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How to Grow Tomatoes with Bio-Plant and Pro-Plant

1. Soil Preparation

1a. Making Potting Soil for Seed Trays

Method 1 – Potting Soil for Seed Flats or Potting Soil Bags

1. Rice husks – burned or not burned (3 parts)
2. Coconut coir (1 part)
3. Soil (2 parts)
4. Bio-Plant mixed with water (20 cc in 20 litres)

- Soak the coconut coir in warm water.
- Mix the ingredients well and then place them in the seed flats.
- Water the potting soil well. Cover the seeds over with more potting soil. Plant 1 or 2 seeds in each section.
- Water with a fine spray because this will ensure that more seeds germinate. Put the seeds in the shade until they grow about 0.5 cm. Then put them out in the sun. Spray them each time with the fine spray.

Tomato seedlings in seed flats.

- **Note:** You could add 1 part of compost made with Bio-Plant.

Method 2 – Potting Soil for Seed Flats or Potting Soil Bags

1. Compost made with Bio-Plant (1 part)
2. Soil (2 parts)
3. Coconut coir (1 part)
4. Bio-Plant mixed with water (20 cc in 20 litres)

- Soak the coconut coir in warm water. Mix the ingredients well and then place them in the seed flats. Water the potting soil well.

Coconut coir potting mix.

1b. Plant a Cover Crop

- **Note:** It's tempting to rush ahead, plough the soil, and plant a monoculture of tomatoes. But the interests of the farmers are not served in this way. The guidelines below will help the farmers to regenerate their soil while producing more nutritious tomatoes with a higher yield and without disease.
- The best way to prepare the soil is to plant a multi-species (5+ species) cover crop that includes legumes and grasses, such as carrots, peas, sorghum, millet, turnips, Sudan grass, cereal rye, annual ryegrass, clovers, buckwheat, oilseed radish, sunflower, sun hemp, and hairy vetch. Consult with your local agronomy department about which cover crops to plant because the choice depends on the climate, the state of the soil, and your goals. Grow diverse microbial life before you plant the tomatoes.

- **Mow (Flatten) the Cover Crop:** Mow the cover crop down (don't plough it) just before it produces seeds and plant through the bio-mass after having left it for 2 weeks on the soil to decay.
- If you prefer you could let your livestock graze on the cover crop and flatten it while they add urine and manure. Don't let them eat all of it because you want the soil to be covered.
- **Don't Till (Plough) the Soil:** Don't till the soil or plough in the bio-mass because then you will kill the fungi networks in the soil that feed the plants, destroy the soil structure, compact the soil, and loose the soil cover, among other harmful effects, such as the oxidization of organic matter, soil erosion, hot soil temperature, etc.
- Plant the tomatoes plants in the rows and leave the bio-mass on the soil. It will keep the soil covered and prevent weeds while providing food for the soil bacteria and fungi that will provide nutrients to the roots.

Planting into a terminated cover crop.

- Spray Bio-Plant on the planting rows (only) as you plant through the bio-mass. Mix 1 litre with 1,000 litres of water per hectare. 500 litres in 500 litres per acre. It is very beneficial to add the microbial life in Bio-Plant to the planting rows.

1c. Compost and Soil Preparation

- If you prefer you could make a lot of compost mixed with Bio-Plant and spread it over the planting rows. You will need about 2 months to make the compost and a minimum of 5 MT per hectare (2.5 MT per acre).
- **How to Make Compost:** See the file at ***Section 3.2*** called ***How to Make Rich Compost with Bio-Plant – Handouts***. Click here for how to make rich compost with Bio-Plant. Scroll down to ***Section 3.2.*** Soil preparation with a lot of compost made with Bio-Plant will be invaluable in increasing growth. Add compost to the planting rows and spread it generously. Add more compost monthly on Day 30 and Day 60. The minimum amount of compost per acre should be 2.5 MT.
- If you only intend to apply manure, then spray Bio-Plant onto the manure at the rate of 1 litre per 1,000 litres of water. Per acre this would be about 500 cc in 500 litres.

1d. Plant a Companion Crop (Intercrop)

- If you don't want to plant a cover crop in spite of the many benefits of doing so, intercrop the rows of tomatoes with a companion plant. You must have diversity of microbial life in the soil.
- Here is a list of crops that make good companions for tomatoes. Click here.

2. Seed Preparation

- See the video at *https://www.youtube.com/watch?v=ZuBv-OpZ-8s&feature=youtu.be*
- Put the seeds in a plastic bag with holes punched into it. Water should be able to enter through holes. Soak them for 4 hours.
- Take the plastic bag out of the water. Wrap it with a wet cloth. Then place the cloth with the plastic bag of seeds in direct sunlight for 12 hours, and then leave them overnight in a warm place for 12 hours.
- Soak the seeds in water that contains 20 cc of Bio-Plant and 20 cc of Pro-Plant per 20 litres. (The ratio is 10 cc per 10 litres of water.) If the amount of seeds is small, reduce the water to just a few litres, but do not reduce the amount of the bio-fertilizers.
- After 24 hours take the germinated seeds out and plant them in a seed potting soil tray where there is potting soil in each small section of the tray. Place one seed per small section or two seeds if the section is large. Then cover them over with more soil.
- If you do not have a tray with sections for the individual seeds, please them in a deep basket kind of tray. Put some newspaper on the bottom and cover the newspaper with potting soil. Use a stick and create a small ditch from one side of the tray to the other. Place the seeds in the ditch and then cover them over with the soil.
- Cover the soil with wet paper or a wet cloth. Leave them for about 5 days. Take off the cloth or paper cover. After about 9 days dip the seedlings one by one in water that contains 20 cc of Bio-Plant and 20 cc of Pro-Plant per 20 litres. (The ratio is 10 cc per 10 litres of water.). Then plant each sprouted seed in a large potting soil tray, which has large, individual sections for each seedling. Or, if you wish, plant each seedling in an individual black planting bag filled with potting soil. Let them grow for about 25 days before transplanting them to a field.
- Transfer the soaked seeds after 24 hours to a growing pot in a black plastic bag or a large tray and leave them to grow. After 22-25 days transplant them into furrows in a field.

3. Transplanting

- Tomato transplants should be hardened off before transplanting to the field. Hardening off is a technique used to slow plant growth prior to field setting so the plant can more successfully transition to the less favourable conditions in the field. This process involves decreasing water for a short period prior to taking the plants to the field.
- For maximum production, transplants should never have fruits, flowers or flower buds before transplanting. An ideal transplant is young (6 inches to 8 inches tall with a stem approximately ¼ inch to ⅜ inch in diameter), does not exhibit rapid vegetative growth, and is slightly hardened at transplanting time. Rapid growth following transplanting helps assure a well-established plant before fruit development.
- Set transplants as soon as possible after removing from containers or after pulling. If it is necessary to hold tomato plants for several days before transplanting them, keep them cool, and do not allow the roots to dry out prior to transplanting.
- As a guideline, plant tomato seedlings deep, so that a full 2/3 of the plant is underground. This has been shown to enhance plant growth and early fruit production and maturity.
- At transplanting, apply compost around the tomatoes because it is very important that soil moisture is maintained so that plant roots can become well-established.

A tomato transplant.

4. Spraying Pro-Plant

- Spray the plants with water that contains a ratio of 20 cc of Pro-Plant per 20 litres.
- For a hectare, mix 500 cc of Pro-Plant with 500 litres of water. For an acre, mix 250 cc of Pro-Plant with 250 litres of water. For half an acre, mix 125 cc of Pro-Plant with 125 litres of water. For 200 sq.m. mix 40 cc with 40 litres of water. For an area of 10 metres x 10 metres (100 sq.m.) mix 20 cc in 20 litres of water.
- Spray on the leaves before 9 AM when the pores are open most. Direct the spray diagonally upwards so that the spray hits the underside of the leaves as well because this is where the pores (stomata) are. Make sure that the spray is a very fine, misty, foggy kind of spray. Be thorough and generous when you spray.
- **70-Day Variety:** Spraying them every 7 days from when the leaves appear will give the best yield. Spray the short duration varieties every 7 days from Day 7.
- **110-Day Variety:** In the case of the longer duration varieties, spray them on Days 20, 30, 40, 50, 60, 70, 80, 90, and 100.
- The farmer can choose the frequency of spraying that suits him best. Spraying every 7 days will give a higher yield than every 10 days. If the farmer chooses to spray every 10 days, when the flowers appear, he should change to spraying every 7 days and continue spraying every 7 days.
- Make sure that the spray is a very fine, misty, foggy kind of spray. Be thorough and generous when you spray.

5. For Extra Yield - Applying Additional Bio-Plant

- Because tomatoes grow for up about 3 months, additional micro-organisms should be added to the soil around the plants, ideally once a month (every 30 days) on Day 30 and Day 60. Compost made with Bio-Plant would be very effective way to do this. Provide several kgs. per plant.
- If the farmer does not have any compost, he could apply Bio-Plant by spraying it mixed with water at the base of the plants.
- Do not spray Bio-Plant on the leaves as this will cause them to turn yellow.
    - Hectare: Spray 500 cc of Bio-Plant mixed with 500 litres of water, or better 1 litre of Bio-Plant mixed with 500-1,000 litres of water.
    - Acre: Spray 250 cc of Bio-Plant mixed with 250 litres of water. You could spray 500 cc in 500 litres of water in order to provide more micro-organisms.

6. Mulching

- It is important to mulch the soil between the tomato plants or to grow a legume crop there so as to suppress the growth of weeds.

Mulched tomato plants.

6.1 What is Mulching?

- Mulching is one of the most important ways to maintain healthy landscape plants and trees. A mulch is any material applied to the soil surface for protection or improvement of the area covered. Mulching is really Nature's idea. Nature produces large quantities of mulch all the time with fallen leaves, needles, twigs, pieces of bark, spent flower blossoms, fallen fruit and other organic material.

6.2 Benefits of Mulching

- When applied correctly, mulching has the following beneficial effects on plants and soil:
  - Mulches prevent loss of water from the soil by evaporation.
  - Mulches reduce the growth of weeds, when the mulch material itself is weed-free and applied deeply enough to prevent weed germination or to smother existing weeds.
  - Mulches keep the soil cooler in the summer and warmer in the winter, thus maintaining a more even soil temperature.
  - Mulches prevent soil splashing, which not only stops erosion but keeps soil-borne diseases from splashing up onto the plants.
  - Organic mulches can improve the soil structure. As the mulch decays, the material becomes topsoil. Decaying mulch also adds nutrients to the soil.
  - Mulches prevent crusting of the soil surface, thus improving the absorption and movement of water into the soil.
  - Mulches prevent the trunks of trees and shrubs from damage by lawn equipment.
  - Mulches help prevent soil compaction.
  - Mulches can add to the beauty of the landscape by providing a cover of uniform colour and interesting texture to the surface.
  - Mulched plants have more roots than plants that are not mulched, because mulched plants will produce additional roots in the mulch that surrounds them.

6.3 How to Apply Mulch

- Before applying any type of mulch to an area, it is best to weed the area. Spread a layer of mulching materials generously around the pumpkin plants. Keep mulch 2 to 3 inches away from the stems of the plants. This will prevent decay caused by wet mulch.

6.4 How Deep to Mulch

- The amount of mulch to apply depends on the texture and density of the mulch material. Many wood and bark mulches are composed of fine particles and should not be more than 2 to 3 inches deep. Excessive amounts of these fine-textured mulches can suffocate plant roots, resulting in yellowing of the leaves and poor growth.
- Coarse-textured mulches, such as straw, allow good air movement through them and can be as deep as 4 inches. A depth of 4 inches will stop weeds growing.
- Mulches composed of shredded leaves should never be deeper than 2 inches because they tend to mat together when wet, thereby restricting the water and air supply to the plant roots.