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Growing Rice With Bio-Plant and Pro-Plant

Photograph shows the 1litre size of bottle.

2. Planting Rice
Planting Technique: Direct Seeding

Direct-seeded crops require less labour and tend to mature faster than transplanted crops.

In this method, plants are not subjected to stresses, such as being pulled from the soil and re-establishing fine rootlets. However, they have more competition from weeds.

Depending on the land preparation method used, direct seeding can be done in two ways:
1. Dry direct seeding
2. Wet direct seeding

Preparing the Seeds

- Put the seeds in a cloth or bucket and soak them for 24 hours. Then leave them in a sack in a warm place for 2 days before sowing.
- Soak in water that contains 20 cc of Power Ant 1 and 20 cc of Power Ant 2 per 20 litres. This is enough for 20 kgs of seeds.
- If the amount of seeds is small, then reduce the water to just a few litres, but not the bio-fertilizer. *The amount can be increased to 100 cc of Power Ant 1 for a better effect*

1. Dry Direct Seeding

This method is usually practised for rain-fed and deep-water ecosystems. Farmers sow onto dry soil surface, then incorporates the seed either by ploughing or harrowing.

Broadcasting

- Broadcast 60 kg - 80 kg of seeds uniformly by hand or in furrows in 1 hectare of field.
- Make shallow furrows by passing a furrower along the prepared field.
- After broadcasting, cover the seeds using a spike-tooth harrow.

Drilling

- Precision equipment, such as the Turbo Happy Seeder, can be used to drill seeds.
- Drill 80 kg - 100 kg of seeds per hectare.
- Seeds are placed by the machine into both dry and moist soil, and then irrigated. A smooth, level seedbed is necessary to ensure that seeds are not planted at depths greater than 10 mm - 15 mm.
- In this technique, fertilizers can be applied at the same time as the seed. Manual weeding also is easier in machine-drilled crops than in seed broadcast crops.

Dibbling

- Dibbling or hill planting is usually practised along mountain slopes or where ploughing and harrowing are difficult.
- Use a long wood or bamboo pole with a metal scoop attached at the end for digging holes.
- Drop the seeds into the holes and cover them with soil.

Dry Season Planting in a Field

2. Wet Direct Seeding

In wet fields, direct seeding can be done either through broadcasting or drilling seeds into the mud with a drum seeder.

Preparing the Seeds

- Put the seeds in a cloth or bucket and soak them for 24 hours. Then leave them in a sack in a warm place for 2 days before sowing.
- Soak in water that contains 20 cc of Power Ant 1 and 20 cc of Power Ant 2 per 20 litres. This is enough for 20 kgs of seeds.
- If the amount of seeds is small, then reduce the water to just a few litres, but not the bio-fertilizer. *The amount can be increased to 100 cc of Power Ant 1 for a better effect*

Broadcasting

- Broadcast 80 kg - 100 kg per hectare of pre-germinated seeds to recently drained, well-puddled seedbeds or into shallow standing water.
- If water in the field is muddy, allow 1−2 days for it to dry before broadcasting.
- If water is drained from the fields after broadcasting, seeds are re-introduced 10−15 days after first seeding.

Farmers direct-seeding their wet fields

Rice seeds in the mud

Vietnam

- When rice farmers in Vietnam sow the seeds, they flood the field with water about 15 cms deep and then sow the seeds. Then they let the water flow out once the seeds have settled and disappeared into the mud. This stops the birds eating the seeds.

Direct seeding of sprouted seeds in flooded soil.

- This method is adopted in areas where there is shortage of labourers or labour wages are very high, and also where mechanical seeders are available.
- The main advantages of this system are seeds are that the rice seeds are not exposed to rat and bird attack
- To overcome these disadvantages, pre-germinated seeds are sown in the puddled land with 5 cm standing water.
- This protects the seeds from bird attack and helps in controlling grassy weeds due to standing water but emergence and establishment of seedlings is low.
- The field is prepared and puddled as with transplanted rice.
- Puddling offers a number of advantages:
  - All weeds are killed and buried in to the soil. (They would otherwise compete with the rice plants for nutrients and water.)

    - The infiltration rate of water is reduced and the water-retaining capacity of soil increases.
    - The seeds germinate easily in soft mud.
    - The plant population becomes more assured.
    - The availability or Fe and P increases and N is conserved better.
- After thorough flooding, the field is leveled, excess water is drained out, and then pre-germinated seeds are sown
- Excess water at seedling time leads to poor germination due to seed mortality because of paucity of oxygen.
- Where the depth of water is more, the plumules elongate more than the radicles and the seedlings float on the impounded water and don't anchor properly.
- If the water is muddy, soil particles should be allowed to settle before seeding.
- This prevents soil from covering the seeds.
- Oxygen supply to the seed decreases in muddy water due to the covering of the seed by settling mud.
- Drum seeders are generally used in puddled conditions and a 20 cm row spacing is maintained.
- One hand weeding is recommended practice for weed management.
- During the first week, a thin film of water is maintained, whereas afterwards 2.5 cm - 5.0 cm water level is recommended.
- There is a possibility of reduction in plant stand due to floating of seeds in the case that the water depth is over 10 cm high.
- A field study for the standardization of seed rate of rice varieties for broadcasting of sprouted seeds under puddled conditions showed that there was a significant increase in yield up to 100 kg hectare seed rate.
- Hence, 80 kg - 100 kg per hectare of seeds is optimum for wet-seeded rice cultivation.

Rice growing after wet direct seeding.

Drum seeding

- Drum seeders are used for fast planting. It operates best on a well-levelled, smooth, and wet seedbed. However, seeders may be clogged if the soil is sticky or if the machine is poorly designed.
- Prepare 80 kg of pre-germinated seeds per hectare.
- *See the photograph on the next page.*

Weeding
Direct-seeded rice have more competition from weeds. Weeds can be controlled through the following:

1. Stale seedbed technique
This technique is best if the field has a large weed seed bank.

It can greatly reduce the weeds in direct seeded rice because of the 2–month fallow period between harvest and sowing, which allows weeds to emerge before they are killed. This technique is also helpful in managing weedy rice.

Stale seedbed technique is most appropriate to reduce the weed seed bank in the soil.
In this technique, weeds are allowed to emerge for at least 2 weeks before being killed.

To do this:
1. Perform tillage operations. Plough, harrow, and level the field.
2. Stimulate weed emergence by light irrigation or after rainfall. Give one irrigation at least 2 weeks before sowing. Maintain enough soil moisture to allow weeds to germinate.
3. It is better to do light cultivation with the weeds than to kill the emerged seedlings using herbicides.
4. If the soil condition is suitable for sowing, plant the crop without further tillage operations. Tillage could bring more weed seeds near the soil surface, thus promoting weed germination.

Remember: Weeds must be actively growing at the time of post-emergence herbicide application. Different types of weed emerge at different times.

2. Weeding by hand or by machine

Weeds are practically impossible to control by **manual weeding by hand**. However, one or two spot hand weeding can be done to:

(1) remove weeds that escape herbicide application;
(2) prevent weed seed production and the accumulation of weed seeds in the soil.

Manual and mechanical weeding

Direct control of weeds can be done through:

(1) manual weeding by hand, and
(2) mechanical weeding using implements, such as a push weeder and inter-row cultivation weeders.

Manual weeding by hand is an efficient method for weed control. However, this is labour intensive and is not practical for large areas.

Implements: Hoes, sickles

When to hand weed

- When weeding annual weeds and certain perennial weeds that usually do not regenerate from underground parts.
- When removing weeds within rows and hills where a cultivating implement, such as a push weeder, cannot be used.

Hand-weeding of young weeds at the two-leaf to three-leaf growth stages is extremely difficult.

To effectively hand weed:

1. Delay weeding for at least 2 weeks or until weeds are large enough to be grasped easily.
2. Ensure that there enough soil moisture for an easy pull.
3. Remove the weeds from the field to stop them from regenerating.

In **mechanical weeding**, motorized cono weeders and other hand weeders can be used.