



KI BIOFERTILIZER LANE KI PHNGIT JING IM BA PYNSBOH IA KA KHYNDEW



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KA JINGLAMPHRANG:

Ki jingthung ki donkam ia shibun ki jingbam lane sboh kumba long u briew khnang ba kin ioh ban san ban plung bha bad pynmih ia kiei kiba ngi kwah. Hynrei napdeng kine ki jait jingbam/sboh, lai jait ki long kiba kham kongsan kata ka Nitrogen, ka Phosphorus bad ka Potash. Ia kine ki lai jait ki sboh, ha ka ri jong ngi hi baroh kawei baroh shi katta la ju pynbiang sha ka khyndew da kaba ai da kita ki jait dawai sboh chemical fertilizers kum ka Urea na kabynta ka Nitrogen, ka SSP/DAP na ka bynta ka Phosphorus bad Nitrogen bad ka MOP na ka bynta ka Potassium. Hynrei kine ki jait dawai sboh ki kham ktah ia ka mariang bad baroh shi katta ym shym la lah ban pyndonkam hok ia kine ki jait dawai sboh. Kane ka la wanrah ia ka jing julor ka mei mariang kaba kynthup ia ka khyndew, ka um ka lyer bad kiwei kiwei. Kane pat ka wanrah kylla ia ka jingktah ia ka koit ka khiah u bynriew bad ki mrad. Shibun ki jait jingpang la lap ba dei na ki daw jong kine ki dawai sboh chemical kiba sah ha ka bam ka umdih bad lyer hadien ba lah dep pyndonkam palat ia ki. Kane ka jing julor ha shibun ki liang lada ym lah ban khmih bad pynsangeh noh kan sa wanlam ia ka lawei ka ban shem jynjar la ka long ha ka rep ka riang ne ka koit ka khiah. Ki khyndew sboh jong ka ri lum khasi bad jaintia jong ngi kin sa duh bad ki tyllong um kiba shngiam kin sa duh noh lada ym lah ban leh ei ei halor kine. Dei na kine ki daw ba ki stad saians ka agrikolshor bad kiba peit mariang(Environmentalists) ki sa wad bniah bad leh ia ki experiment ban wad ia kiwei pat ki lad ban pynbha ia ka mei mariang khlem da pyndonkam bad pynduna ia ka jingpyndonkam ia kine ki dawai sboh kiba long bih lada pyndonkam khlem pud bad bakla. Ka jingwad bniah ka la seiso bad sa mih kita ki jait pynsboh khyndew ia kiba la khot ki “ Bio-fertilizers”.

KIEI KI BIOFERTILIZERS?

Ka kyntien Bio fertilizers ka wan na ka kyntien “Bio” kaba mut ba don jing im bad “Fertilizers’ kaba mut Ki Sboh. Te ki biofertilizers kidei kita ki jait sboh kiba don ha ki ia kita ki phngit jingim kiba rit (Micro organisms) kiba lah ban kharoi ha ka khyndew lane ha ki bynta hapoh u jingthung bad kyntiew ia ka jingsan jingmih u jingthung da kaba shna lane pynbiang ia kita ki jingbam ba kongsan na ka bynta jong u bad da kaba pynkhih lane pynshait ia ki bynta u jingthung ba un san un plung kham bha. Ia kine ki jait sboh lah ban

khleh lang ha ki symbai, lane da ka ba shu synreit ha u jingthung bad thied lane da kaba shu ber ne synreit ha ka khyndew.

KUMNO KI BIOFERTILIZERS KI TREI KAM?

- Ki Biofertilizers ki shna ia ka jingbam Nitrogen da kaba kjit na ka haw haw, hapoh ka khyndew bad kumjuh hapoh ki thied jong u jingthung bad pynlong ia u jingthung ba un ioh kjit ia ka da kaba suk.
- Ki iarap ha ka ban pynpra ne pynlait ne pyn um noh ia ka jingbam Phosphorus ba dambit bad sahkut ha ki kynja maw ne shyiap bad ailad ia u jingthung ba un ioh kjit ia ka.
- Ki lum ki kjit ia ka jingbam phosphorus ba don ha ka sla khyndew bad pyllang ia ka ha ka met jongki bad hadien pat ki sa pyllait noh ban ioh kjit da u jingthung.
- Ki Biofertilizers ki pynmih ruh ia kita ki kynja dawai Hormones bad ki kynja vitamin kiba iarap ia ka jingsan ki thied bad kumjuh ia u jingthung.
- Ki iarap ha ka ba pynpyut kham stet ia kiei kiei kiba lah ban pyut bad pynkylla jingbam pat na ka bynta u jingthung.
- Don ruh ki Biofertilizers lane phngit jing im kiba lah ban ialeh ia kiwei pat ki phngit jing im kiba ktah ia u jingthung.
- Haba ai ia kine ki Biofertilizers ha ki symbai lane khyndew, ki pynbun ia ka jingdon jong ki jingbam ha ka rukom ba u jingthung u lah ban pyndonkam ia ki bad kane ka pynkiew ia ka jingmih da 10 haduh 25% khlem da ktah ia ka khyndew bad mariang.

KI JAIT BIO FERTILIZERS BA KHAM KONGSAN:

La phiah ia ki jait Biofertilizers ha ki lai bynta ban pynsuk ha ka ban sngewthuh ia ki.

1. Na ka bynta ban ioh Nitrogen

- U Rhizobium ban pyndonkam ha ki jait rymbai ne presbin bad motor.
- U Azotobacter/ Azospirillum ha kino kino ki jait jingthung lait noh ki jait rymbai.

- U Blue green algae bad Azolla na ka bynta ki jingthung kum u kba pynthor ne ki jaka ba lang um.
2. Na ka bynta ka jingbam Phosphorus:
- Ka Phosphatika na ka bynta baroh ki jait jingthung ba la khleh lang bad u Rhizobium lane Azotobacter.
 - Ka VAM(Vesicular arbuscular Mycorrhiza)
3. Ban Kham pynsboh ia ka sbob mariang (Enriched Compost): Da ka ba pyndonkam da Ka Cellolytic fungal culture bad ka phosphatika bad Azotobacter culture.

KI JINGBATAI KHYNDIAT SHAPHANG KINE KI JAIT BIOFERTILIZERS:

A. U Rhizobium: Kine ki jait phngit jingim ki im ki kharoi ha ki khmut jong ki thied ha ki bynta ba pyllon pyllon khamtam ha ki jait jingthung motor, presbin bad kino kino ki rymbai. U Rhizobium u iarap ha ka ban ring ne tan ia ka Nitrogen shapoh ka khyndew na ka haw haw bad pynlong ia ka ban ioh kjit da ki



thied u jingthung. Ban Pyndonkam ia u Rhizobium ha ki jingthung, ka buit ka ba bha eh ka dei ban khleh ia u bad ki symbai. Ban kham myntoi kham bun, khleh lang ia u Rhizobium bad ka Phosphatika. Leh ia ka soil test bad lada ka khyndew ka lam jew eh(acidic) ai shun (powder) ban pynduna ia ka jing lam jew. Haba khleh ia ki symbai bad U Rhizobium, milai bad king bha la kumno kumno 200 gm u Rhizobium bad 200 gm ka Phosphatika ha shiteng litar ka um bad sa khleh ia ki symbai (10-12 kg) lem bad kane ka jingkhleh khnang ba kane ka jingkhleh kan sop bha ia baroh ki symbai. Thad rkhiang ia kine ki symbai ha ka jaka kaba tngen ne ba kah syrngiew bad ym ha ka jingshai kjat sngi bad sa thung ia ki ha ka jaka ba lah pynkhreh. Lah ruh ban pyndonkam da ka jingkhleh ban kham pyndam bit is u Rhizobium bad ki symbai, kum ka mithai 100 gm ba lah khleh lang bad 1 litar ka um.

B. Azotobacter: U Azotobacter u dei u phngit jing im ba im bad kharoi ha khyndew hajan ki thied u jingthung. U lah ban kjit ia ka Nitrogen na ka haw haw bad pyllang ha ka met ka jong u katba u dang im. Ynda haba kine ki phngit ki iap, ka nitrogen ba lah pyllang da ki ka long kaba lah ban kjit pat da ki thied



jong ki jingthung. Ki jingthung km u riewhadem, u kba, kynphad, pai, ki krai, ki jhur bad kiwei kiwei de ki ioh kjit nitrogen bha lada bun u Azotobacter ha ka khyndew. Nalor ka Nitrogen, kine ki phngit jingim katba ki dang im ki lah ruh ban shna bad pynlait sha ka khyndew ia ki dawai hormones bad vitamins ki ba bun kiba iarap ha ka jing san jing heh ki jingthung. Kine ki phngit jing im ki iarap ruh ha ka ba ialeh ia ki phngit jingim kiba thaw jingpang ia u jinghung da kaba ialeh pyrshah ia ki. Kine ki phngit jingim ki kham trei kam bha ha ka khyndew kaba don bun ka sboh mariang. Ia kine ki phngit jingim pynsboh lah ban khleh lang bad ki symbai lane da kaba shu wieh ia ki thied ha ka jingkhleh bad ruh da kaba shu synreit ne bret ha khyndew.

C. Azospirillum: U Azospirillum ruh u trei kam kum u Azotobacter hynrei une u phngit jingim u im bad kharoi ha ka snep ki thied u jingthung. U lah ban kjit ban shna jingbam Nitrogen na ka bynta u jingthung bad ailad ia u jingthung ban ioh kjit suk ia ka. Ia u Azospirillum lah ban pyndonkam ha shibun ki



jait jingthung. Une u phngit jing im pynsboh khyndew u iahap bha ha ki hali kba ne pynthor bad ruh ha ki jhur. Lah ban pyndonkam ia une u Azospirillum da kaba shu khleh lang bad u symbai lane da kaba shu wieh ia ki thied sara bad ruh da kaba shu synreit ne ber halor ka khyndew. Lah ban pynmih 20-40 kg ka Nitrogen ha ka shi hektar ka jaka

da u Azospirillum bad 20-25% ka jingdonkam ka Urea lah ban pynduna da kaba pyndonkam da u Azospirillum.

D. Blue green algae bad Azolla:

Ki Blue green algae ki long kum ki kynja sohpaillen kiba lah ban kjit bad shna jingbam Nitrogen na ka bynta u jingthung ha ki jaka ba lang um. U Azolla pat u long kum ki kynja tyrkhong ba rit bha ba jyrngam kiba per ha sla um bad kjit Nitrogen na ka haw haw bad pyllait pat ia ka kum ka jingbam na ka bynta ki jingthung khamtam ha ki jaka ba lang um kum ha ki hali kba pynthor. U Azolla u kham trei kam bha da kaba ia trei kam lang ryngkat bad u BGA(Blue Green



Algae). U Azolla ryngkat bad u BGA ki lah ban pynmih haduh 40-60 kg ka Nitrogen ha ka jaka kaba heh shi hektar (2.5 akar).

- E. Ki Phosphate Biofertilizers:** Ki phngit jing im kum u Pseudomonas, Bacillus, Penicillium, Aspergillus bad kiwei kiwei de ki don ha ki ka bor ba lah ban pynlait ia kata ka jingbam Phosphate(Phosphorus) ba donkam da u jingthung. Ka Phosphate hi barabor ka ju don ha ka khyndew lem bad kiwei ki marpoh. Ka shah teh bad dambit ha ki bad u jingthung um lah ban kjit satia ia ka kum ka jingbam. Hynrei lada kine ki phngit jing im ki don ha ka khyndew, ki lah ban pynlait ia ka na ka bynta u jingthung da kaba pynmih ia ki jait acid ba lah ban pynum bad pyllait sha ka khyndew. La lap ba ha u phan bad u kew ka jingmih ka kiew bha lada pynbun kine ki jait phngit jing im. Kine ki phngit jing im ki kharoi stet bha ha ka khyndew khamtam lei lei ha ki bynta hajan ki thied u jingthung hadien ba lah ber ne synreit ia ki ha ka khyndew. Ka Phosphatika kadei kawei na ki phosphate Biofertilizer kaba trei kam bor bah bad kaba lah ruh ban iarap ia u jingthung ban khlain bad plung bha.

F. Ka VAM (Vesicular Arbuscular Mycorrhiza): Ki VAM kidei ki jingthaw kiba long kum ki kynja tit kiba pur ki thied bad ki im da kaba ia trei ryngkat bad ki thied jong ki jingthung. Ki VAM ki lah ban kjit ia ki jingbam (Nutrients), pynlang ia ki (Store) bad pynpoi (transfer) pat ia ki sha ka met u jingthung. Kine ki phngit jing im ki lah ban kjit bad shna ia shibun ki jait jingbam (Nutrients) na ka khyndew ia kaba u jingthung u donkam. Hadien ba ki lah dep kjit bad shna, ki pynlang ia ki ha ka met jong ki bad pynpoi pat sha ka met u jingthung. Ki Mycorrhiza ki ksam sha ki thied jong ki jingthung katba ia ki thied lade ki pyiar jngai shapoh ka khyndew. Kane ka pynlong ia ki jingthung ba kin ioh ban pyiar ki thied kham jngai ban ia ka ki lah ban long. Hadien ba ki Mycorrhiza ki lah kjit ia ka jingbam, ki pynlang ia ka ha poh ki pla Vesicles bad phah ia ki sha ka met u jingthung lyngba ki arbuscular. Ki jingbam Phosphorus, Zinc bad Sulphur ki kham bun da ka jingtrei kam ki VAM. Nalor Kine, Ki jingbam ba donkam na ka bynta u jingthung kum ka Copper, Potash (potassium), Aluminium, Manganese, Iron bad Magnesium ruh la iarap da ka VAM ha ka ban pynpoi sha ka met u jingthung. Ki VAM ki lah ruh ban ialeh pyrshah ia ki phngit jingim bad khniang kiba pynjulor ia u jingthung.

KI JINGMYNTOI NA KI BIOFERTILIZERS:

- Lah ban pynjlan ia ka jingtrei kam ka jongki ym kum ki dawai sboh ba tang shi por.
- Ka pyn neh ia ka jing koit bad jing sboh ka khyndew.
- Ka lah ban iarap ia ka jingduna ka sboh ha ka khyndew nalor ka jing ai dawai sboh kum ka urea, ssp ne mop.



Kaba ai Biofertilizer ha u riewhadem

- Ka lah ban pyn duna haduh 25-30 % ia ka jing pyndonkam ia ki jait dawai sboh kharkhana (Chemical fertilizers).
- Ka pynkiew ia ka jingmih ha duh 10-40%.
- Ka iarap ha ka ban pyn pyut kham stet ia kiei kiei kiba na ka mariang.
- Ka pynbha ia ka jing long ka khyndew(texture and Structure) bad ruh pynbha ia ka jinglah ka khyndew ban bat ia ka jingsngem.

- Kam ktah ia ka jing heh jing san u jingthung lane ia ka jingsboh ka khyndew.
- Ka iarap ha ka ban pynkhie pynsan bad pynstet ia ka jing heh jing san u jingthung da kaba pynmih ia ki dawai hormones.
- Ka iarap ha ka ban ialeh ia ki phngit khniang jingpang bad khniang kiba pynjulor ia ki jingthung da kaba pynmih ia ki dawai ba pynduna ia ki.
- Ka iarap ha ka ban pyn um bad pyllait ia ki jingbam kiba shah teh shah khum ha ki mar poh.
- Kam ktah ia ka mariang, ka long paralok bad ka mariang bad ka kham tad shibun ban ia ki dawai sbok karkhana(Chemicals).
- Kam long ka ba tang shi por hynrei kan wanrah ia ka jingbha ka lawei.

KI JAIT JINGTHUNG BAD KA RUKOM AI IA KI BIO FERTILIZERS:

Ha ka jaka kaba heh shi hektar lane 2 akar shiteng, lada ia ki biofertilizers la song ha ki paket powder 200 gm, ka jingdonkam paket na ka bynta ki biofertilizers bapher bapher ha man la ki bynta ka jing im u jingthung ki long kumne harum:-

Jingthung	Ha ki symbai	Ha ki nur sara	Ba wieh ia ki thied sara	Ha lum/ lyngkha/ pynthor	Baroh ka jingdonkam paket ba 200 gm ha ka shi hektar
Kba	5	10	5	10	30
Krai Sorghum	3	-	-	10	13
Krai Pearl millet	3	-	-	10	13
Riewhadem	3	-	-	10	13
Kynphad	3	-	-	10	13
Tiewsnagi	3	-	-	10	13
U pai	10	-	-	36 (3 bynta)	46
Shynrai	-	-	-	24 (2 bynta)	24
Duma sla	1	3	-	10 g/tyndrai	14
Soh kynphor	2	-	-	10	-
Soh niamtra	2	-	-	10 g/tyndrai	-
Soh saw	1	-	-	10	14
Ka kait	-	-	5	10 g/tyndrai	-



Lada pyndonkam da ki Biofertilizers ba la song ha ka kynja um ha ki bitor, ka jingdonkam bad rukom ai ha ki jingthung bapher ba pher ka long kumne harum:-

Jingthung	Ki Biofertilizer ba kham iahap	Rukom ai	Katno ban ai
Ki jingthung ba long symbai (Pulses) kum u shana kulai, u motor, u shana budam, u rymbai ktung, u dai, U lucern, Dai jyrngam, Dai iong, U Bhori, bad kiwei kiwei	Rhizobium	Khleh bad ki symbai	200 ml shi akar
Ki cereal kum u kew, u oat bad barley	Azotobacter/ Azospirillum	Khleh bad ki symbai	200 ml shi akar
Kba	Azospirillum	Khleh bad ki symbai	200 ml shi akar
Ki jingthung pynmih umphniang kum u tyroso, u castor, u nei, Tiew sngi, etc	Azotobacter	Khleh bad ki symbai	200 ml shi akar
Baroh ki jait krai rit (rai shan/ rai truh)	Azotobacter	Khleh bad ki symbai	200 ml shi akar
U Riew hadem bad krai	Azospirillum	Khleh bad ki symbai	200 ml shi akar
Ki jait jingthung ai bam jingri kum ki phlang ne dieng sla	Azotobacter	Khleh bad ki symbai	200 ml shi akar
Kiwei pat ki jait jingthung plantation kum u Duma	Azotobacter	Khleh bad ki symbai	500 ml shi akar
Slasha, u coffee	Azotobacter	Synreit ha ka khyndew	400 ml shi akar
Dieng snep kor	Azotobacter	Synreit ha ka khyndew	2-3 ml man u tynrai

Ki Jingthung bad dieng khlaw /Baroh ki jait dieng soh Ki jingthung ne kynbat ba im baroh shisnem, ki jingthung ne dieng ban pyndonkam thang ne shna jingshna ne ai bam jingri,ki dieng jri, ki jingthung masala, ki syntiew, ki jhur sla/ soh, ki soh ot etc	Azotobacter	Synreit ha ka khyndew	2-3 ml man la u sara tynrai
Ki Jingthung/ dieng kynja rymbai/ presbin/motor (Leguminous)	Rhizobium	Synreit ha ka khyndew	1-2 ml man la u jingthung



- * Lada pyndonkam da ka Biofertilizer powder, na ka bynta ka jaka shi akar, ka bha eh ban khleh 1 kg ka Azotobacter + 200 gm ka Phosphorus Solubilizing Bacteria (PSB) ha ka um bad sa wieh ia ki thied jong ki sara jhur kum u soh saw, u soh baingon, u phul kubi, u soh mynken, u kubi bad kiwei pat ki jait jhur ba sara.
- * Na ka bynta u Phan, Sying, Ka Shriew, U Shynrai bad kba rep syrti, khleh U Azoto bacter ne Azospirillum 4 kg + PSB 4 kg + 100-200 kg ka sboh mariang na ka bynta shi akar ka jaka bad bret ia ka jingkhleh ha ka khyndew.

KA JINGPHIKIR HABA PYNDONKAM IA KI BIOFERTILIZERS:

- ✓ Da khmih bha ia ka jingsong/packet ba buh ia ka Biofertilizer. Pyntikna ia ka jait Biofertilizer na ka bynta u jingthung uba phi kwah.
- ✓ Pynthikna ba ka Biofertilizer ban thied ba ka dang biang ka por ne ka tarik ba la buh ne thoh ha ki jingsong (Expiry Date).
- ✓ Buh ia ka Biofertilizer ha ki jaka ba tngen tad haduh ba yn pyndonkam ia ka. Lada lah ka bha ban buh ha ka refrigerator/ fridge. Ka jingkhriat ka

pynneh kham slem ia ki phngit Biofertilizer bad ka jing syaid ka pynduh ia ki.

- ✓ Ka bha ban pdem ne khleh ia ka Biofertilizer bad ki symbai shwa ban thung ne bet ia ki. Lada ieh slem ia ki symbai hadien ba lah dep khleh, ki phngit ki iap kloï.
- ✓ Kynmaw ban kiar na ka jing ia khleh ki dawai sboh/ khniang (chemical fertilizers/ pesticides) ha ki symbai ne ha ka khyndew ba lah dep ai Biofertilizer namar ka bih na ki dawai sboh/ khniang ka pyniap ia ki phngit Biofertilizer.
- ✓ Hadien ba lah dep khleh ne pdem ia ki symbai bad ka Biofertilizer, thad ia ki ha ka jaka ba tngen bad lait na ki kjat sngi.
- ✓ lalah ban pyndonkam lut ia ka Biofertilizer hadien ba lah plied ia ka jing song. Lada ka tam, buh bha ia ka jingsong ha ki kor pyndait thah(Refrigerator) ha ka jingkhriat kaba 40 C.
- ✓ Ym dei ban ai Biofertilizer ryngkat bad ki dawai sboh/ khniang (Chemical)
- ✓ lalah ban sait khuid bha ia ka pump ba lah dep pyndonkam dawai (Chemicals) shwa ba yn pyndonkam na ka bynta ka Biofertilizer lane buh kyrpang da kawei ka pump.

KA JINGPYNKUT:

Wat la ka jing pyndonkam ia ki Biofertilizer ha kane ka ri ka jong ngi ka dang dei tang ha ka jingsdang, ka don pat ka jing ngeit ba ha ki snem ki ban dang wan ka jing pyndonkam ia ki kan nang par bad iar khambun ka ban sa wanrah pat ia ka jingkylla ha ka jinglong jingman jong ka rep ka riang, ka khyndew, ka mariang, ka koit khiah bad ruh kan sa kyntiew ia ka ioh ka kot jong u nongrep. Hooid ym lah ban len ba ki Biofertilizer ki kham suki ka jingtrei kam jong ki bad kan ym lah ban wanrah ia ka jing ioh nong kloï kloï kum ki dawai, hynrei ka jingpyndonkam ia ki barabor kan sa ai buit ai lad ia ki para nongrep ba kin nang jam bad nang stad ha ka ban pyndonkam ia ki. Ha ki ri sepmgi, ki jingthung ba lah pynmih da kata ka buit Organic farming ki rem dor bha bad ka don ka jing dawa shibun na ka bynta ka jongki. Ki Bio fertilizer ruh ki dei ka wei na ki buit ban trei ia kata ka rep Organic lane ka rep ka riang bad ri jingri khlem da pyndonkam ia ki dawai. Lada ngi lah ban bud ia ka jingpyndonkam ia kiei kiei kiba na ka mariang ryngkat bad ki Biofertilizer wat la ka long suki suki, kan sa wanrah pat ia ka lawei kaba phyrnai na ka bynta ka ri ka jaid bynriew ka jong ngi.

La wad jingtip bad pynkhreh da
U Shanmebansan Marbaniang
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bad U
Baiaishah Syiemlieh
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