuipui kamah te a chin theih a, temperature 22-32^o C velah an tha duh hle. Ram san zawng 1100m thlengin a chin theih a ni.

Leilung duhzawng: Tui tlin reng theih lohna leh awih tlan deuhah pawh a chin theih. Balu lei leh lei chung lang dur tha awmna leh lei thur zawng tehna pH 5-6 velah a chin theih. Tlak lei ban tak tih loh ah chuan lei chi hrang hrang ah a chin theihin, lei me lam deuh (Sandy loam) ah an tha duh hle.

Variety hrang hrangte: A langsar zual pathum(3) te lo sawi ila:

- 1) **Kew:** A rah a lian a (1.5-2.5 kg), a mit a lian in a thuk lo bawk a, hrui (fibre) an ngah lo in tui an pai hnem bik. An hnah in hling an nei tlem in, lakhuihthei tin siam nan an hmang nasa hle.
- 2) **Queen:** A kung a te deuh a, an mit a tein a thuk bawk. An hnah ten hling an nei a, a rah lenzawng hi 0.9-1.3 kg te an ni thei.
- 3) **Mauritious:** A rah lian lutuk lova, Kew leh Queen inkar a mi a ni.

A chin pun dan:

- 1) **Slip:** A rah bul hnuai lam atanga peng lo chawr hi a ni in, phun atanga thla 18 na ah a rah tan thei. Slip kan hman dawn chuan 45-50cm vela sei an ni tur a ni.
- 2) **Sucker:** A kung bul lei seh chin atanga rawn peng hi a ni a, thla 15 na ah a rah tan thei. Rah tha leh zual chhuah tur chuan 55-60cm vela sei hman a tha.
- 3) **Crown:** A rah chhip a chawr hi a ni a, 5-10cm tal a sei an ni tur a ni. Rah chhuah tur chuan hunan duh rei deuh.

A phun dan: Chi hrang hrang in a phun theih in, tlang pang leh hmun zawlah a phun theih. A phun dan langsar zual 2 te chu:

- 1) **Single row system:** He system ah hian lakhuih kung leh kung inkar hlat zawng chu 30cm (1 ft) niin, a tlar inkar hlat zawng hi 60cm (2 ft) vel a ni tur a ni.

2) Double row system (High density planting):

Heti ang ah hian tlar leh tlar inkar hi 60cm (2 ft), a kung inkar hlat zawng 30cm (1 ft) leh bed inkar hmun awl hi 90cm (3ft) danah siam tur a ni. Heti ang hian tin 2 leh a chanve hmunah kung 43,500 a phun theih a ni. Lakhuih thei hi mual vang tan zawnga phun a tha ber a, hei hian leimin tur a veng thei.

Double row system (High density planting) thatna te:

- Hnim to tur nasa takin a veng .
- A rahte nisa lakah an him a, hmun zim zawkah pawh a thar hlawk thei hle.
- A peng (suckers leh slip) an chhuah hnem bik.
- A hnah in nisa laka a ven avangin lei hnawnna (soil moisture) a ti tamin tuipek tur a tih tlem phah.



High density planting of Pineapple

Phun hun: April-June hi phun hun tha ber a ni. North East hmun thenkhat ah chuan September ah te pawh an phun thin.

Leitha pek: Lakhuihthei hi lei chung langte a chaw zawng chi a nih avangin Nitrogen leh Potassium a mamawh hnem hle a, Phosphorus erawh a mamawh tam lo hle. Lakhuihthei kung khat zel hian Nitrogen leh Potassium hi 12g vel an mamawh a, lei a chhiat lutuk chuan Phosphorus 4g vel pek tel tur a ni. Nitrogen hi phun hnu thla 2 dan zelah pek a, Phosphorus hi phun ruala pek tur a niin, Potassium hi phun rual leh thla 6 hnu ah pek tur.

Hlo thlawh leh rih vur: Rah tha leh tam zawk thar chhuak turin hnim te fai taka thlawh thin tur a ni a, kut a thlawh bakah Diuron 3kg/ha a hman theih bawk. An zungte a pawn lan avangin a khat tawh a rihvur thin a tha.

Lei khuh (Mulching): Lei a hnawng vawn him nan leh hnim titem turin mulching tih hi a tha. Mulching tih nan hian thingzai nawi leh buh pawlte pawh a hman theih a, thelret puan dum a khuh hi a tha ber a ni.

A peng paih: Lakhuihthei a par laiin a zung atanga peng lo chhuak in an lo rah hnuah a rah hnuai lamah peng an lo chhuah thin a, heng a pengte hi a rah lawh zawh veleh paih vek tur a ni. A peng (suckers leh slip) phun leh tur chu phun dawn ah bal chauh tur a ni.

Tuiphek: Lakhuihthei hian thei dang ang lo takin tui tel lo in a nung rei thei hle a, rah tha chhuah tur chuan khawro laiin ni 20-25 inkar dana tuiphek hi a tha.

Enkawh zui dan: Lakhuihthei hi kum tluan a rah chhuah thei turin a buatsaih theih a. Vawi khat ah sucker, slip leh crown te kha phun rual lovin hunbi in ang lova phun tur a ni. Heng bakah hian damdawi chi hrang hrang chawh pawlh in kumtluan a rah chhuah turin a siam theih bawk.

A rah seng: A rah seng hun hi kan hman duh dan a zirin a danglam thei a, hmun hla taka thawn tur a nih chuan a hmin tak tak hma a seng a tha a, nihnih khat lek a ei tur chu a hmin that hunah seng tur a ni.

Lakhuihthei hi kan phun atanga thla 10-12 ah an par tan thei a, thla 15-18 ah a rah te a lawh tan theih. Dan pangngai ah chuan May-August thla ah a seng theih a, thlasik lai a hmin chu a thur duh bik.

A thar theih zat: Phun in kar zing a phun (High density planting) hian 300 Qtl/Ha a thar theih a, enkawl dan a zirin a danglam thei bawh a ni.



Natnate:

1) Heart rot/ stem rot leh root rot: Lakhuihthei natna langsar tak a ni a, a hnah hringte chu an lo eng a, hnah hmawr lam chu an lo uk thin. A hnah chhunglam chu zawite a pawhin a lo chhuak thin. Hnaw hnuai lam chu an tawihin an rim pawh a lo chhe thin.

Ven Dan:

- i) Tui luankawr tha taka siam tur.
- ii) Lakhuihthei hrisel tha chauh phun tur.
- iii) Dithane Z-78 (3g/ tui litre 1 a pawlh) a kah tur.

2) Leaf Spot: Hnaw ah rawng uk in spot a lo awm thin.

Ven Dan: Dithane M-45, 2-3g tui litre 1 a pawlh a kah tur.

Rannungte:

1) Mealy bug: Khumfa ang deuh an ni a, thei kung a tuihnang an dawt a, a kung in a thih phah thei. An thih loh pawhin an thangtha thei lovin an rah a te bawk.

Ven Dan:

i) A kung hrisel chauh phun tur.

ii) Hnim fai taka thlawh tur.

iii) Phunhma in a kungte chuFenitrothion a minute 15 chiah emaw, phun hnu thla 3 ah Phorate 1.75 kg/ha pek a tha.

2) Termites: Tlumpi kan tih ang chi hi an ni.

Ven Dan:

i) Tui a tawk chauh a pek tur.

ii) A pengro a awm chuan paihfai zung zung tur.

iii) Chlorpyrifos 2ml/ tui litre 1 a pawlh a kah a tha.

PURUNSEN CHIN LEH ENKAWL DAN

Botanical Name : *Allium cepa*
 Family : Liliaceae

Purunsen hi sumchang thlai pawimawh tak mai a nih avang hian India ram hmun hrang hrangah an ching nasa hle a, thar hlawk tur chuan uluk taka enkawl a pawimawh hle a ni.

Sik leh Sa duhzawng: Purunsen hi boruak vawta chin chi thlai ni mahse hmun hrang hrangah a chin theih a, boruak lum lutuk leh vawt lutuklo leh ruahtui tam lutuk lohna hmunah a tha duh bik. A bulbawk insiam hma chuan boruak lum lam 12.8-21°C an mamawh a, 15-25°C hi bulbawk in siam laiin an mamawh thung. Phuntirh lama boruak a vawh lutuk chuan a par hma tir thei a, thlasik laia boruak lum lutuk palh chuan a bulbawk a te duh bawk.

Leilung duhzawng: Tui luanral zung zung theihna hmun, organic matter tamna hmun ah an tha duh hle. Lei charna hmunah chuan bulbawk a in siam tha thei lova, seng hnuah pawh bulbawk an keh duh hle a, rei tak vawn that an har a ni.

Phun hun: Purunsen hi nipui leh thlasik ah a chin theih ve ve a, a chinna hmun leh variety a zirin a phun hun leh seng hun a danglam thei

Season	Kui hun	Phunsawn hun	Seng hun
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Thlasik	Sept- Oct	Oct- Nov	Mar- April
Nipui	Nov- Dec	Jan- Feb	June- July

Nursery bed siam dan: Nursery hi uluk taka siam a ngai a, 10-15 cm a sanga siam a, a vang hi metre khata lian ni thei se enkawl a awlsam. A sei zawng hi mamawh dan a zirin siam mai tur a ni a, tin khat hmun atan 200 m² a lian nursery a tawh a ni.

Chi mamawh zat leh kui dan: Tin hnih leh a chanve hmun atan 5-7 kg a tawh a, tin khat hmun atan chuan 2-2.8 kg a tawh a ni.

Purunsen hi nursery bed vang tan zawnga kui tur a ni a, inches 2-3 danah kui tur a ni. Kui zawh veleh hian lei tlemte a khuh a, tui tlem pek nghal hi duhthusam a ni. A tiah hma nan leh hnawng a pai tam theih nan buhpawl emaw thil dang remchanga khuh a, a tiah veleh laksawn leh tur a ni. Kui hmaa nursery damdawi (fungicide) hmanga kah thianghlim hian a pul lakah a veng thei.

Phun sawn: Nipuilai chuan kui atanga ni 35-40 ah phunsawn theih a, thlasik ah chuan kui atanga ni 45-50 ah phunsawn theih a ni. Purunsen tiak upa leh naupang lutuk te phunsawn loh tur a ni a, purun tiak hmunthuma thena hmunkhat chu cut tur a ni. Phun hma darkar hnih vel chu Carbendazim a chiah hian fungus vanga harsatna lakah a veng thei a. Phun inkar hlat zawng hi 6 inches leh kung leh kung inkar hi 4 inches a phun tur a ni.

Leilung buatsaih: Phunsawwna tur leilung chu uluk taka lehphut a, fungicide damdawia lo kah thianghlim a tha. Tui in a chim lohna turin 15cm vela sanga siam a, a vanglam hi ft 4 a zaua lei chhun pawn a, a chung tihzawl leh tur, a sei zawng chu mahni remchan dan ni se, a kar awl ft 1.5 a kar awl awm a siam hian enkawl a awlsam.

Tuipek: Phun zawh veleh tuipek tur a ni a, chumi hnu ni 7-10 danah pek leh thin tur a ni. Khawlum lai chuan ni 8-10 danah pek a tha. Tui an tlakchham chuan a thar hlawk thei lo. Boruak awmdan a zirin pek hun pawh tih danglam a tul thin. Seng hma ni 10-15 ah chuan tui pek tawh loh tur.

Hlo thlawh: Zing taka chin an nih avangin fai taka hnim tihfai a pawimawh hle a ni. A zung a pawn lawi avangin hlo tiah hmaa hman chi Pendimethalin tui litre khata 3-4 ml pawlhin a kah theih bawk

Seng leh senghnua sawngbawl dan:

Purunsen hnah chunglam an lo eng a, za zela sawmnga (50%) an lo tluk hian an seng theih a, seng hma ni 2-3 ah a hnah tiangin emaw an ti tlu bawk thin. Phun atanga ni 130-180 (thla 5-6) hnua variety leh boruak awmdan a zirin a seng theih a, a bulbawh hrisel tha chu rei tak a dah that theih a, a hrisel lo chu a tawih hma hle. Seng hma lutuk hian a bulbawh quality a tichhiain seng tlai pawhin an keh duh a, tin field a an awm lain an chawr leh hman thin. Purunsen hi seng hnua dahthat loh chuan 25-50% velte a chhe thei a, dahthat hmaa tihro that

hi a pawimawh hle a, chawh sate chu a hmunah ni 3 vel an hnutchhiah a, chumi hnuah a hnah chu a bulbawk atanga inches khat vela sangah a tan chhum a, daihlim hnuaiah ni 10-15 vel a ro that theih nan an dah leh phawt a. Daihlim a tihro hian duhthusamah chuan hnuailam atanga boruak lut thei tur a ni a, chhuat awng neiah emaw maukham chungah dah hian a tawih tur a veng a ni.

Hetianga tihro hnuah an lendan indawtin a thliar (grading) theih a, chumi hnuah chuan hralhchhuah turin a pack theih a ni.

Physiological disorders:

1) Sprouting of bulb: Purun bulbawkte chu seng hmaa lo chawr an awm thin a, hei hi a lo awmna chhan chu thlasik laia ruahtui tam vangte, leia hnawng tam lutuk leh nitrogen pek tam lutuk vang a ni. Variety a zirte leh phun hma lutukin a awm duh bawk.

2) Splitting of bulb: Bulbawk te chu an lo keh a, hei hi seng tlai lutuk vang leh rei tak tuipek loh hnua tuipekin a awm thei.

Natnate:

1) Purple blotch: Purun hnahte chu an lo eng a, a sen deuhin an lo spot thliah thliah a, an lo tla thin.

Ven dan: Mancozeb 2.5g tui litre khata pawlhin ni 15 dana kah hian a veng thei.

2) Cercospora leaf blight: Purun hnahah chuan spot te tak te te vut rawngin an lo awm a, a rei hnuaah an lo lian telh telh a purun hnah zawng zawng ah an lo lang chhuak thin.

Ven dan: Captan 2g tui litre khata pawlh emaw Copper oxychloride 3g tui litre khata pawlhini ni 15 danah kah tur.

3) Powdery mildew: Vutbuak natna in purun hnahte an bawm thin.

Ven dan: Sulfex 3g tui litre khata pawlhini ni 15 danah kah tur.

4) Damping off : Natna langsar tak a ni a, pul hri kan tih ang hi a niin. Lei atang leh a chi atanga kai theih a ni.

Ven dan: Carbendazim emaw Copper oxychloride 3g tui litre khata pawlhini kah tur. Nursery ah pawh hman tur a ni. Kui hmaa leilung lo kah thianghlum lawk hi a pawimawh hle bawh.

Rannung:

1) Thrips: Purun eitu rannung lar tak an ni a, khawlum laiin an tam a, purun hnah an eite chu an lang var vek thin.

Ven dan: Insecticide Imidacloprid 3ml tui litre khata pawlhini kah tur.

PURUNVAR CHIN LEH ENKAWL DAN

Botanical Name : *Allium sativum*
Family : Liliaceae

Purunvar hi chawhmeh atan bakah damdawi chi hrang hrang atan an hmang nasa hle a, luna, asthma, pum nuam lo leh ulcer tan a tha hle a ni. Enkawl danin a zir chuan sum chang thlai hlawk tak a ni.

Sik leh Sa duhzawng: Hmun hrang hrangah a chin theih a, boruak lum lutuk leh vawt lutuk chu an tuar thei lo. Boruak dai leh hnawng hi an than laiin an mamawh a, boruak ro hi a bul puitlin laiin an mamawh bawk. Phun tlai lutuk chuan an thang tha thei lova, a bulbawk a in siam tha thei lo. Boruak awm dan hian a bulbawk in siam danah awmzia a nei thui hle a ni.

Leilung duhzawng: Tui luanral zung zung theihna hmun, lei thur lam pH 6-7 velah a tha duh hle a. Lei char na hmunah chuan bulbawk a insiam tha thei lova, seng hnuah pawh bulbawk an keh duh hle a, rei tak vawn that an har a ni.

Lin hun leh lin dan: Purunvar hi chi hrang hrang a lin theih a ni a, thlur siamin emaw a bulbawk te deuh thehdarhin a lin theih a, 5-7.5cm vela thukin lin tur a ni. March-April thla velah tlangramah a chin theih rualin September-October ah pawh a chin theih bawk.

Purunvar china tur chu uluk taka leh phut hmasak tur a ni a, an zungte hi 8-10cm vela an awm avangin thuk lutuka laih a tul lo a ni.

Phun inkar hlat zawng hi variety a zirin a danglam thei a, 15x8cm,10x7.5cm,15x10cm danah a phun theih.

Leitha pek: Purunvar hian organic leitha an mamawh a, leilung buatsaih laiin FYM @ 50 tonnes/ha nena chawhpawlh a tha a, N:P:K hi 100:50:50 kg hi tin hnih leh a chanve hmunah a tawh a ni. Heng bakah hian chaw tha dang Boron (0.5-1 ppm) hi a thar tam lehzual nan pek a tha. Phosphorous leh Potassium pek tur zawng zawng chu phun tirhah pek tur a ni a, Nitrogen pek tur chanve hi phun ruala pek tur a niin, a bak chanve hi phun hnu thlakhatah pek tur a ni.

Tuipek: Phun zawh veleh tuipek tur a ni a, chumi hnu ni 10-15 danah pek leh thin tur a ni. Khawlum lai chuan ni 8-10 danah pek a tha.Tui an tlakchham chuan a thar hlawk thei lo.

Hlo thlawh: Zing taka chin an nih avangin fai taka hnim tihfai a pawimawh hle a ni.

Seng leh seng hnua sawngbawl dan: Purunvar hnah chunglam an lo eng a, an lo tluk hian an seng theih a, phun atanga ni 130-180 (thla 5-6) hnua variety leh boruak awmdan a zirin a seng theih a, a bulbawh hriseltha chu reitak a dah that theih a, a hrisel lo chu a tawih hma hle. Seng hma lutuk hian a

bulbawk quality a tichhiain seng tlai pawhin an keh duh a, tin field a an awm lain an chawr leh hman thin. Variety a zirin 100-200 qtl/ha a thar theih.

Purunvar hi seng hnuah dahthat loh chuan 25-50% velte a chhe thei a, dahthat hmaa tihro that hi a pawimawh hle a, senghnuah nisa hnuaiah kar khat vel an dah ro thin a, a nih loh chuan daihlim hnuaiah ni 7-10 vel a ro that theih nan an dah hmasa phawt a, purunvar hnahte chu a bulbawk atang 2.5cm velah tan chhum a tha. Daihlim a tihro hian duhthusamah chuan hnuailam atanga boruak lut thei tur a ni a, chhuat awng neiah emaw maukham chungah dah hian a tawih tur a veng a ni.

Hetianga tihro hnuah an len dan indawtin a thliar (grading) theih a, chumi hnuah chuan hralh chhuah turin a pack theih a ni.

SER RAH TLA VEN DAN

Ser rah tla (fruit drop) tih hi tunlai a kut hnathawktute harsatna lian tak a ni a, a thlen tu a zirin ser rah tla hi chi hrang hrang in a then theih a, chung te chu:

1. Physiological drop (June Drop): Physiological drop avanga harsatna lo awm hi ser kung in a chaw tha chi hrang hrang carbohydrates, tui, hormones etc. an in chuhna avanga harsatna lo awm nen a in kungkaih a ni. Hetiang harsatna ser kung a alo awm chhan ber chu boruak lum lutuk (high temperature) emaw tui tlakchham vang te a ni thei a, ser hnah temperature in 35-40°C a thlen chuan hetiang harsatna hi a awm duh a, hormone leh carbohydrates tam lam in an loh vang te in ser rah hi a tla thin bawk.

Ser rah tlak nachhan te:

i) Thlai hriselna lam: Thei rah a hnah awm lohna kung aiin a hnah chhuah tawh hnua rah te hi an thang chak zawk a, thei rah ti thang chak tur chuan thei kung chuan hnah a nei tam tawk tur a ni. A tlangpuiin thei rah puitling tur chuan hnah 40 tal an nei tur a ni. Thei rah seng zawh hnu a awmze nei taka tang hlawi te, natna awmna leh rannung eichhetute hi paih thin a tha.

ii) Nitrogen: C:N ratio hian ser than leh rah that lamah awmzia a nei hle a, Nitrogen te hian ser rah tla tur te hi an ti tlemin an veng ve thei a ni.

iii) Carbohydrates: Carbohydrates tlem hian ser hnah te a par kuhmum leh rah tla a thlen thei a, Carbohydrate tam hian kawng hnih in ser ah a lang chhuak thei a, pakhatna ah chuan carbohydrates tam hian cell wall (cell bang) a tichhah in a rah tla a tlem phah a, pahnihna ah chuan ser a ovulary wall a tam chuan embryo in siam a puiin, embryo chuan auxin siam lo pui lehin ser rah tla a tih tlem phah thei.

v) Lei hnawn lam (Soil moisture): Tui tam lutuk leh tlem lutuk hian ser rah tlak leh tlak loh ah awmzia a hril thui hle a, ruahsur vanglaia tui tling hian a zung te a ti tawih in, tui leh chaw tha hip te a ti buai thei a, chutih rualin khawkheng rei lutuk te hian a rah insiam tir te a ti tla thei bawk.

v) Temperature: Boruak a vawh deuh hian ser rah a tla tlemin a lum hian a tla tam duh bik. Ser rah tla nasa lutuk hi boruak lum leh ro ah a tam a, hnah leh par te pawh an tla duh hle a ni.

2. Pathological Drop: Ser rah tla hi Fungi chi hrang hrang vangin a awm thei a, chung chuan a kung hmawr rah awmna lam a ti tawih a, hetiang hian a rah puitlin hnu a hmin dawn tep ah ser rah a ti tla nasa thei hle. Fungus ang chi natna lo awm nachhan chu ser rah chhuah lai tang ro leh khawizu ang mai a thil tui hnang pe chhuak thei rannung chikhat citrus blackfly hian hmuar dum ang deuh te

ser ah a awm tir thei a, heng harsatna hian kan seng hma in za zela sawmhnhniah pahnh vel a ti tla thei.

3. Entomological Drop: Citrus psylla, Citrus budmites leh Orange bugs te hi ser rah ti tla tu rannung langsar zual te an ni a, heng rannung hian ser par leh rah te nasa takin an ti tla a ni. Fruit fly hi North East a Khasi mandarin kan tih ah an tam hle bawk.

Ser rah tla ven dan:

i) Ser rah tla ven nan hian ser rah in siam tan tirh lai May leh June velah thla khat danah growth regulator 2,4-D 15 ppm emaw GA₃ 15 ppm + Benomyl 1000ppm + Urea 1% hi a tha a, hetiang ang chiah a chawhpawlh hi September leh October vela kah hian a rah seng hmaa tla tur eng emaw zat a veng thei bawk. Bavistin tui litre 1 a gram 1 pawlh a, ni 15 dana a rah seng hma a vawi 3 tal kah hian a rah tla a ti tlem bawk.

ii) Ser in a chaw mamawh chi hrang hrang a inbuk tawka pek tur a ni a, chu chuan a hnah te a ti thang duangin a rah a pui bawk.

iii) Ser rah seng zawh veleh a tang ro te paih nghal a tha. Hei hian natna chi hrang hrang lakah a veng thei.

iv) Tui luan ral zung zung theihna ah phun hram hram tur.

v) Ser rah tla te ser huan atanga paih bo vat thin tur.

SERTHLUM ENKAWL DAN

Common Name : Mandarin Orange
Botanical Name : *Citrus reticulata* Blanco
Family : Rutaceae

A to bul: Ser kan tih zing ah hian serthlum hi India rama kan chin tam ber a ni a, India rama kan ser chin za zela sawmnga (50%) te hi serthlum an ni. Kan ser chin tam berte hi an to bul chu China ram khi a ni a, India hmarchhakah hian ser chi hrang hrang a tam in Mizoram pawh hi a ching uar berte zing a mi kan ni.

Leilung a mamawh dan: Serthlum hian lei tak tha, lei ban lo, tui hip ral zung zung thei, awih lutuk lo leh lei thawleng lutuk lo a mamawh a, lei thur leh thur loh tehna pH 5-6 velah a tha duh hle a ni. Serthlum hi lei chi hrang hrang ah a to thei a, mahse hlawk zawka tharchhuak tur leh rei tak dam tir kan duh chuan a chung a kan sawi tak hmunah hian chin hram hram tur a ni.

Sik leh sa mamawh dan: Boruak lum leh vawt in chawih tawkna hmun (Tropical leh Sub-Tropical) ah an tha duh a, hmun thengthaw lam tlakdeng nikang lam aiin chhuah chhawng emaw zel en lam, tlang sang leh zo lutuk lo, ruahtui kumkhat chhunga in sem rual khai taka a tlakna leh tuilak tur awm theihna hmunte hi duhthusam a ni.

Phunna tur buatsaih dan: Phun hma thlakhat velah a khur 2ft a thuk leh zaua metre 5 danah laihlawk a, nisaa em thianghlim hmasak a tha a, hmunawiha phun dawn chuan half moon terrace siam hian tui leh leitha pek a tiawlsam a, tin a khur mawngah chuan phun hmain lung leh meihawl dah hmasak hian vual leh a zungtawih lakah a veng thei a, heng bakah hian bawngkek leitha, Neem cake leh lei chunglang hang tha chawhpawlh a, phun hmaa a khur chu hnawh tur a ni.

Phun dan: Serthlum hi May-June vel hi phun hun tha ber a ni a, a khurlai takah chuan uluk taka phun tur a ni a, ser phun hian lei hrul aia sang hreta phun tur a ni. Phun zawh veleh a tuipek nghal a tha.

Enkawl zui dan tur hrang hrangte:

1) Leitha pek: Serthlum hian rah tha leh tam chhuah tur chuan chawtha an mamawh nasa hle a. Kum khatah leitha vawithum March-April, June-July leh Oct-Nov ah pek thin tur a ni. Heng bakah hian kan phuntirh ah FYM 20-25 kg tal pek a tha. Ser phun tirh ah chuan a kung atanga inches 8 vela hlaah pek a, a kung puitlingah chuan serkung atanga feet 3 a hlaah lei laihkhua a, leitha pek hnua vur leh tur a ni.

Heng bakah hian serin an mamawh em em chu micronutrient hi a ni a, kumkhatah heng $\text{ZnSO}_4(0.5\%)$, $\text{CuSO}_4(0.4\%)$, $\text{MgSO}_4(0.5\%)$, $\text{MnSO}_4(0.4\%)$ a vawithum kah thin a tha, a nih

loh chuan Multimicronutrient for Citrus 500gm
tui litre 200 a pawlh a kah tur a ni.

2) Tuipek: Thei dang aiin tui an mamawh hnem a,
tui tam lutuk leh tlem lutuk pawh hi a tha lo.
Tuipek tam lam hi a ram leilung leh sik leh sa a
zirin a danglam thei bawk. A kung bulte
hnimhnaha khuh hi a tha hle bawk a, fur lai chuan
a kung bul chu tihfai vek tur a ni.

3) Thlai dang nena chin pawlh: Thlai chi hrang
hrang Chana, Behlawi leh Be lam chi te nena chin
pawlh hi a tha. Thlai dang nena chin pawlh hian
lei hnawnnate leh lei min turte an veng ve thei a,
hnim to tur lakah an veng bawk. Mahse awmze
neia thlaite hi thlan thin tur a ni.

4) Thlawhfai: Ser huana hnim to te chu thlawhfai
zung zung tur a ni. Heng hnimte hian natna leh
rannungte an tipung thei a, an chawtha eiturte an
eisak thin avangin a fai thei ang bera thlawhfai tur
a ni.

Physiological Disorders:

1) A rah tla (Fruit Drop): Sik leh sa inthlak
danglam vangte, boruak hnawng tlem leh lei
hnawnna inbuk tawh loh vangte, chawtha
hmuhloh vang leh rannung leh natna chi hrang
hrang vangin a awm thei.

2) Granulation: Hetianga ser an awm chuan sertui a tlem in a hul a, a tui lovin ser rawng a lo dang a, ser rah lianah a tam bik. Boruak hnawng tam lutuk vang ten a awm thei.

Citrus Decline (Ser tam):

Citrus decline (Ser tam) kan tih hi natna chauh a ni lova, mahse natna angin a lo lang chhuak thin. Serthlum kung tha kum tam tak rah tawhte chu an lo ro a, a zarte ro in a rei hnuah pheh chuan a kung pumpui an thi thin. A tirah chuan an hnahte lo eng in an tla a, an thang theilo a, a chang leh an par teuh a, rah tlemte an nei thin. Ser rah awm chhun pawh a te a, a kawr a chhah a, an thur em em bawk.

Ser tam lo awmna chhante:

- ◆ Ruahtui tam lutuk vang emaw thal laia tui tlak chham vang.
- ◆ Hmunawiha phuna lei chunglang luanral nasat lutuk vang.
- ◆ Chaw tha chi hrang hrang Nitrogen, Phosphorus, Potassium, Zinc, Magnesium, Boron, Molybdenum, Calcium etc inbuk tawh loh vang leh khawp kham loh vangin.
- ◆ Ser phun tur thlan uluk tawh loh vang.
- ◆ Ser phun dan mumal lo lutuk, khurlaih leh phun inkar hlat zawng awmze neilo leh tuiluan kawr mumal loh vang.
- ◆ Rannung leh natnate laka enkawl uluk tawh loh vang.

Ser tam enkawl dan:

◆ Awmze neia phun. Ser kung inkar hlat zawng hi 5m tal a ni tur a ni a, phun hmain a khur 2ft biala laih hmasaka, a khur chu bawnggek lei tha 20-25kg leh lei chunglang hang tha chawhpawl a vur leh tur a ni.

- ◆ Awmze nei leh inbuk tawka leitha leh chawtha pek.
- ◆ Variety hriatchian leh natna kailo phun thin tur.
- ◆ Phunna hmun thlan uluk. Hmunawihah pawh half moon terrace siam tur.
- ◆ Serhuan enkawl uluk a, hnim thlawhfai a, a tangro hlawi ngaih pawimawh.
- ◆ Serkungte chu thal khawro laiin a theih ang anga tuipek a tha a, a kung bulah chuan hnawng a pai theih nan hnimhnah ro emaw buhpawlte a khuh a tha.
- ◆ Rannung leh natna awm hriatchian a, damdawi hmanga enkawl thin tur.

STRAWBERRY CHIN LEH ENKAWL DAN

Botanical Name : *Fragaria L*
Family : Rosaceae
Origin : France

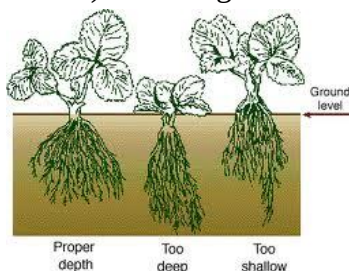
Strawberry hi thei lar tak leh hun reilote chhunga rah chhuah thei leh thar hlawk thei tak a ni. Chaw tha chi hrang hrang Vitamin C, Protein leh Minerals chi hrang hrang Phosphorus, Potassium, calcium leh Iron te a pai tel a ni.

Leilung duhzawng: Strawberry hi lei chi hrang hrang ah a phun theihin lei chhia ah pawh tui luan ral zung zung theihna leh lei hnawng awm na ah a tha duh bik. Strawberry hi lei sakhat aiin lei thawl tha ah a hmin hma bik. An zung te hi a pawnlawi in (15cm) kan chinna hmunah tui a tling tur a ni lova, lei tlem a thurna hmunah pawh a phun theih. Lei a al lutuk chuan a zung pawh a in siam tha theilo. Lei thur lam tehna pH 5.7-6.5 hi Strawberry chin nan a tha tawh vela ngaih a ni. Alu, Tomato, Bawkbawn leh Hmarcha chinna hnuah te Strawberry hi chin loh tur a ni.

Sik leh sa duhzawng: Strawberry hi a variety a zirin boruak lum deuh leh vawt deuha phun chi a awm a, chhunah temperature 22-25°C leh zanaah 7-13°C an mamawh a ni. Khaw vawt lutuk ah chuan a thar hlawk thei lo.

Chin pun dan: Strawberry hi a peng (runners) hmanga chin pun hi a awl ber a, mahse virus natna a pung duh bik a, fimkhur a ngai a ni. Kung khat hian peng 7-10 te an chhuah thei in, variety a zirin a danglam thei a ni. A peng chhuah tur bik hi nursery bed hranga siam a tha. A peng tih tam nan hian May kartawp ah GA₃ 40mg tui 1 litre pawlha pek a tha.

Phun Dan: Phun hmaa lei tha taka laih phut a pawimawh hle a , lung leh hnim te paih fai hmasak vek tur a ni. A zung a pawnlawi avangin a phun danah pawh fimkhur a ngai a, thuk lutuk lo, a zung lang lova phun a tha. Phun hmaa Soil fumigation, Methyl Bromide leh Chloropicrin tih hian a zung a ti tamin, nematode(rulhut chikhat) leh vuai natna (Verticillium wilt) ah a veng thei.



Phun hun: September-November hi phun hun tha ber a ni a, phun hma lutuk pawh a thar a tlein a rah quality a ti thalo thei. A zung tichhe lo thei ang bera phun tur a ni. Phun hmaa a peng Carbendazim (2g tui litre 1) a chiah hi a tha.

Phun inkar hlat zawng:

Tlar leh tlar inkar	-	40cm
Kung leh kung inkar	-	30cm
Nursery bed inkar	-	90-120cm
Nursery bed san zawng	-	25cm

Lei khuh (Mulching): Buhpawl emaw thelretpuan a hman theih a, hei hian hnim a ti tlemin lei a ti hnawng rei a, a thar a ti tam in, rah tawih tur lakah a veng a ni. Thelretpuan a khuh a nih chuan a tiak awmna zawn kha tui leh leitha pek awlsamna tawk tura verhkuak vek tur a ni.



Thelretpuan hmanga Mulching tih dan

Tui pek: A zung a pawnlang avangin tui hi vawikhata tam lutuk lo leh zing deuh zawka pek a tha. Tui pek that hian a zung a ti thang chak in a peng a chhuah hma baw. Tui pek tam lutuk chuan a hnah leh rah te a ti tawih theiin Drip Irrigation hi a tha ber a ni.



Drip Irrigation hmanga tui ptk

Chaw tha mamawh zat: Ram tin 2 leh a chanve hmunah NPK 100:60:140 kg vawi 3 pekah a tawk a ni. Kan phun dawnah NPK 20:40:40 kg leh 20 tons FYM pek a, a bak chu vawi 2 dang pek leh tur a ni. Strawberry hi a zung a pawnlawi avangin leitha te hi thuk lutuk a pek loh tur a ni.

Tih tur pawimawh hrang hrangte:

- A peng hmasa hi paih emaw phunsawn tur.
- Phunna hmun chu a hnawng lutuk tur a ni lo.
- Phun hmain natna laka veng turin Fungicide hmanga a zung chiah a tha.
- Chinai pek tam lutuk loh tur.
- A rah leh hnah tawihthe chu paihbo zung zung tur.

A seng: A rah te hi hmun li a thena hmun thum a sen hunah a seng theih a, khawlum ah a hmin hma in ni 2-3 hnuah a seng zel theih a ni. Zing kara seng a tha in, a kuang nena sengin a tawih har bik. Duhthusamah chuan seng hnuah daihlim a dah a, Fridge ah emaw dahvawh a tha. A rah tawih te hi kan phunna hmun atangin paih bo zung zung tur a ni.

A thar zat: Strawberry hi kung khat zelin 200-500 g vel rah a chhuah theih a,enkawl dan a zirin a danglam thei bawk.A rah hi Rs 200/kg in hmun thenkhat chuan hralh thin a ni.

Physiological Disorder:

Albinism: Strawberry rah te chu rawng neilo emaw sen no rawng ang deuhin an lo awma, an thur in an tawih hma bawk. Boruak awm dan leh chaw pek hnm lutuk vang te in a awm thei.

Rannung:

1) White grubs leh Cut worms: A zung leh a kung naupang deuh te an ti chhum thin.

Ven dan: Lei laih phut that leh Chlorpyrifos 2ml tui litre 1 nena chawhpawlha leia kah a tha.



2) Root weevil: A zung a ker in a kung pumpui in a thih phah thei.

Ven dan: Carbofuran 6-10 kg hi tin 2 leh a chanve hmunah leia phul a tha.



Natnate:

1) **Verticillium wilt:** Hnahn hnuai lam rawng a lo uk a, an lo vuaiin, a tawpah a kung pumpui an thi thin.

Ven Dan:

- Hmun khata thlai ngai reng chin loh a tha.
- Damdawi Formalin (5000 litre/Ha) leh Chloropicrin (210 litre/Ha) hmanga kah tur
- litre/Ha) hmanga kah tur.



2) **Leaf Spot:** Ruah sur hunlai in hnahn ah spot a lo awm a, hnahn lo ro in an tla thin.

Ven Dan:

- Hexaconazole 100ml tui litre 200 nena pawlhin vawi2-3 kah emaw
- Carbendazim 100g hi tui



TOMATO CHIN LEH ENKAWL DAN

Botanical Name: *Lycopersicon esculentum*

Family : Solanaceae

Tomato hi thlai pawimawh tak a niin kawng hrang hrangin a hman theih a, vitamins A, B leh C a pai tel bakah soup, salad, pickle, ketchup, sauce siam nante an hmang thin.

Leilung duh zawng: Tui luanral zung zung theihna an mamawh a, organic pai tam leiah an tha duh hle bawk. Lei dur tha leh lei thur lam tehna 7-8.5 pH velah an tha duh.

Sik leh sa duh zawng: Khawlum lam 15-27°C an mamawh a, khawlum lutuk leh vawt lutukah chuan an tiak tha thei lova, an parlai leh rah insiam laia ruah a sur nasat hian a thar a hlawk thei lo.

A chi kui tiah dan: A kuina tur lei chu tha taka leh phut phawt tur a ni a, tuitling theilo turin leizawl aia 15cm sanga nursery siam a tha a, kui hmain bawngke leitha nen uluk taka chawhpawlh tur a ni. Heng bakah hian thlai tiak pul hri laka veng turin Dithane M-45@3g/m² emaw Bavistin@2g/m² nena chawhpawlh a tha. Hemi hnu hian Tomato chi chu ngil taka kui tur a ni a, kui hnuah lei pan te a vur leh tur a ni. Buhpawl emaw saranga ni 3-5 vel a tiah hma nan khuh tur a ni a, a tiah veleh laksawn leh tur a ni. Kui zawh veleh tui tlem pek a, a tiah hma chu a hnawng tawk chauha tui nitin pek a tha.

Kui leh phun sawn hun: February-June emaw September- December hian a variety a zirin a kui theih a, nipui laia chin hian a man a to in a hlawk bik, enkawl uluk chu a ngai bik.

Kui atanga ni 25-30 velah an phunsawn theih a, phun inkar hi 60x45cm emaw 75x45cm tal an nitur a ni. Phunsawn hi tlai lamah tih thin a tha a, phunsawn zawh veleh tuipek bawh tur.

Leitha pek: Bawngkek hi 25t/ha an mamawh a, NPK hi 120:60:50 kg/ha an mamawh a, Phosphorus leh Potassium hi phunsawn ruala pek nghal tur a ni a, Nitrogen dose chanve hi phunsawn ruala pek tur a ni a, a bak zawng hi hmun hnih a thenin phunsawn atanga ni 30 leh 60 ah pek leh tur a ni. Leitha pek hian a kung atanga 10-15cm vela hlaah pek tur a ni a, lei nen chawhpawlh a tuipek nghal a tha. Phosphorus hian a zung in siam a pui a, Potassium hian a rah rawng in siam a pui bawh. Heng bakah hian Boron pek hian a rah len lam leh rawngte a pui bawh, Boron an tlakchham chuan an rah a keh duh a ni.

A peng paih: Tomato hi pawnaah emaw greenhouse hnuaia chin a nih pawhin a peng paih hi a pawimawh hle a, a hnah hnuaiah leh hrisel lo te chu paihbo zung zung tur a ni.

Tuipek: Tui hi a hnawng tawh chauh a pek a, tuitling thei lova siam tur a ni, tui a tlin chuan a kung a tawih duh a, a thar hlawk thei lo.

Enkawl zui dan:

-Hnimfai taka thlawhtur a ni a, a zung tichhe lo zawnga tihfai thin tur.

-A zamna siam (staking) hi a pawimawh hle a, hei hian a thar tam leh tam loh a hril thui hle, a zamna hi hrui emaw mau hmangin a siam theih. Ni eng leh boruak te rualkhai takin a rah ten an hmuhphah a, Tomato zam chi phei chu a rah a ti tamin a lian bik a, a thar a hlawk phah thei.

-A zung lang lo turin a khat tawka rihvur fo tur a ni.

A seng: A hmanna tur a zirin a seng hun a dang thin a, hmun hlaa thawn tur a nihchuan a rah puitlin tawh hnu la hrin laiin an seng a, khawchhung a hralh tur chu a hmin hnuah an lo thin. Phunsawn atanga ni 70-100 ah a seng tan theih a, variety zirin a danglam thei baw. Hybrid chi hi 400qtl/ha a thar theih a ni.

Natnate:

1)Early blight: A hnahah spot ang deuhin an lo val a, a rei hnuah hnahte lo engin an lo ro a, a hnahte an tla kawlh thei.

Ven Dan:

i)Natna kaite chu paihbo nghal tur.

ii)Dithane M-45 (2g/litre) emaw Ridomil (2g/litre) emaw Bavistin (1g/litre) a kah tur.

2)Late blight: Tomato hnahah te, a kungah te val dum angin an lo awm a, a hnah pumpuite an lo ro thin a ni. Tin, he natna hian a rah thlengin a khawih a, an lo val a, an lo tawih thin.

Ven Dan:

- i) Natna kaite chu paihbo zung zung tur.
- ii) Dithane M-45 (2g/litre) emaw Ridomil (2g/litre) emaw Bavistin (1g/litre) a kah tur.

3) Bacterial wilt: Hetiang natna in a tlak buak chuan a kung pumpui an lo vuai a, an thi thin.

Vendan:

- i) Tuitling thei lova siam tur.
- ii) An zungte chu thawleng thei ang bera dah tur.

Rannung:

1) Fruit borer: Tomato raha pangang lo awm thin hi a ni a, a rah an ker a, an ti tla thin.

Ven Dan:

- 1) Malathion (3ml/litre) a ni 15 dana kah hian a veng thei.

Physiological disorders:

1) Fruit cracking: Tomato rah keh hi chi hrang hrang a awm a, a dung zawng, a vang zawng leh puakkeh ang deuhin a awm thei bawk. Boruak lum leh vawt in thlak danglam vangte, lei hnawnna lo danglam vangte, reitak ruahsur loh hnua a surte leh Boron thlakchham vangte in a keh thei bawk.

A rah keh veng tur hian Borax 15-20kg/ha leia pek emaw Borax @0.25% a wawi 2-3 a rah atanga hmin thleng kah hi a tha.

2) Blossom end rot: Calcium tlakchham vangin a lo awm a, a rah chhiplam chu a lo vala, a lo dumin a rah pumpuite an titawih thin.

Calcium sulphate, Calcium hydroxide leh Calcium chloride hmanga kah tur .

3) Blotchy ripening: Hetianga Tomato rah a lo awm chuan a kung leh rah in zawmna laichu a hring, eng leh var ang deuhin an lo awm a, hei hi Potassium tlakchham vangte, Nitrogen leh Potassium in buk tawk loh vangte, Nitrogen, Calcium leh Sodium tam lutuk vangtein a awm thei bawk. Fertilizer inbuk tawka pek hian a veng thei.

DAWNFAWH CHIN LEH ENKAWL DAN

DAWHFAWH

Botanical Name: *Citrullus lanatus*

Family : Cucurbitaceae.

Dawnfawh hi boruak lum mamawh thlai a ni a, a kui atanga a rah seng thlenga a boruak mamawh erawh a danglam thin hle a ni. Kan enkawl dan a zirin a thar hlawk leh hlawklo a hril thui hle a. Kan chin dan fuh tawkloh vangte, variety zirte, rannung leh natna vangte pawhin a thar hlawk lam a in thlau thei hle bawk.

Taksa tana a thatna te:

- 1) Kal leh Lung lam thalo tan
- 2) Cancer vengtu atan
- 3) Asthma leh thisen sang tan
- 4) Tihrawl na leh pum puar nuamlo tan

Leilung buatsaih dan:

- Phunsawwna tur chu tha taka leh phut that tur a ni a, lung leh thlai zung te paih fai hmasak vek tur a ni
- Lei chunglang hang tha lakkhawm a, phunsawwna tura lo dah lawk a tha.
- Tui tlin lohna turin 60 cm a hlai leh 15 cm a sang a lei chhun pawn hmasak tur a ni.
- Phunsawn hmain Nitrogen leitha pek tur chanve leh Phosphorus leh Potassium hi a vaia pek nghal tur a ni. (75 kg N:100 kg P₂O leh 35-75kg K₂O/Ha). Lei chunglang 5cm a thuk ah pek a tha.

-Phunsawanna tur bed chu plastic mulch (black-silver) a khuh hian lei a tihdawng reiin tui mamawh engemaw chen a ti tlem a, hnim to tur a ven phah bawh.

-Plastic mulch chu 10cm a zauin tih kuak a, a lai takah chuan phun sawn tur a ni, 60cm inkar a hlatin phunsawn tur.

Nursery siam leh kui tiah dan:

Dawnfawh hi nursery a kui hnu a phun sawn theih a nia, a tiak hrisel tha chu phunsawn hnua pawh an thang tha hle thin. Tin hnih leh a chanve hmunah dawhfawh chi hi 1-1.5 kg field a direct a phun dawn chuan kan mamawh a, phunsawn dawn chuan tiak 9,000 vel kan mamawh a ni. A chi tiah that theih nana leh a tiah hnua pul hri in a man loh nan Copper oxychloride 2gm tui litre khat nen chawhpawlh in kui hma, kui hnu leh kui atanga ni 10 velah a kah tur a ni. Dawnfawh kui hmaw zankhuua tua zankhat emaw lo chiah lawk a, chumi hnua pawnhche hnawnga up hian a ti tiak tha duh a, a uingho a nih veleh a phunsawn theih thin, A variety a zirin a tiah hun a danglam ve thei bawh.

Phunsawn dan:

Kui atanga ni 14-16 a phunsawn theih a protray a kui a nih chuan, phunsawn hian fimkhur taka a zung tichhe lo thei ang bera phunsawn tur a ni.

Enkawl zui dan hrang hrangte:

-Phunsawn atanga ni 30 naah Nitrogen a chanve pek tur kha pek leh tur a ni.

- Phunsawn atanga ni 40-45 naah a hnah hrisel lo leh upa deuh te paih a, a zamna tur pawh siam tan a hun tan

-A parlaiin karkhat dana vawi 2-3 Borax @ 25 ppm (25mg/l) leh NPK 19:19:19 @ 3g/l a rah that nan pek tur a ni.

-Phunsawn atanga ni 50 na a rah in siam laiin micronutrient formulation Arka vegetable special @ 3g/l vawi 2-3 ni 10 danah a rah quality tih that nan leh thar tam nan pek tur.

- A peng hi zuah tam loh hian a rah a lian duh a, kungkhat a peng pahnih bak zuah loh tur a ni.

-A rahin lei hnawng a sik loh nan leh a tawih loh nan fimkhur tur a ni, a rah support tu siam atha a puitlin dawn in

-A rah a thlum leh zual nana seng hma kar khat chung chu tui pek loh a tha

Rannung leh natna laka ven him dan:

-Phunsawn atanga kar khat hnuah, a hnah no deuh te chu paih tur a ni a, rannung chikhat Leaf miner laka ven him nan. Neem cake emaw neem oil a kah tur a ni.

-Phunsawn atanga ni 10 hnuah Copper oxychloride in kah leh tur a ni a, hei hian a kung vuai leh natna avanga kung hrisel lo lakah a veng ve thei a ni.

-Pikhawizu (fruit fly) ven nan Pheromome trap hman a pawimawh hle a, a pa hip khawm nan 10 vel tin hnih leh chanve hmuna dah a tha, a nih loh chuan Mai tihsawm kg 1 leh kurtai gram 100 leh Malathion insecticide 10 ml chawhpawlh chu tin khat hmunah hmun 4-6 velah hung ila, Pikhawizu in tui nan an hmangin thah na remchang tak a ni thei a, a tih rem dan tha tak a ni. Deltamethrin 1ml/litre tui a chawhpawlh in a kah theih bawk.

-Dawhfawh chinna bula Vaimim chin hian rannung chi khat thrips (Bud necrosis virus thlentu) a ti tlem thei bawk.

-Heng bakah hian Acephate emaw Imidacloprid hi phunsawn hma emaw phunsawn hnu ah ni 10-15 inkar danah ni 60 chhung chu kah theih bawk.

Rah seng leh thar zat:

Dawnfawh rah lei lam rawng kha a lo engvar deuhin emaw, a tendrils a lo ro in a hmin a ngaih a nia, tin a rah han ben a ri thawp a lo nih in a hmin tura ngaih a ni a, a variety zirin a danglam thei bawk. Hybrid variety ah chuan ni 75-85 chhungin quintal 600-750 a that theih a, OP variety ah chuan quintal 450-500 a thar theih a ni. A variety a zirin a danglam thei bawk.

PLANT PROTECTION

PA KHAWI DAN

Pa hi hmuar chikhat (macro fungus) a ni a, hmun hnawng emaw, thingah emaw leiah te to thin a ni. Pa hi mihring tana chaw tha tamtak paitu niin ram changkang zawkah chuan Pa khawi hi an uar hle a, eizawna liantham tak a ni nghe nghe. Mizoram ah pawh Pa khawi hi hun engemaw kalta atang khan kan uar chho hle. Mizoram Kan Pa khawi tlanglawn ber hi Oyster Mushroom (*Pleurotus spp.*) a nih avangin Oyster mushroom khawi dan lo sawi zau ila.

Pa khawina atana mamawh te:

- Pa chi (Mushroom spawn)
- Buhpawl
- Dekchi/ bel lian
- Polythene/ sarang lian
- Rubber band
- Dettol emaw sanitizer (kut leh polythene vel tih thianghlim nan)

Pa khawi dan:

- A hmasa berah Buhpawl chu inches 2-3 a seia chan tur a ni a, zankhua a tuia chiah tur a niin, tui chu paih leh tur a ni.
- Dekchi/ belah tui kan chhuan anga tichuan kan buhpawl chu tui so ah chuan minit 15-30 chum tur. Hei hi natna hrik leh bal engemaw lo awm thei venna tur a ni.
- Kan buhpawl chu duhtawka kan chhum hnu ah tui chu paih a, reilote hmun dai ah silpauline

emaw sarang lian chungah pho ro emaw dah hul leh phawt tur a ni. Buhpawl chu kan han sawr chin anga, tui far tur a awm tawhlo tih kan hriat hnu ah kan pack thei tawh dawn tihna a ni.

- Buhpawl chu polythene/ sarang fai tak chhungah inches 2 emaw 3 vela chhah in kan nem muk anga, chumi chungah chuan pa chi chu a sir zei zei ah kan thlak kual ang a, chutiang zelin a chungah angai ang tho in buhpawl leh Pa chi chu kan dah le hang. Chawng li emaw chhawng nga vel tal kan dah tur a ni. A chhawng tawp ber ah chuan buhpawl in a chin tur a ni. Heihi block emaw bag khat kan ti chu a ni.
- Chutichuan kan block/bag siam chu phui takin rubber in kan tawn anga, room thimah dah ang.
- Kan block/ bag chu ni 15 atanga ni 20 hnu velah kan check leh anga, alo var vek hnu ah sarang chu kan phelh anga, a in turah kan khai anga, zing leh tlaiah tui pek tawh tur a ni.

Hriattur pawimawh te:

1. Pa hi hmuar chikhat anih avangin kan Pa khawina in leh a velah thianghlimna kan ngaipawimawh tur a ni a, ka Pa khawi tur leh khawi tawh sa te kan sawngbawl dawnin kut fai taka sil zel tur a ni a, dettol emaw sanitizer in kan kut te chu fai takin kan ti thianghlim zel tur a ni.
2. Ka pack na polythene/ sarang chu boruak luh chhuah nan kan vit pawp bawh tur a ni.
3. Thlai damdawi engpawh kan Pa khawina ah kah/hman loh tur a ni.
4. Pawh hma ni in tui pek tawh loh a ni.

FALL ARMY WORM (FAW) LAKA VAIMIM VEN LEH ENKAWL DAN

Fall Army Worm (*Spodoptera frugiperda*) hi rannung, ram dang atanga lo lut (invasive pest) niin Tropical leh Sub-tropical America rama vaimim eichhe tu ber a ni a, favang lain a hluar hle a ni. Kum 2016 khan Central leh Western Africa, Nigeria, Sao Tome, Benin leh Togo ram thlengin nasa takin Vaimim leh thlai dangte a tichhia a, India ramah pawh kum 2018, May thla khan College of Agriculture, Shivamogga, Karnataka a an vaimin china humanh FAW hian vaimim a tichhia a ni tih hriatchhuah a ni bawk. Karnataka atang hian darh chho zelin, thla kaw (9) chhung lekin state sawm (10) laiah a darh hman a. He rannung hi Mizoram-ah ngei pawh kum 2019, April thla tir khan hmuh a lo ni ve ta a ni.

FAW chanchin tlangpui:

Fall Army Worm (FAW) pangang hi thlai eichhe tu ber a ni a. A pui, pangang thlahtu hi Phengphehlelep hmul nei, lungphur thlahtu kan tih mai (moth) a ni a, zan lama chetla chi a ni. Hun reilote chhung pawha hmun hla tak tak pem thei niin, thli chakna hmangin zan khat lekah pawh km 100 laia hla te a thlawk thei a ni. Atui atanga a keu a a thih thleng (life cycle) hi ni nipui ah ni sawmthum (30) niin favang lain ni sawmruk (60) leh thlasik ah ni sawmriat atanga sawmkua (80-90) a ni. A pui hian vawikhatah 50-200 lai a tui thei a, damchen ni 10-21chhung hian tui 1000-1500 lai a tui thei a ni.

A tui hi ni 2-3 hnuah keuin, a pangang keu thar hi a hring a, a lu a uk emaw a dum a, a lo len deuhah bawngkek rawng a lo ni thin, a pang sirah a dung zawngin a dumin a rang a, a mawng lamah spot (val) pali, kil li nei, a intlar a, a lu-ah ‘Y’ letling zawnga inthai a awm bawk.

Vaimim a tihchhiat dan:

Pangang keu tir hian a hnah hring a dit a, a hnah chu hmuh tlang theih khawp darthlalang ang hialin a ei pan a, a eina hnuhma chu a var bawk thin a ni. A pangang puitling hian vaimim hnah a ei pawh mai bakah a hnah tlang atangin a ei hek thin. A eipawh hi a bial emaw a tung sei tak pawh a awm. A zik karah luh chilhin, a zik bula kung lairil te pawh a hreuh chhe thin. A vui insiam tur leh a kawm insiam tir a tichhe bawk thin a ni.



FAW laka inven/enkawl dan:

FAW hi kan vaimim emaw thlai dang hmunah an awm tih hriat chhuah hma a pawimawh hle a, an inthlah pun chak em avangin, thlai kan venhim theih nan an awm leh awm loh en thlithlai reng a pawimawh. Kan inven emaw enkawl dan tlangpui te-

- 1) Pheromone traps @ 5/acre (tin khatah panga) chu FAW lo awm tawhna thinah leh thlai a tihchhiat theihna tura kan rinah kan hung tur a ni.
- 2) Kan vaimim chi thlak chu a rawn tiaah atanga thlithlai reng a pawimawh hle a, pangang hnu hma kan hmuh chuan pangang chu kutin kan vai thin tur a ni.
- 3) FAW tam hun lai pumpelh theih nan thlai chin hun sawn hma emaw sawn tlai a tha. Khaw lum lutuk emaw vawt lutuk ah FAW hi an awmthei lova, ruahtui tlak tam laiin an tlem sawt thin bawk.
- 4) Thlai chin kar lakah emaw thlai chin loh laiin tha taka lei lehphut a FAW buhchium (pupae) lai leia awm te chu sava leh nisa em leh tihchhiat theih tura hma lak a pawimawh.
- 5) Vaimim emaw thlai dang chin hmaw pesticides-a chiah emaw phul (seed treatment) tur a ni a. Seed treatment atana Chlorpyrifos 20 EC @ 5 ml/ kg seed emaw Imidacloprid 30.5 SC @ 6ml/kg seed emaw Cyantranilipole

- 19.8 % + Thiomethoxam 19.8 % @ 4 ml/kg seed emaw Fipronil 5 % SC @ 5ml/kg seed te hman thin tur a ni.
- 6) Azhadirachtin 1% EC @ 10,000 ppm emaw neem oil @ 5 mL/lit chu a chi kan thlak atanga ni nga velah kahin a a pui chu vaimim ah a tui duhloh phah thin.
 - 7) Behiang emaw chana lam chi, black gram emaw green gram leh vaimim chin pawlh a tha.
 - 8) Leidip emaw vut leh chinai (9:1) in pawlh vaimim zik karah phul ila pangang taksa nem a kanga, an thihpui thei.
 - 9) Huanah sava fukna tur thing emaw thildang/dah a tha. Hectare khat hmunah he sava fukna hi sawm (10) vel tal dah ila a tha.
 - 10) Rannung tangkai, FAW hmelma, *Trichogramma pretiosum* emaw *Telonomus remus* @ 50,000/acre kar tinin thlaihmuna chhuah a tangkai.
 - 11) FAW in kan thlai te anlo eichhiat tawh viau chuan, Emamectin Benzoate 5% WG emaw Spinetoram 11.7% SC emaw Chlorantraniliprole 18.5% SC emaw Thiamethoxam 12.6% + Lambda cyhalothrin 9.5% ZC t etui litre khata 2ml pawlh a kah tur.

BUH NATNA CHUNGCHANG LEH A ENKAWL DAN

1. Blast

Natna thlentu: *Pyricularia oryzae*

(Perfect stage- *Magnaporthe grisea*)

He natna hian buh nausen lai atanga a puitlin thlengin a tichhe thin. Rauh tui tlak tamna hmun emaw, hmun vawt lampang leh relative humidity sang lutuk (93-99%) ah te a hluar hle. Leiin tui khamkhawp tawkhlohna hmunah pawh a hluar hle bawk.

A lanchhuah dan:

A hnah ah (Leaf Blast): Buh hnah chu mit ang takin a val a, uk de thet thet a intan in, a len hnu ah a valna chhungril rawn var a, a val chu a uk in a hual thin a ni. Uluk taka kan en chuan a val lai chu a zum (spindle shape) in a awm bawk thin. A val hi a len zel phei chuan a hnah zawng zawng a ti ro in, buh chu a kang emaw tih mai turin a awm thin.

A chang ah (Nodal Blast): Buh chang chu rawn dum in a tih ro phah em em a, buh chu a tliah phah thin a ni.

A vui ah (Neck Blast): Buh vui chang tirah a awm leh duh bawka, buh vui laia he natna a awm hian buh a vui thalo in buh rah insiam tur te thlengin a tih buai thin a ni.

A enkawl dan:

1. He natna hi kan leilet/huan bul hnim vel te'n an kai ve theih avangin kan buh hmun leh a vel te fai takin kan thlo tur a ni.
2. Buh chi kan theh hma emaw nursery a kan chin hma in Captan emaw Thiram emaw Carbendazim @2g/kg seed (buh kg khatah damdawi gram hnih) a chiah thin tur a ni.
3. Buh hmun chu Carbendazim emaw Tricyclazole emaw Azoxystrobin + Difenoconazole emaw Hexaconazole 5 % EC emaw Tebuconazole 250 EC @2g/litre (Tui litre khatah damdawi gram hnih) pawlh a ni 15 dana kah thin tur a ni.

2. Brown spot

Natna thlentu: *Bipolaris oryzae*

Buh nausen lai atangin a vui tantir, buh rai laiin (milking stage) a awm tlangpui thin. Relative Humidity 86 – 100% inkar leh sik leh sa, temperature 16 – 36°C anih in he natna hi a hluar hle.

A lanchhuah dan:

Blast natna ang tho in buh hnah te leh a chang te chu uk thet thet in a bawm a, A uk val hi blast natna aiin a te hreta, a bial bawk. Tin a hnah de hi a eng in a hual bawk a ni. Buh rah a ntana a awm hian buh chu a ti hmelhem in a vui thalo thin bawk a, a rah chu a si thin. He natna hi nitrogen leitha pek tam lutukin a ti hluar thei bawk.

A enkawl dan:

1. He natna hi buh chi hrisello atanga inkaichhawn theih anih avangin, buh chi fai tha leh thianghlum, natna kailo thlan a pawimawh.
2. Kan leilet/ huan leh a vel te fai takin kan thlo thin tur a ni.
3. Buh chi chu Captan emaw Thiram @4g/kg seed (buh kg khatah damdawi gram li) a chiah tur.
4. Kan nursery emaw leilet/ buh hmun chu Edifenphos emaw Mancozeb emaw Propiconazole 25%EC emaw Hexaconazole 5 % SC emaw Azoxystrobin 18.2% + Difenconazole 11.4% SC @2g/litre (Tui litre khatah damdawi gram hnih) pawlh a kah thin tur a ni. Damdawi hi ni 15 dana kah thin tur a ni.

3. Bacterial Leaf Blight (BLB)

Natna thlentu: *Xanthomonas oryzae* pv. *oryzae*

Buh, nusersery atanga kan phun sawn kar khat atanga kart thum velah a he natna hi a kai duh tlangpui. Ruah tui tlak tamna leh leilet ah te he natna hi a awm duh bik hle a, tin temperature 25 – 34°C leh Relative Humidity 70% aia sang leh nitrogen leitha pek tam ltk vangin ah a hluar phah thei.

A lanchhuah dan:

Buh chu kan phun sawn hnu reilote ah a hnah te chu rawn rawn uai in a rawn ro thin a. A hnah chu in vial mum in vut rawng lam pu lek lekin a hnah te

chu an ro a, a thih pah thin. Buh puitling lama he natana hi a awm anih chuan a hnah hmawr atanga rawn eng tannin a dung zawngin a eng thla ruih thin a, zingara a hnah hnuai lam kan en chuan dai fim anga tui paw deuh riai hmuh tur a awm thin ang.

A enkawl dan:

1. He natna hi lei ah leh buh nat tawhna hmun, tihfai thatloh naah a chamban theih avangin kan buh hmun te chu then thianghlim nan hal fai a pawimawh.
2. Leitha dose dik taka pek a pawimawh.
3. Buh chu phunsawn dawn in a hnah hmawr hleh thlakloh tur.
4. Hlo thawh fai that tur.
5. Streptomycin sulphate emaw Tetracycline 50g + Copper oxychloride 200 g/ac. or Copper hydroxide 500 g/ac a kah thin tur.

4. Sheath Blight

Natna thlentu: *Rhizoctonia solani* (Perfect stage: *Thanetophorus cucumeris*)

Buh peng insiam tan lai atanga a vui tirh thlengin he natna hi a awm thin a. Rauh sur nasat lai leh sik leh sa in lumlet but but vangin a hlur pah thei baw. Tin kan buh te kan phun inhnaih lutuk avangin natna inkaidarh a awlsam bik baw.

A lanchhuah dan:

Leileta buh chu tui seh chinah a bial in emaw a sawl lam deuhin a rawn rau a, rawn lian chho zelin a rau chu a chhunglam var lam deuhin leh a sir uk lamin a

hual thin a ni. A nasat deuh pheih chuan a buh kung pum ah rau chho in buh in a thih phah thei bawk. Buh upa lam in he natna hi an kai duh bik leh zual a, an damchhuah pawn buh a si duh hle.

A enkawl dan:

1. Lei tih that a pawimawh a, neem cake @ 60Kg/acre emaw bawng ek leitha, FYM 5 tonnes/ha a pek tur a ni.
2. Leileta natna awmna zau atangin natna awm lohna zau ah tui sah luh loh tur.
3. A natna hi leia inkhuar thei anih avangin buh chinloh lain a buh hmun chu lehphut that a pawimawh a, buh hmuna buhpawl awm reng reng chu hal vek a tha.
4. Carbondazim @ 100 g /acre emaw *Bacillus subtilis* @ of 1 kg/acre phun sawn hnu ni 30 velah leiah kah tur.

5. False Smut

Natna thlentu: *Ustilaginoidea virens*

He natna hi Mizo te'n '**Buh Rah**' kan tih, buh natna ni em em pawh a kan ngaihloh a ni a, nimahsela buh tana pawl tak a ni. Buh vui tantirh atanga a upat thlengin he natna hi a kai thei a ni. Temperature of 25 – 35°C, Relative Humidity 90% aia sang leh nitrogen leitha pek nasat avangin he natna hi a pun lun thei. Chu mai bakah, ruah tlak nasat avanag leh thli thawt nasat avangin he natna hi a tai darh vak thei bawk.

A lanchhuah dan:

Buh rah kan tih hi natna chi khat niin, buh vui insiam laiin an lo lang a, Buhhum khatah bu khuarin Buh rah kan tih hi a lo insiam thin a ni. Buh rah hi thil mum, hmul thip thep angin a langa, en chian chuan powder phut ang deuh (fungal spores) inhlawmkhawm a ni mah zawk. Atirah chuan serthlum rawng lam a ni a, a hnuah a hring eng emaw bawngkek rawng in a lo inlet leh thin. Buh rah hi a lo keh a, natna a lo in tai darh ta thin a ni.

A enkawl dan:

1. Buhpawl leh hlo te chu buh seng hnu ah hal ral tur.
2. Buh seng lain 'Buh rah' hi buh dang te nena pawlh loh tur.
3. Nitrogen leitha pek nasat loh tur.
4. Buh chi thianghlim leh fai tha hman a pawimawh.
5. Buh chi chu Carbendazim @2g/kg seed a chiah thin tur.
6. Hexaconazole @ 2gm/litre a kah a tur.

DRAGON FRUIT NATNATE LEH A ENKAWL DAN

Dragon fruit hi mizote'n kan hmehhriatna ala reiloh ngaihtuahin kan ching nasa hle a. He thei hi Mizoram leilung mil tak anih avangin kan ching nasa in, in tin deuhthaw in kan khawi in kan nei deuh fur emaw tih tur a ni. Dragon fruit hi cactus chhungkaw zing ami ani a, enkawl leh ngaihsak vak ngai angin langlo mahse natna chi hrang hrang kai thei ani a. Heng natnate avang hian kan thar tur ang pawh kan tharchhuah loh phah fo. Mizorama natna kan hmuh theih tlanglawn deuhthe leh a enkawl dan lo zir chiang dawn ila.

1. Stem canker (*Neoscytalidium dimidiatum*): Stem canker hi dragon fruit natna tlanglawn leh hlawhawm ber pakhat a ni a. A tirin a kung chu uk de thret thet in a rawn bawm a, a hnu ah he uk de thet hi rawn lian zelin a rawn sen chhuak thin, a tuiiek lam rawng a pawl mah. He uk sen hi a pan emaw tih mai tur ang hian awmin, a khir angin a awm thin. He natna hi kumtlwana hmuh theih niin ruah tui tlak tam lain a nasa duh hle.



2. Anthracnose (*Colletotrichum* spp.) : He natna hi *Colletotrichum* species chi hrang hrang - *Colletotrichum gloeosporioides*, *Colletotrichum siamense*, *Colletotrichum aenigma* leh *Colletotrichum truncatum* vanga thleng a ni a , fur lai leh ruah tui tam laiin a hluar hle. He natna hian dragon fruit kung mai bakah a rah te thlengin a ti hmel hem thei a ni. A tirin he natna hi a kungah rawng uk thet thet in a intan a, chu chu rawn lian chho zelin a panna lai chu rawng eng in a hual thin. Chik taka en chuan a panna chhungah fungus acervuli, powder ang deuha dum kual ruih hmuh tur a awm thin.



3. Bacterial soft rot (*Enterobacter cloacae*): A natna vei kung chu a eng emaw a uk rawngin a awm a, a kung eng lai chu a nem bikin a tawih thin a, a rim pawh a chhe duh hle. A kung bul a nat chuan a natna lai chu tawihin a kung chu a ti fi rul thei a, tin, a kung leh a par, rah te a chhel tel vek thin a. A rei hnuah a kung a tih tawih vek theih avangin lak thlak vata paih tur a ni. he natana hi sik leh sa in

lumlet lai October atanga January inkar ah a nasa duh bik hle.



5. **Stem spot (*Botryosphaeria dothide*):** He natna pawh hian a chung a kan sawi te ang bawkin rawng uk lam emaw a sen lamin a rawn intan a, a hnu ah rawn lian chho zelin pan khir ang takin a rawn sor chuak thin a. Heng pan tetakte hi a zual kai pheii chuan inzawm khawmin pan lian tak te a siam thei a, a kung a chaw insiam turte thlengin a ti buai thei a ni. He natna hi a kung kan cut lai emaw kan hleh thlak laia hmanrua kan tih thianghlim that tawkhloh avang te in a in kaichhawng thin a ni.



Natna enkawl dan tlangpui:

1. Kan huan leh a vel te fai taka kan enkawl a pawimawh hle, hnim awm te chu thlawh fai zung zung a pawimawh.
2. Dragonfruit tiak kan lak emaw phun sawn turte chu natna kai lo kung atanga lak a pawimawh hle. Phun sawn hma in a kung te chu daihlim hnuaiah dah chan phawt a carbendazim (0.1%) emaw copper oxychloride (0.25%) emaw Mancozeb (0.25%) a chiah thin tur a ni.
3. A natna kai te chu hleh thlak a paih vat zel tur a ni a, tin heng natna te hi leiah te a chamban theih avangin a kung bul hnaiah kan hleh thlak te chu paih loh hram a pawimawh.
4. A kung kan paih emaw kan hlethlak reng rengin 1% Bordeaux mixture kah emaw Bordeaux paste hnawih thin tur.
5. Natna inkai darh loh nan kan hleh thlakna hmanrua te chu Copper Oxychloride 0.25% emaw Hydrogen Peroxide emaw ethyle alcohol tuia hruk emaw chiahfai zel tur.
6. Kan dragon fruit huan te chu ni zung leh boruak thianghlim inluhchhuah zung zung theih nan a kung inkar te chu spacing mumal tak pek an pawimawh, hei hian natna inkai darhna a tih tlem phah thei.
7. Natna ven leh enkawl nan damdawi mancozeb (0.25%) emaw copper oxychloride (0.25%) emaw difenoconazole + azoxystrobin @ 0.1% te hi khawchin ena mumal taka kah hun bi siam a pawimawh.

INTEGRATED PEST MANAGEMENT (IPM)

A hmasa in enge Pest kan tih chu? Thilnung engpawh, rannung a ni emaw, natna hrik emaw zu va emaw, hlo emaw pawh ni se, an inthlah puna, an lo tama, kan thlai thar hlawk lo khawpa an tihchhiat chuan , chu thil nung kha 'pest' a ni.

IPM awmzia: Hlawk tak leh kan leilung tichhe chuang silo a heng kan thlai tichhetu (pest) kan tih te enkawl emaw venhimna kawnga hma lakna hrang hmanga thlai enkawl hi IPM kan tih chu a ni.

IPM hmanga thlai enkawl dan:

IPM chu thlai venhimna kawnga hmalakna hrang hrang tangkawp anih avangin heng kan thlai tichhetute beih nana hma kan lakte chu uar bik neilo a hman tangkai a pawimawh hle a. Kan loneitu te pawhin hriatloh lain kan huan leh a velah te pawh IPM hi kanlo hmang reng thei. IPM hmanga thlai enkawl dan chi hrang hrang a awma, a tlanglawn zual leh kan hman tangkai mai theih te chu:

- Physical or Mechanical Control
- Cultural Control
- Biological Control
- Chemical Control

1. **Physical or Mechanical Control:** Physical emaw Mechanical control chu tha chakna emaw hmanraw dang hmanga kan thlai tichhetu te kan beih hi a ni. Entirnan; kut hmanga pangang emaw rannung kan vai khawma kan

tihchhiatte, thang hmanga sazu kan awh emaw, lei hnuia rannung emaw natna hrik thah nana lei kan lehphut te thlengin a huam a, heng bakah hian soil solarization kan tih, ni chakna hmanga kan leilung kan hem te thlengin a huam baw, tin mulching kan tih, kan thlai bula polythene emaw buhpawl emaw thlai dang hmanga kan leilung kan tuam te thlengin a huam thei awm e.

2. **Cultural Control:** Cultural control chu mihringin kan thlai eichhetu (pest) laka kan venhim theih nana hma kan lak lawk thin, entirnan; thlai chi tha leh thianghlim thlan te, rannung emaw natna do thei thlai chi (resistant varieties) hman te, kan thlai tuh hun sawn hma emaw sawn tlai te, thlai leh thlai inkar hlat zawng siksawi emaw thlai dang vek, thlai eichhechhetu ranung lapeng thei chi kan huan bula kan tuh te, thlai chi hrang hrang chin chhawkte, lei tihthatna (fertilizer) a hun tak a pekte, hlo/hnim thlawhfaite, a hun taka tui pekte hi cultural control chuan a huam vek a ni.
3. **Biological Control:** Rannung tangkai chi emaw natna hmang veka kan thlai eichhetu rannung emaw natna kan ven hi Biological control kan tih chu a ni. Kan thlai eichhetu rannung emaw natna te hian ral an nei ve veka, chung an ralte chuan heng pest kan tih te hi chawah ringin an theih ang angin an vaiin anlo that ve thin a, kan thlaite tan erawh hmelma an

ni ve lemlo. Loneitu tanpuitu tha tak, Pathian siamsa an ni a, hei vang hian loneitu thianthate (farmer's friends) te pawh an ti thin. Mihringte vulh leh khawi an nilova, anmahni a lo awm ve an nih avang hian a chang chuan 'Natural enemies' an ti bawh thin. Loneitu thian thenkhat te Chu: Maimawm, Khuavanglamdar, Daidep, Darkawlhchunchhek, Uifawm, Chungu, Utawh, Rul leh a dangte an ni.

4. **Chemical Control:** Damdawi emaw tur hmanga thlai eichhetu te kan beih hi chemical control kan tih chu a ni a. Heng damdawi, thlai eichhetu (pest) venna atana kan hman te hi pesticides tih a ni. Thlai eichhetu (pest) azirin insecticides (rannung thahna) te, fungicides (hmuar thahna) te, bactericides (bacteria thahna) te, rodenticides (sazu thahna) leh herbicides (hlo thahna) te a awm. Pesticides damdawi hmanga thlai eichhetu thah hi IPM hmanga thlai eichhetu beihna leh venhimna awlsam ber ni mahse a tul tawpkhawkah chauh lo chuan hman loh tur a ni.

SOIL SCIENCE

AZOLLA ENKAWL DAN

Azolla hi kat chat chikhat chaw tha pai tam em em a ni a. A hnah lera a phel avangin dichotomous an ti bawk thin. Hmun dam tui tlinna dilah te an awm duh hle bawk, a zung te chu tui chhungah a awm a, tui atangin chawtha a ei thin a ni. A hnah chung lama kaw tereuh te ah hian hrik (algae) chikhat Anabaena tih chu a awm a, he hrik awm hian boruak a Nitrogen awm chu lain azolla plant kaltlangin leiah chawtha a dah thin a ni. He leitha a dah hi leilet buh tan a tha bik em em a ni.

Chemical fertilzer (Leitha) te hi a to em avang leh lei a ei nasat avangin heng lei titha thei te hi a tih pun theih avang leh a tlawm em avangin a thlan awm em em a ni.

A chawtha pai zat:

Nitrogen	5%
Phosphorus	0.5%
Potassium	2-4.5
Calcium	0.1-1%
Magnesium	0.65%
Manganese	0.16%

Iron	0.26%
Sugar	3.5%
Starch	6.5%
Fat	3-3.3%
Chlorophyll	0.55
Ash	10%

Azolla chi hnih te

Azolla hi chi hnih a awm a, chungte chu:

1. *Azolla caroliniana*: Hemi chi hi chu a hnah a parh deuh a, khaw vawt a ngam deuh, 5°C velah pawh tha deuhin a a thang thei a ni. Hmun dang atanga lakluh a ni.



2. *Azolla piñnata*: Hetiang chi hi chu kan awmna Northeast India atanga hmuhchhuah a nih

avangin, han khawi deuh chuan a pung duh hle a ni.

Azolla tih pun dan tur:

1. Hmun zawl tha ah lei laih khuar tur, a lenzawng tu chu $3 \times 2 \times 1$ m. Brick rem pawn hemi size hian a siam theih a ni.
2. Tui 10-15cm a sang in dah tur a ni. Tuih hian Azolla 50-200g/sqm., leitha (SSP) 2g/sqm., Furadan 1g/kg azolla leh bawng ek hring dah tur a ni.
3. Kar 2 hnu velah kan dahna hmunah chuan a lo pung khat hman vek thin a ni.
4. Heta tang hian kan buh hmunah chhuah tur a ni.
5. Ni 15-20 inkarah azolla chu a seng theih thin a ni. Thlasikah erawh chuan ni 25-30 a ngai tlangpui bawk.

Azolla than that na turte:

1. **Tui**: Tui thinghlim tha 10-15cm a sang a awm reng tur a ni.
2. **Sik leh sa**: Khaw lum zawnga 25-30°C hi a than nan a tha tawk viau
3. **Ni eng**: Ni eng in directin chhun lo se, a khawina hmun kha zar hlih deuh a tha.

4. **Lei:** Tlem a lei thur deuh ah a tha duh. A thur zawng atan 5.2-5.8 pH hi a tawh viau.



Azolla that bikna te

1. Azolla hian buh mamawh bik Nitrogen a pek tam avangin, nitrogrn leitha (Urea) pek tam a ngailo a ni.
2. Azolla buh hmuna vawihnih chhuah hian buh thar tur 20-30% lain a tipung thei a ni.
3. Tui chunglang a khuh tlat avangin, hnim to tur a veng tlat a niLeilet a tui boruaka kal ral tur a veng tlat a, tui tangkai takin a hmantir bawh a ni.
4. Ran chaw, ar chaw leh sangha chaw ah te pawh a hman theih bawh a ni



Azolla hn

1. Leilet a tui a tlin laiin, azolla tih pun tawh chu, lei kan leh hnan thei, hei hian nasa takin lei a ti tha thei a ni
2. Buhin azolla tan daihlim a siam hun velah azolla kan tih pun tawh chu kan leilet ah kan chhuah thei bawh a ni
3. Azolla ro hi Ar chaw atan an pe bawh thin
4. A la hring hi sangha leh ran chaw ah te an hman bawh thin
5. Azolla hian Nitrogen (Buh tana chaw tha) hi 25kg hectare khatah buh tan a chhek khawl thei a ni



Bawngin Azolla a ei lai

Hriattur pawimawhte:

1. Azolla te hian ni engin direct a, a chhun hi an haw em em a ni tih hriat tur
2. Ni 7 danah kan tih punna hmunah khan bawng ek hring rual takin thlak tur a ni
3. Tha taka chawm a nih chuan ni 15-20 inkarah regular takin seng thin tur a ni
4. Ran chaw anga kan hman dawn chuan ran chaw pangngai nen 50:50 in pawlh thin tur a ni
5. Kan tih punna hmunah pangang a awm nge awmlo tih kan en fo tur a ni

6. A hnah eng deuh kan hmuh chuan nisa em
vang emaw SSP leitha tlakchham vang a ni
tlangpui



BUH LEH THLAI TANA POTASSIUM PAWIMAWHNA TE

Potassium tlakchhamna lan chhuah dante:

1. Potassium tlakchhamna hi a langchhuak har thin khawp mai. A lan chhuah meuh chuan thlai in a lo mamawh tawh hle thin.
2. Hnah upa lam hmawr chu a eng emaw a uk rawngin a tuam hmasa ber thin, a hnah sir a tuam leh a, a hnah zung erawh chu a hring thin a ni.
3. A chang chuan tuiek rawng emaw serthlum rawng lek lekin a tuam thih.
4. Hybrid chi hi potassium tlakchhamna in a nang duh bik hle.
5. Potassium tlakchhamna hi buh hnah upa lamah a lang hmasa tlangpui, hei hi a chhan chu potassium kha buh kungah a kal sawn theih vang a ni.

Potassium tlakchhamna stage hrang hrang te:

Stage I: A tirah chuan buh chu a tawia, a hnah a te a, a kung pawh a sin em em a ni.

Stage II: Tlakchhamna a awm chhunzawm zel chuan, hnah sir zai zai chu a eng emaw serthlum rawngin emaw a tuam thin , a hnah upa lamah

Stage III: Buh hnah a rawng eng chuan hnah bul lampang chu a zawh thla a, amaherawhchu buh hnah a, a lai zung chu a hring thin.

Stage IV: A tawpah chuan hnah chu a uaithla a, a kung chu a thi mai thin a ni.

Potassium tlakchhamna awm thin nate:

1. Lung leia insiam mai turah potassium a tlemin.
2. Kan ram leiah hnim leh thlai tawih a tam loh in, potassium tlakchhamna a awm thin.
3. Nitrogen leh phosphorus fertilizer kan hman uchuak in, potassium fertilizer a tlakchham theih a ni.
4. Transplant lo a buh tuh in potassium tlakchhamna a awm duh bik.
5. Lei thur na hmun a ruah a sur nasat in potassium tlakchhamna a awm thin
6. Kan huan ramah tui luan dan a mumal loh in iron leh sulphur ten potassium tlakchhamna a thlentir thei a ni.
7. Hybrid chi-ah potassium tlakchhamna hi a awm duh bik

Integrated Nutrient Management (INM) hmanga nitrogen tlakchhamna enkawl dan

**** INM chu enge ni?**

INM chu leitha chi hrang hrang chemical lamte, bawng ek leitha te, changpat leitha te leh lei hrik hmanga siam leitha a thlai enkawl dan a ni.

A enkawl dan te:

1. Thlai kan thlak hma in, lei chu test pawt nise, chuta tang chuan thlaiin a hman theih

potassium chu leiah engzat nge awm tih kha kan hre thei dawn a ni.

2. Lei test result a zirin, leitha hman a ngaih leh ngaih loh te hriat a tha, leitha hman tur chi hrang hrang te:
 - a) Tawih thei leitha- Bawngkek leh changpat leitha
 - b) Chemical leitha- MOP, Potassium sulphate
 - c) Lei hrik atanga siam leitha- Rhodospirillum, Azospirillum, etc
3. Thlai in tangkai zawka a hman theih nan, potassium leitha chu a dose pangngai chu wawi 2-3 pekah hman a tha. A vawikhatna chu transplant hnuah, vawihnihna transplant hnu ni 40-50 ah, a vawithumna chu transplant hnu buh leh lai par laiin pek tur a ni.
4. Thlai dingah tawhah chuan kan tui pek rualin pek thin tur a ni.

Potassium tangkaina te:

1. Thlai leh buh rah a ti tha a, chu mai bakah a ti tui bik em em a ni.
2. Thlai in lei atanga tui alak chhohna atan a pawimawh em em baw a.
3. Natna leh sik leh sa inthlak avanga thlai in a tuar tur lakah a veng thei baw a ni.

4. Potassium leitha MOP hian thlai tiak a kang thei a, chuvangin thlai bul hnaih lutukah chuan pek loh a tha.

LEI TEST TUR LAK DAN

Lei test in a thil tum:

1. Lei in thlai tana chawtha a pai zat hriat nan
2. Thlai tana hlawk dan tur bera leitha kan pek theih nan, leitha ngaizat hriat nan.
3. Lei that dan tlangpui hriat nan

Lei test tur lak dawn in hriat tur pawimawh te:

1. Lei laih thuk zawng – 15 – 20 cm
2. Leilung danglam dan – Lei dur/ Lung hmun/ Awih tlan
3. Kan hmanraw hman – Khurpi/ Tuthlawh/ Chem/ Chemkawm
4. Lei lak sa dah nana kan hmanraw hman - Sarang
5. Lei test tur kan lak zin dan – Kum 2
6. Lei test tur kan lak hun – Buh leh thlai kan chin hma, ruahsur loh hun
7. A tam zawng – 1-2kg



Lei test tur lak dan :

1. Lei lakna tur bul vel chu hnim/ thil tawih thei lakah a fai tur a ni
2. Lei chu 15-20cm in kan lai khua ang (Thlai zungin chawtha a lakna china nih avangin)

3. Lei laih khwar vung chu la loin, lei laihkhuaarna pang chu, kan laih khuarna thuk zawng zat chahin kan lai leh ang a, chumi lei chu lak tur a ni.
4. Sarang phui taka dah tur a ni.
5. Lei lak zawhin, lei lak ni, thla, kum, ram hming leh a ram neitu hming chhinchhiah a, lei testna tura kan thawnna ah thawn tel tur a ni

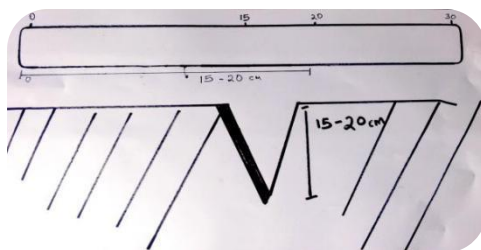


Fig. Lei test tur lak dan thuk zawng

Lei lak zawh a sawngbawl dan

1. A lei hnawng tih reh tur
2. Daihlimah lehkha phah chungah kan dah hil ang a, a hnawng lutuk tur ven nan
3. A ro that hunah hrik tur a ni
4. Hrik zawh a leinawi dip tak chu, test tura dah tur a ni



Pic. Lei lak zawh a, daihlim a dah ro la

LEI KAL RAL TUR VENDAN CHI HRANG HRANG-TE

A pawimawhna:

Kan ram hmun tam zawk hi hmun awih tak takte a nih mai bakah tlangram loneih kan la bansan theih tak tak loh avangte, kan ramin ruahtui a dawn nasat em avangte in kan rama lei luangral tur kan ven tlat h i a p a w i m a w h e m e m a n i .

Lei luangral tur ven dan hrang hrangte:

A. Thlai chin hmangin:

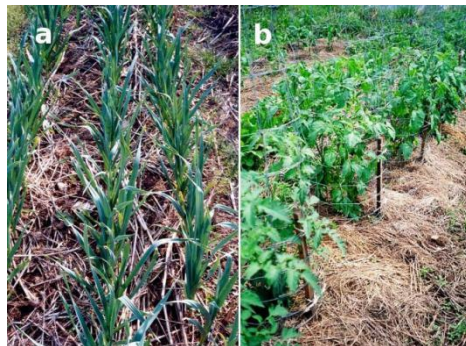
- I. Ngil taka thlai chin (Contour):** Lo ah leh huan ah_thlai kan chin reng rengin ram awih tan zawngin hmun hrang hrangah ching ila, hei hian lei luangral tur a venga, chumai bakah leichhunga tui lut tur a ti tam bawk a ni. Tih chhin pawh a harsa lo a, hlo thlawh pawh a ti awl hle bawk.



Awih tan zawnga thlai chinna hmun

II. Leileh dan tha (Conserve Tillage): Lei kan leh hian lei a kaw tereuh te te awmte a ti chhia a, lei mukna a ti danglam thei hle bawkw avangin leileh nasat lutuk hian lei luangral a ti tam thei a. Chuvangin, lei kan lehin, lei inthuah ti chhelo ber zawngin leh buh leh thlai kan seng duh tawh loh te hnuchhiah thin hi lei luangral tur ven nan leh lei tihthat nan a tangkai em em a ni. Hei hian thlai a ti thang duang em em bawkw a ni.

III. Lei chunglang khuh (Mulching): Buh pawl, hnim leh thlai hnah kan duh tawh loh te hmanga kan thlai bul leh a velte kan khuh hian, lei luangral tur a ven mai bakah ruah malin a ding taka lei a deng tur a veng tlat bawkw a ni. Ruah mal tla hian nasa takin lei a deng sawmin a luanral tir thin. Hei mai bakah, hetiang a lei chunglang kan khuh tlat hian lei a ti hnawng tha em em bawkw a ni.



Buh pawl hmang a lei chunglang khuh la

IV. Thlai hmanga ven dan: Thlai reng reng leikhuh tam zawnga to chi entirnan, badam,

behlawi, bête, kawl bahra, adt. chin hian furah, ruahtui avanga lei luangral a ti tlemin lei a ti tha thei bawk a ni. Chumai bakah awmze nei taka thlai chin pawlhin, entir nanm vaimim leh badam chin pawlh te hian lei a vengtha in, a thar hlawk duh bik em em a ni.

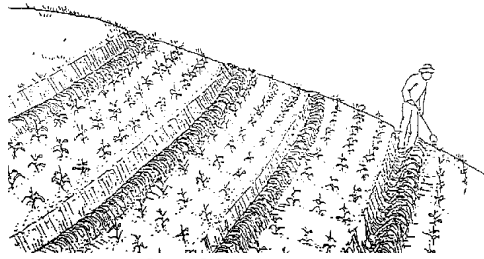


Vaimim leh badam chin pawlh lai

B. Leilung ti danglam zawngin:

I. Hmun awih a laih khuar (Basin listing): Hmun awihah lei laih khuar thin a ni. A len zawng erawh chu kan thlai/thei phun tur a zirin a lianin a te thei bawk. Hei hian tuihawk leh lei luangral tur chu a dangin, lei chunglang hang tha a dawng khawm bawk thin a ni.

II. Ngil taka lei chhun pawn (Contour bund): Hmun awihah, awih tan zawngin lei an chhung pawng thin, hetiang hian hmun tam takah tiin, thlai chin nan hman thin a ni. Hei hian tuihawk luangral tur vengin, lei chhungah tui a ti lut zawk thin a ni. Lei chhun pawn inkar chuan 150 cm a pel tur a nilo bawk. Ram awih zawng 6% aia tlem a nihin hetiang hian an ti thin. Terrace laih aiin a hautak lo zawk bawk.



Awih tan zawnga lei chhun pawn

III. Terrace laih: Ram awih zawng 6-33% a nihin terrace hi laih tur a ni. Awih tlan chu chhawng hrang hrang a laih zawl ti ila a dik ber awm e. Terrace siam hian thlai mamawh kan pek leithate hi a luangral mai lo a, a thawk tha bik em em thin a ni. Tui a hip tha in, lei a luangral tlem em em bawh a ni



Leilet buh terrace ah

IV. Tui kawng siam: Tuihawk mumal taka luntir a tum ber a ni awm e. Ram tha lai te tuihawk in a hawrh chhiat loh nan tui luan dan mumal taka siam tur a ni. Tui luanna kotlang a grass chi hrang hrang phun te hian tui kawng a tit lo hle bawh.

LEITHA CHI HRANG HRANG LEH A HMAN DANTE

Leitha chi hrang hrang te:

1. **Urea:** Hei hian a ken ber chu thlai mamawh Nitrogen (46%) a ni. Thlai a ti thang duh a, chu mai bakah thlai hnah lam chi tan a tha bik em em a ni. Thlai rah lam chi tan, a mamawh aia tam a awm chuan thlai hmin hun a titlai thei bawk. Urea hian lei a ti thur thei bawk a ni. Thlai hnah ti hring tu 'chlorophyll' siam nan a tangkai em em a ni.
2. **Ammonium sulphate:** Hei hian thlai mamawh Nitrogen (21%) leh sulphur (24%) a keng a. A that bikna chu thlai tana chaw tha nitrogen leh sulphur tum khatah a pe kawp thei a ni. Thlai chi insiam nan sulphur hi a pawimawh em em a ni.
3. **Single super phosphate (SSP):** Hei hian thlai mamawh Phosphorus (22%) leh sulphur (12%) a keng a. Phosphorus hi thlai rah tur insiam nan a pawimawh em em a, a par a ti tam bawk. Thlai zung a than tir a, thlai tiak a ti tha em em bawk a ni. He leitha hian thlai mamawh chawtha tum khatah pahnih a pe thei bawk a ni.
4. **Diammonium phosphate (DAP):** Hei hian thlai mamawh nitrogen (21%) leh phosphorus (50%) a keng a. Thlai in a mamawh bik em em chaw tha pahnih nitrogen leh phosphorus tum

khatah a pe thei a ni. Thlai mamawh aia tam leiah a awm erawh chuan thlai tana chaw tha dang iron leh zinc te thlai in a tlachham thei a ni.

5. **Muriate of potash (MOP):** Hei hian thlai mamawh potassium (60%) a keng a. Thlai rah a ti tha a, chu mai bakah a ti tui bik em em a ni. Thlai in lei atanga tui alak chhohna atan a pawimawh em em bawk a. Rannung, natna leh sik leh sa inthlak avanga thlai in a tuar tur lakah a veng thei bawk a ni. MOP hian thlai tiak a kang thei a, chuvangin thlai bul hnaih lutukah chuan pek loh a tha.
6. **Farm yard manure (FYM):** Hei hi bawng ek leitha kan tih kha a ni. Nitrogen (0.5%), phosphorus (0.2%) leh potassium (0.5%) te a keng a. Leitha dang nena a danglamna chu, hetiang hi chuan lei a tichhe ve ngailo a ni. Lei a ti thawlin, leia thlai tana tangkai rannung leh hrik an awm duh bik em em a ni, hetiang leitha ah hian.
7. **Vermicompost:** Hei hi bawlhhlawh chi hrang hrang entirnan, huan bawlhhlawhte, choka bawlhhlawhte leh adangte, tawih thei chi him changpatin a ei atanga leitha siam kha a ni. A hma ami ang bawkin lei tichhe ve lo a ni. Nitrogen (1.2%), phosphorus (0.22%) leh potassium (0.7%) te a keng a ni.

Leitha hman dan chi hrang hrang te:

1. **Theh (Broadcasting):** Huan lei buatsaih hma deuhin, kutin leitha kha huan/lo ah kan theh chhuak vek thin. Leileh hnan emaw lei nen thatakin pawlh tur a ni. Hetiang tihdan hian leitha chi hrang hrang a pek theih veka, amaherawhchu nitrogen keng tel leitha (Urea) tan a hlawk thlak lo deuh. A chhan chu nitrogen keng tel leitha hi boruak ah, a kalral theih vang a ni. Buh leh fu ah te hetiang leitha pek dan hi hman thian a ni.
2. **Dah (Placement):** Thlai zungin awlsam taka a lak theih turin, thlai chi/ kung atanga 1-3 inch vela hla leh thuk ah leitha dah tur a ni. Leitha chi hrang hrang a hman theih a, amaherawhchu, potassium keng tel leitha (MOP) chu thlai bul hnaih vak lo ah dah a tha. A chhan chu, hetiang leitha hian thlai bul a ti kang thei a ni.
3. **Thlai chin tawh hnua leitha pek (Top dressing):** Thlai chin tawh hnua lei hrul a leitha pek hi a ni. A full dose in pek loh tur a ni a, leitha kha then hrangin (split), thlai thanlen dan a zir zelin pek tur a ni. A pek dan dose erawh thlai hrang hrangah a inang lo. Top dressing method hian nitrogen leh potassium keng tel leitha, urea leh MOP te ran chaw thlai bikah pek thin an ni.

4. **Thlai sir a leitha pek (side dressing):** Thlai inkar mumal nei taka kan siamin, thlai leh thlai inkarah lei chhung 5cm vel a thukah leitha dah thin a ni. Hetiang tihdan hian nitrogen keng leitha (Urea) chu bawkbawn, vaimim, zikhlum, balhla, hnuhnun ah te pek thin a ni.

Fertilizer hman chungchanga hriat tur pawimawh te:

1. Leitha pek tur zat diktak aia tam pek hian ram lei a ti chhia thei tih hriat a tha.
2. Leitha pek tur zat kan hriat theih nan mahni ram zau zaawng hria in lei test tir thin tur a ni.
3. Leitha thenkhat te hi an ral mai lova mihring tan pawh a hlauhawm thei a ni, chuvangin vawikhat ah pek teuh teuh loh tur, a luangral atam thin, kan pek tur zat (dose) mumal takin hriat thin tur a ni.
4. Tawih thei (Organic) atanga siam leitha hman tam tluk a awm lo, ram lei a ti tha a, khuarei atan pawh a chenpakawm.

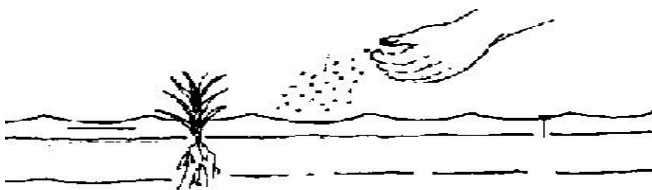


Figure 1: Leitha theh lai (Broadcasting)

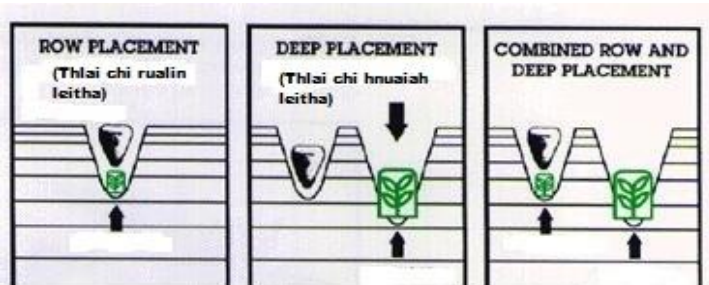


Figure 2: Leitha dah dan chi thum
(Placement)

BUH LEH THLAI TANA PHOSPHORUS PAWIMAWHNA TE

Phosphorus tlakchhamna lan chhuah dante:

1. Phosphorus tlachham buh leh thlai chu a hnah a hringtak rawng in a awm a, a chang chuan a pawl dal (purple) rawng in a awm bawk thin.
2. Buh vuiah buhfang a tlem em em a, buh hmin hun a titlai thei bawk a ni.
3. Phosphorus chu tlemte a, a tlakchham hlek pawhin buh kung chu a ria in a than a tawi em em bawk thin.
4. Buh leh thlaiah phosphorus tlakchhamna hi a hnah upa lam a hniam lamah a lang hmasa thin.
5. Buh hnah upa lamah chuan a uk emaw, a sen emaw, a pawl dal lam rawngin a awm thin

Phosphorus tlakchhamna stage hrang hrang te:

Stage I: A tirah chuan buh/ thlai chu a te in a tawi em em , a khawng hle bawk. Hnah hmawr chu a pawl dal rawngin a awm a, hnah bul amah a insawn thla zel thin.

Stage II: A hnah upa lam atangin a uaithla a, chuan a kung pumpui chu a uk chhuak vek a, a thi mai thin a ni.

Phosphorus tlakchhamna awm thin nate:

1. Balu lei chi, lei hraw naah phosphorus tlakchhamna hi a awm duh bik hle.
2. Lei al awm naah a awm duh bawk.

3. Lei thur lutukah leh lei al lutukah phosphorus tlakchhamna hi a awm duh hle
4. Lei thur awm naah ruah a sur nasat in, phosphorus tlakchhamna a awm thin.
5. Lei chunglang hang tha kan tih ral hian tlakchhamna awm duh hle bawk.

Integrated Nutrient Management (INM) hmanga potassium tlakchhamna enkawl dan

**** INM chu enge ni?**

INM chu leitha chi hrang hrang chemical lamte, bawng ek leitha te, changpat leitha te leh lei hrik hmanga siam leitha a thlai enkawl dan a ni.

A enkawl dan te:

1. Thlai kan thlak hma in, lei chu test phawt nise, chuta tang chuan thlaiin a hman theih phosphorus chu leiah engzat nge awm tih kha kan hre thei dawn a ni.
2. Lei test result a zirin, thlai chin hma in heng leitha te hi hman tur:
 - a. Tawih thei leitha- Bawnggek leh changpat leitha
 - b. Chemical leitha- DAP, SSP
 - c. Lei hrik atanga siam leitha- Azospirillum, PSB, etc

Phosphorus tangkaina tlangpui te:

1. Phosphorus hi thlai rah tur insiam nan a tangkai hle a, a par a ti tha em em bawk a ni.
2. Thlai zung a than tir a, thlai tiak a ti tha em em bawk a ni.
3. Thlai mamawh aia tam leiah a awm erawh chuan thlai tana chaw tha dang iron leh zinc te thlai in a tlachham thei a ni.
4. Buh leh thlai a hun takah rah a siam tira, chubakah, a kung a ti chak a, an tlu mai mai ngailo a ni, phosphorus thlaiin a tlak chham loh chuan.
5. Thei rah, ran chaw, thlai leh buh tan an rah a tit ha thei bawk a ni. Chubakah natna lak ata a veng bawk a ni.

VERMICOMPOSTING

Production and Practices

Vermicomposting chu changpat hmanga leitha siam hi a ni mai awm e. Thil awlsam tak, kan huan a hnawmhnawk te hmangin leitha kan siam thei a ni. Changpat te hian heng hnawmhawmawk te hi ei in, an ek chu leitha takah a lo chang thin a ni. Chung an ek te chuan thlai ta a chawtha, lei ti thawl thei leh natna hrik do tu an kengtel bawk a ni. Hemi avang hian changpat leitha hi **Black Gold** te pawh anti bawk thin a ni. Thlai tan chawtha a nih bakah hian lei a tih thawl avang hian lei a tit ha bike m em a ni.

Changpat leitha siam nan a hman theih te

Thial tawih thei chi hrang hrang ran ek, choka hnawk, huan leh ramhnuai a hnawm hnawkte hi hman a ni fo bawk thin. Bawng ek leh hnim chu chan sawmin a b hmang bawk a, hei bakah hian be lam thlai hman hian a tha duh zual bik a ni.

Changpat sen (*Eisenia foetida*) hi a tha ber a, a chhanchu a in thlah pun chak bakah ni 45-50 chungin hnawm hnawk te hi a an ei zo hman vek thin vang a ni.

Characters	<i>Eisenia foetida</i>
A sei zawng	3-10cm
A rih zawng	0.4-0.6g
A puitlin hun	Ni 50-55
Damrei zawng	Ni 70
An ei chak zawng	20kg/1000worms/week
An tui chak zawng	Ni 3 danah 1
Cucoon a awm rei zawng	NI 20-23

Changpat sen chungchang:

A siam dan chi hrang hrangte

Heap method leh pit method a awm a.

Heap method (Fig.1), chu leilawngah bed siam ang a buatsaih hi a ni mai. A bed len zawng chu (6x2x1 feet) a ni a. Hetiang hi a awlsamin enkawl a nuam em em a ni.

Pit method (Fig.2), ah erawh chuan a len zawng 5x5x3 fee ah hian brick rem kual a, cement a plaster

leh vek a ni thin. Hetiang hi chu sumdawwna a ti tak tak ten an hmang thin a ni.



Fig.1 Heap method



Fig.2 Pit method

Changpat leitha siam dan

Vermicomposting is done stepwise in the following manner:

- Vermicomposting should be done in cool, moist and shady places.
- Firstly cow dung and leafy materials should be mixed and left for 15 days for partial decomposition
- Cow dung and dried leafy materials/crop residues should be used in the proportion of 10:3.
- A layer of 15-20cm of chopped dried leaves, and grasses is made as bedding material.
- Then a bed of partially decomposed materials of size 6x2x1 feet should be made (Fig.3).

- Bed can also be made of 5-6 alternate layers of partially decomposed cow dung and leaves. (Fig.3)
- Each bed can be of 1.5-2q of organic waste depending upon size/ requirement.
- Red earthworm (1000 no) should be released in the upper layer of mixture. (Fig.4)
- After release of earthworm water should be sprinkled regularly by water cane. (Fig.5)
- Bed should be covered with gunny bags/polythene to maintain moisture level.(Fig.6)
- Turning should be done at twenty days interval for maintaining aeration and moisture.
- Vermicompost generally gets ready between 45-50 days.(Fig.7)
- Harvested vermicompost should be sieved before application (Fig. 8)



Fig.3 Bed of leaves and cow dung



Fig.. 4 Red earthworm for use



Fig.5 Watering of beds



Fig.6 Beds covered with gunny bags



Fig. 7 Harvesting in heaps



Fig.8 Final product after sieving

Preventive measures

- The floor should be compact enough to prevent worms migration into the soil beneath.
- Organic wastes should not contain plastics, chemicals, pesticides and metals etc.
- For proper growth of earthworms proper aeration should be maintained.
- The heap should be kept moist (20-30%) but should not be wet to avoid death of worms.
- Temperature requirement for optimal result is 18-25°C.
- Fresh cow dung should not be used to avoid excess heat.

Nutrient content of vermicompost

The level of nutrients in casts depends upon the source of the raw materials and the species of earthworm used. A fine worm cast is generally rich in N P K besides containing other nutrients.

Nutrients in vermicompost are found in readily available form and release most of the nutrients in the same year of application.

Nutrient Analysis of Vermicompost made from *Eisenia foetida* is given in the table below:

Parameters	Content
pH	6.8
OC %	11.88
OM %	20.46
C/N ratio	11.64
Total Nitrogen %	1.02
Available N (kg/ha)	690
Available P (kg/ha)	125
Available K (kg/ha)	1045
Ca (%)	0.17
Mg (%)	0.06

Harvesting

The vermicompost gets ready for use between 45-50 days if proper care is taken.

Generally, the finished product is $\frac{3}{4}^{\text{th}}$ of the raw materials used. Earthworms start making compost from top layer to bottom layer of the bed, so vermicompost should be harvested periodically from top layer. The vermicompost should be taken out and be kept on the floor over the wet heap of partially decomposed cow dung. This process allows worms to go down in the wet cowdung. The worms' start burrowing down in the cow dung and next day vermicompost can be separated. The harvested vermicompost should be sieved to make granular final product and which is free from pebbles and indecomposable materials.

The final product is ready for application or selling.

Advantages

There are many advantages of vermicompost:

- It provides better usages of organic wastes/crop/animal residues.
- It is a stable enriched soil conditioner.
- It also reduces population of pathogenic microorganisms.
- It also brings reduction in the toxicity of heavy metals.
- It is economically viable and environmentally safe.

- It makes farming sustainable for organic food production.
- The farmers can easily adopt low cost systems.
- It is highly profitable venture if properly taken up.

Doses

The rate of application of vermicompost depends up on the nature and requirement of crops.

Benefits of vermicompost

Vermicomposting may be a highly profitable venture for those who are having dairy units. It is possible to earn up to Rs 1 lakh annually by maintaining a unit of 3 tonnes capacity