



## Green-Ag: Transforming Indian Agriculture for Global Environmental Benefits and the Conservation of Critical Biodiversity and Forest Landscapes

### Capacity Development on Seed Treatment and Storage at Village level

Maintaining seed quality depends on many environmental factors, some of which are moisture, temperature, humidity, and storage conditions. Even though these factors are properly accounted for, seed quality may still be reduced by certain seed-borne diseases or destroyed by insects and other pests. Research has shown that treating seed with one or more pesticides is the most economical and efficient way to protect seed from these pests and improve seed quality.

#### *Objectives*

- Its main role is to protect seeds from seed-borne diseases and pest attacks.
- To revive a seed that has been dormant for a long time
- Drought tolerance is induced
- Early emergence is used to increase the percentage of seeds that germinate.

As per the approved Green Landscape Management Plan (GLMP) 2023, capacity development on Seed treatment and storage was conducted for women farmers by the Community Resource Person (CRP) in their respective villages. A detail description of the training dates, name of project villages, number of participants were presented in *Table 1*. This training covers an important topics like different techniques of seed treatment e.g. dry treatment, wet treatment, slurry treatment, pelleting on biological and chemical seed treatment. The benefits and importance of practicing seed treatment before sowing and transplanting were highlighted in this training. All the participants were requested to practice seed treatment in future for increase agriculture productions. Besides seed treatment, all participants were given training on seed storage. The farmers were taught and informed the level of moisture content before for seed storage and that proper seed storage play an important role in agriculture productivity. It was conducted in 17 project villages with a total number of 402 farmers actively participated during this capacity development training. During this training, leaflets prepared in the local language (Mizo) by the Green-Ag team were distributed to the farmers. The translate leaflets are attached at the end of this document.

Number of women farmers participated				
SN	Village	District	Date of training	No. of Beneficiaries
1	W Bungmun	Lunglei	26.05.2023	25
2	Laisawral	Lunglei	26.05.2023	25
3	Sesawm	Lunglei	07.07.2023	25
4	Tleu	Lunglei	31.05.2023	23
5	West Phaileng	Mamit	18.05.2023	25
6	N W Phaileng	Mamit	20.05.2023	25
7	Teirei	Mamit	22.05.2023	25
8	Damparengpui	Mamit	22.05.2023	23
9	Tuipuibari	Mamit	23.05.2023	29
10	Rajiv Nagar	Mamit	22.05.2023	25
11	Tuirum	Mamit	21.05.2023	25
12	Khawhnai	Mamit	23.05.2023	15
13	Phuldungsei	Mamit	09.05.2023	22
14	West Phulpui	Mamit	02.06.2023	25
15	Pukzing	Mamit	25.05.2023	15
16	Pukzing Vengthar	Mamit	20.05.2023	25
17	Marpara North	Mamit	20.05.2023	25
18	<b>TOTAL</b>			<b>402</b>



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Bungmun Village



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Damparengpui Village



Latitude: 23.26501  
Longitude: 92.474742  
Elevation: 846.43m  
Accuracy: 4.0m  
Time: 26-05-2023 15:16  
Note: seed treatment laisawral

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Laisawral Village



©FAO/Henry

Marpara North Village



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New West Phaileng Village



©FAO/Nunpuia

Phuldungsei village



©FAO/Hruaia

Pukzing Village



©FAO/Ruatmawia

Pukzing Vengthar Village



©FAO/Govind

Rajiv Nagar Village



Tuipubari Village



Teirei Village



Tuirum Village



Tleu Village





West Phulpui Village



West Phaileng Village



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Sesawm Village

## 2. Chemical (Damdawi) hmanga sawngbawl :

- ▶ Thlai natna darh zel tur a veng.
- ▶ Thlai chi tawih tur leh a pul lakah a veng.
- ▶ Thlai chi a ti tiak tha
- ▶ Thlai chi dah that bei thintu rannung lakah a veng.

### Chemical hmanga thlai chi sawngbawl

- ▶ Thlai chi kan tuh/phun hma in chemical-in sawngbawl tur ani a, hei hian thlai chi leh lei a natna hrik thlai tichhe thei tur lakah a veng.
- ▶ Chemical hmanga thlai chi sawngbawl hi hlawn 3 ah a then theih a, chungte chu - Thlai chi tihthianghlim, thlai chi a natna hrik awm thah/tih tem leh thlai chi venhim.
- ▶ A tlangpuin insecticide hi chu thlai chi kan dah that laia rannungin a tih chiat tawh tih tem nan leh a ti chhe zel tur ven nan hman a ni tlangpui a, heng bakah hian lei a rannung awm (wireworms leh seed corn maggot) ven nan pawh hman thin ani.

### Thlai chi dah that dan

Kan thlai chi dah that tur chu uluk takin kan thlang ang, kung tha leh hrisel a tanga thlai chi dah that tur thlan hi a him ber ani. Tin, kan thlai chi dah that tur chu a thianghlimin a hrisel tur ani a, bawhlhawn leh bal dang a awm tur ani lo. Kan thlai chi dah that tur chu kan phoro anga, uluk taka funin hmun hul leh ro ah kan dah tur ani. Hmun hnawnga kan dah erawh chuan natna hrikin a bawm thei a, kan thlai chi an ti chhe vek thei ani. Kan thlai chi dah thatna tur chu a thianghlimin a fai tur ani, rannung leh natna hrikin a tihchhiat loh nan hlo te pawh kah a tha awm e.

Thlai chi hi ro lutuka pho tur erawh ani lo, tha taka a chawh leh theih nan tui engemaw zat a pai ve reng angai. Tui an pai tam dan a zirin thlai chi thenkhat chu kum tam tak dah that theih a ni.

Entirman: Tui 11-13% pai te chu kum charve chungvel a dah that theih a, tui 8-10% pai te chu kum 4 thlang pawh a dah that theih ani. Tin, kan thlai chi dah that tur chu mei vap/vut, sawhthing phut, aieng phut leh chi nen te dah pawh ila, rei tak a dah theih a, rannung leh natna hrik lakah an him bik a ni.

### Thlai chi sawngbawl dan

Thlai hming	Hmanraw mamawhte	Sawngbawl dan	Sawngbawl hun	Inven dan tur
Mizo Hmarcha	Trichoderma/ Pseudomonas	Trichoderma emaw pseudomonas 4-5 g ah hmarcha chi 1kg pawh tur.	April - June (Thlai chi thlak hma deuhin)	Kul bawm kan huan tur leh a, hman kan bawm bawm tur ani
Buh	Trichoderma	Trichoderma 10g ah buh chi 1kg kan pawh ang.	April - May (Thlai chi thlak hma deuhin)	
Tomato	Trichoderma/ Pseudomonas	Trichoderma emaw pseudomonas 4-5g ah Tomato chi 100g pawh tur.	March emaw November (Thlai chi thlak hma deuhin)	
French bean	Trichoderma/ Pseudomonas	Trichoderma emaw pseudomonas 4-5g ah Tomato chi 1kg pawh tur.	October - November (Thlai chi thlak hma deuhin)	
Zikhum	Trichoderma/ Pseudomonas	Trichoderma emaw pseudomonas 4-5g ah Tomato chi 1kg pawh tur.	November (Thlai chi thlak hma deuhin)	
Zikhum, Parbaw, Broccoli, Knol-khol, Buluh	Trichoderma/ Pseudomonas	Trichoderma emaw pseudomonas 2-4g ah Tomato chi 100g pawh tur.	Thlai chi thlak hma deuhin	
Dhania, Bakhawr, Bawkbaw	Trichoderma/ Pseudomonas	Trichoderma emaw pseudomonas 2-4g ah Tomato chi 1kg pawh tur.	Thlai chi thlak hma deuhin	



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## THLAI CHI SAWNGBAWL LEH DAH THAT DAN



ISSUED BY

GREEN-AG PROJECT (MIZORAM)  
DEPARTMENT OF AGRICULTURE  
GOVERNMENT OF MIZORAM



Loneitu thlai thar chhuah reng reng hi an thlai chi that leh that lohah a inghat thui hle. Thlai chi tiak tha lo leh natna awm kan tuh chuan thlai a tichhia in kan thar chhuahin beisei a phak lo fo thin. Kan thlai chi tuh tur chu hnim chi nena a lo inpawh sawp phei chuan kan buai pah fova, hlo thlawh manah kan in sengso thlawh mai ani, hnimin a dip avang hian rannung an lo pungin natna hri a tam pah fo bawk. Thlai chi hrisello chingtu phei chuan thlai seng tur an nei dawn em tih sawi theih a ni lo. Hengte avang hian, thlai chi kan thlak hmaw emaw kan tuh hmaw emaw thlai chi uluk takin kan thlang anga, kan sawngbawl anga, kan dah tha tur ani. Hetianga kan thlai chi kan enkawl thei anih chuan kan thlai chin a tha anga, kan thar hlawk dawn ani.

### THLAI CHI THA CHU ENNGE?

- ▶ Thlai chi chu a nungin a tiak tha tur a ni.
- ▶ A hriselin a fai tur a ni.
- ▶ Thlai chi chu a len zawngte, a rawng leh thildangah pawh an in ang tlang bawk tur ani.
- ▶ Seed Company atanga lak/lei theih phei chu a tha leh zual.
- ▶ Thlai chi atanga inkai darh chi natna a vei/pai tur a ni lo.
- ▶ A nget tur a ni bawk lo.

### THLAI CHI SAWNGBAWL THATNA LEH TANGKAINATE

- ▶ Thlai chi sawngbawl hian a tum ber chu thlai chi a natna lo awm thei laka thlai chi ven leh rannung thlai chi tichhe thei laka ven ani.
- ▶ Thlai chi thanthu tawh kaithawh leh.
- ▶ Khawkheng do theihna a neih tir.
- ▶ Thlai chi damdawi hmanga sawngbawl hian thlai chi a ti tiak tha bawk.
- ▶ Thlai puitlin hnuah pawh natna hrik lakah a him bik.

## THLAI CHI SAWNGBAWL DAN CHI HRANG HRANG TE

Thlai chi tura kan dah that te hi, a chi atan a tha em tih kan thlai chi dahna hmun, sik leh sa, boruak hnawn zawngte hian nasa takin a ngawng thei a. Heng kan sawi tak te hi uluk takin kan thlai chi tur atan a tha thei ang bera kan lo ti anih pawhin, kan thlai chi dah that khan natna hrik an lo la pai thei a, chu chuan harsatna min la then thei ani. Mi thiam ten an zirchianna atanga a lan danah chuan, thlai chi atana kan dah that te hi kan tuh/kui/theh hmaw rannung thahna hlo (pesticides) chi khat aia tama sawngbawl hi a hlawkthlak, thlai chi a natna awmthei lak atangin a venghima, thlai chi a ti tha bawk ani.

### THLAI CHI THLAK HMA A SAWNGBAWL

Thlai chi kan thlak hma a, kan thlai chi tha zawka a lo tiah theih nan leh kan thlai tiak te hrisel taka an lo than choh theih nana damdawi hmanga kan sawngbawl hi ani a. Thlai chi thlak hmaw sawngbawl kan tih chuan hengte hi a huam tel a ni.

1. **Thilnung leh hnimhnah hmanga thlai chi sawngbawl** : A tlangpuin thlai chi hi chemical hmangin kan sawngbawl thin a. Heng chemical kan hman te hian kan leilung, sik leh sa a tih chhiat bakah, loneitute hriselna atan pawh a thalo hle bawk. Chuvang chuan chemical tellova thilnung leh hnimhnah hmanga thlai chi sawngbawl hi a sawngbawl dan tur dik leh tha zawk ani a, thlai chi tiak leh than a tih that ve tho bakah, kan leilung leh sik leh sa tan ngawng thalo anei velo bawk ani.

Thlai natna hrang hrang, rannung leh hnim avang hian kan thlai thar tur za a 20-30 vel hi kan hlauh pah a. Sik leh sa inthlak danglam kan chhut tel phei chuan hei aia nasa hi kan hlauh ani.

Heng laka kan inven theih nan leh kum tuana ei leh bar tur kan neih theih nan tun aia tha zawka kan thlai chin turte sawngbawl hi kan tih makmawh ani.

### A thatna te

- ▶ Thilnung leh hnimhnah hmanga thlai chi kan sawngbawl hian thlai ati tiak chakin ati tiak tha bawk ani.
- ▶ Thlai tiak te natna laka an dinhmun a derthawn/zuamawm lai berin natna awm thei lakah a veng.
- ▶ Chaw tha hip thei a ti pung a, chu chuan nakin zela chaw tha an hip luhaah a pui.
- ▶ Thlai zung bawr vela chaw tha a tipungin chu chuan thlai chaw tha lak/lei kawngah nasa takin a pui bawk.
- ▶ Sik leh sa danglamah pawh thlai than a ti tha.
- ▶ Damdawi kan hman a tilemin hei hian loneitute hriselna atan ngawng thalo awm thei leh kan leilung leh sik leh sa tibuai thei lakah nasa takin a pui bawk.

### Thilnung hmanga thlai chi sawngbawl dante

- ▶ **A ro a sawngbawl (Dry Treatment)**: Thlai chi damdawi/chaw tha tih tui a thlai chi chiah.
- ▶ **A huh a sawngbawl (Wet Treatment)**: Damdawi/Chaw tha tih tui a thlai chi chiah.
- ▶ **A diak a sawngbawl (Slurry Treatment)**: Thlai chi/ Thlai tiak kha damdawi/chaw tha tih diakah kan chiah ang. Entirman, buh tiak kan phun hmaw chaw tha (phosphate) tih diakah kan chiah zuai.
- ▶ **Saihlung ang deuh a sawngbawl (Pelleting)**: Thlai chi damdawi/chaw tha nena, a ti rit tur leh in tiat tlang thei tura saihlung ang deuha hual. Damdawi (pesticide) hmanga hruai hian leia natna hrik awm leh rannung dang leh sava, sazu te lakah a veng.

## Special seed treatments

### Seed pelleting

- ▶ Here the nutrients are coated on the seeds.
- ▶ By pelleting we can increase the size of seed and we can make it free flowing one.
- ▶ Through this we can be able to reduce the seed rate, it is also important for aerial sowing (gum arabica) in tree seeds.

### Pre-storage seed treatments

- ▶ Pre-storage treatments of harvest-fresh seed are primarily aimed towards protection against deteriorated senescence during storage.
- ▶ Seed storage, which is again threatened by insect and pathogen attacks, can also be taken care of by prescribed Pre-storage seed
  - o Halogenation
  - o Antioxidant treatment
  - o Seed sanitation

### Mid storage treatments

- ▶ Seeds in storage accumulate damage to cell membranes during senescence.
- ▶ Mid storage seed treatments are capable of reducing the age-induced damages and restoring the seed vigour to a certain extent besides, the seed viability and productivity of stored seeds are also improved.

### Seed treatment equipment

- ▶ Seed treating drum
- ▶ Slurry seed treater
- ▶ Panogen Seed treater
- ▶ Mist-O-Matic Seed Treater

Crop	Safety measures	Timeline for adaptation of the practice	Resources required
Sticky rice	Use gloves and face mask, Avoid contaminated water, Wash hands properly with soap water after mixing the seed	Kharif Rainfed: 1st week of April to 2nd week of May (thum paddy), Kharif Irrigated: Mid-March to 1st week of May (Kharif Paddy – Wetland Rice Cultivation)	Seed, Trichoderma vidi (10g/kg) Sticky rice, Gloves, Good quality water, 2000rs drum or bowl.
Mizo Chilli	Use gloves and face mask, Use seed treater Wash hands with soap water after mixing	April – May – June	1. 1.5kg seed per hectare, Use Pseudomonas/ Trichoderma/ Phosphate solubilizing bacteria (PSB/Azospirillum)
Tomato	Use gloves and face mask, Use seed treater Wash hands with soap water after mixing	November	2. 4-5 g/kg seed, mixer bowl or seed treater.
French Bean	Use gloves and face mask, Use seed treater Wash hands with soap water after mixing	April- May & October- November (bush type)	300-400 g of Tomato seed/ha, seed treater, Pseudomonas or Trichoderma vidi
Cabbage	Use gloves and face mask, Use seed treater Wash hands with soap water after mixing	November	25-30 kg Seed/ha or 80-90 kg/ha 400-500 g/ha

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Ministry of Agriculture and Farmers Welfare

ISSUE NO. 4

2023

Food and Agriculture Organization of the United Nations

Ministry of Agriculture and Farmers Welfare  
Ministry of Environment, Forest and Climate Change

Green-Ag: Transforming Indian Agriculture for Global Environmental Benefits and the Conservation of Critical Biodiversity and Forest Landscapes

## SEED TREATMENT AND SEED STORAGE



ISSUED BY

GREEN-AG PROJECT (MIZORAM)  
DEPARTMENT OF AGRICULTURE  
GOVERNMENT OF MIZORAM



GLOBAL ENVIRONMENTAL FACILITY  
INVESTING IN OUR PLANET



DEPARTMENT OF AGRICULTURE

Maintaining seed quality depends on many environmental factors, some of which are moisture, temperature, humidity, and storage conditions. Even though these factors are properly accounted for, seed quality may still be reduced by certain seed borne diseases or destroyed by insects and other pests. Research has shown that treating seed with one or more pesticides is the most economical and efficient way to protect seed from these pests and improve seed quality.

### OBJECTIVES

- ▶ Its main role is to protect seeds from seed-borne diseases and pest attacks.
- ▶ To revive a seed that has been dormant for a long time
- ▶ Drought tolerance is induced
- ▶ Early emergence is used to increase the percentage of seeds that germinate.

### TYPE OF SEED TREATMENT

#### Biological seed treatment

Seed Treatment has traditionally been carried out using highly potent but toxic agrochemicals. The use of agrochemicals has a huge impact on the environment and puts farmers at risk as well. Therefore, a biological seed treatment is the right solution since microbial plant growth promoter can be just as effective but with zero environmental impact.

#### Benefits of Biological seed treatment

- ▶ Biostimulants improve rate and frequency of germination.
- ▶ Helps seedlings fight off plant pathogens at the most vulnerable development stage.
- ▶ Plant growth-promoting microorganisms influence the plant root's microbial ecosystem which influences nutrient uptake at later stages.

- ▶ Seed treatment increases the availability of plant nutrients in the root system and increases nutrient uptake.
- ▶ Uniform growth and establishment even in adverse conditions.
- ▶ Reduces the use of agrochemicals which helps farmers reduce the impact on the environment and themselves as well.
- ▶ All the above factors contribute to improving yield.

#### Methods of biological seed treatments

- ▶ **Dry treatment:** Mixing the seed with pesticides/nutrients in powder form.
- ▶ **Wet treatment:** Soaking the seeds in a pesticide/nutrient solution in liquid form.
- ▶ **Slurry treatment:** Seeds/seedlings are dipped in a slurry. Rice seedlings, for example, are immersed in phosphate slurry.
- ▶ **Pelleting:** It is the process of coating seed with enough seed ingredients to make the seeds larger, heavier, and consistent in size for sowing using seed drills. Pesticide pelleting is used to protect soil organisms and pests, as well as to repel birds, ants, and rodents.

#### Chemical seed Treatment

##### Insecticidal and Fungicidal treatments

It is an important attribute of quality seed. Though a seed lot that meets high standards of germination, vigour and purity if it is contaminated with seed borne pathogens and insect pests, may be useless to farmers because it may result in severe yield loss or even crop loss in an entire area.

##### Benefits of the insecticidal and fungicidal treatment

- ▶ Prevents the spread of plant diseases

- ▶ It protects the seed from seed rot and seedling blights
- ▶ It improves the seed germination
- ▶ It provides protection from storage insects.

#### Seed Treatment Fungicides

Fungicides are applied to seed prior to planting to provide effective protection against many seed and soil-borne plant pathogens. Fungicidal seed treatment may be divided into three categories, depending on the nature and purpose of the treatment. These categories are: Seed disinfection, Seed disinfestation and seed protection.

#### Seed Treatment Insecticides

Insecticides are often applied to seed to control or reduce insect damage to seed during storage and, to a lesser degree, to prevent damage from such insects as wireworms and seed corn maggots in the soil

#### Formulation of fungicides /insecticides

Fungicides/insecticides are available in the form of dusts, wettable powders, and liquids.

- ▶ **Dusts:** It is usually applied @ 200-250 gms / quintal of seed. Main disadvantage is dusty condition will prevail during the seed treatment and after handling
- ▶ **Slurry:** This type of fungicide is applied to the seed along with soap like water suspension which can be mixed with seed by using special slurry treater
- ▶ **Liquids:** The use of the liquid solution is known as the "quick wet" method. Here a volatile fungicide is applied to the seed and it thoroughly mixed with them