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

Note: It's tempting to rush ahead, plough the soil, and plant a monoculture of cotton. 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 a higher yield and without disease.

1. Compost and Soil Preparation

1.1 Plant a Cover Crop

- 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 carrots.
- **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 cotton saplings 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.

Cotton growing in the residue of a black oats cover crop.

Additional Information

- See the file called ***How to Make Rich Compost with Bio-Plant – Handouts*** for how to make rich compost with Bio-Plant. **Click here** for the file.
- Soil preparation with a lot of compost made with Bio-Plant will be invaluable in increasing growth. Add compost to the planting holes and spread it generously around each tree after planting. Add more compost around each tree monthly.
- If you cannot make any compost, read the file ***How to Prepare the Soil with and Without Compost***. **Click here.**

2. Seed Preparation

- Put the seeds in a plastic bag; or in a cloth or sack and tie up the ends so that the seeds cannot escape. Water should be able to enter through holes. Soak them for 18-24 hours (no longer) in water that contains 20 cc of Bio-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. *The amount of Bio-Plant can be increased to 100 cc for a better effect.*
- If you are going to plant the seeds directly in a field, then plant them in furrows. If the field has not been prepared with bio-compost made with Bio-Plant, then place compost in the furrows and place the seeds in groups of 3 in the compost. They will germinate in 7-14 days.
- If you wish to plant seedlings in the field, then transfer the soaked seeds after 24 hours to a growing pot in black poly bags or a large tray and leave them to grow. After 32-35 days transplant them into furrows in a field.

Planting cotton seeds in furrows in a field.

3. 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 cotton plants with a companion plant. You must have diversity of microbial life in the soil.
- Cotton gets along well with many herbs including basil, cilantro, mint, dill, and sage. It makes a good pairing with onions and garlic which may help with repelling the boll weevil. It's also a good companion for sunflower.
- Avoid growing cotton with potato.

4. Spraying Pro-Plant

- Spray the leaves of the cotton plants. Spray before 9 a.m. when the pores are open most for better results. Please spray Pro-Plant using spraying equipment that gives a fine, misty spray, and that the spray is directed diagonally upwards as well as downwards so that it hits the pores of the leaves underneath as well as lands on the leaves. Be generous when you spray a tree. You do not have to spray every leaf. Spray 20 cc of Pro-Plant in 20 litres of water.
- For a hectare, mix 500 cc of Pro-Plant with 500 litres of water.
- Cotton (135-140 days): Spray on Days 30, 40, 50, 60, 70, 80, 90, 100, 110, 120 and every 10 days until 10 days before harvest. Spraying every 10 days will give a higher yield than every 15 or 30 days. If you wish to keep costs low, spray Pro-Plant every 15 days from Day 15 after planting.
- About two months after planting, flower buds called squares appear on the cotton plants. In another three weeks, the blossoms open. Their petals change from creamy cotton bolls to

yellow, then pink and finally, dark red. When the flowers start to appear spray every 10-15 days until the bolls are open. There is no need to spray anymore when the bolls crack open and the fluffy white cotton is exposed.

- If there is disease, mix 5 cc - 10 cc of Bio-Plant with 20 cc of Pro-Plant per 20 litres of water. 10 cc is in the case of serious disease. Cut off the affected leaves before spraying.
- If the farmer wishes to spray pesticides, spray them at least 3 days before or after spraying either bio-fertilizer. We encourage farmers not to use chemical sprays, though.

A Cotton Flower.

A Closed and an Open Cotton Boll.

- About 40-50% of the flowers and bolls are shed due to boll worm attack or due to nutritional stress. Hence there is need to supplement the plant with proper micronutrients to produce more flowers and to retain them on the plant to develop into bolls for final harvesting.
- The optimal growth stages in cotton for foliar-applied Potassium is during the flowering and the period of boll growth starting soon after flowering, with the optimum stage occurring three weeks after the first flower.
- The farmer can choose the frequency of spraying that suits him best. If the farmer chooses to spray every 30 days, then when the flowers appear, he should change to spraying every 10-15 days and continue spraying every 10-15 days until the bolls are open. Spraying the bolls every 10 days would increase the yield more though as the bolls will benefit from the high supply of nutrients. In short, the more nutrient applications, the better.
- Make sure that the spray is a very fine, misty, foggy kind of spray. Be thorough and generous when you spray.

A Cotton Field Ready for Harvest.

5. Spraying Additional Bio-Plant

- Because cotton grows for nearly 5 months, additional micro-organisms should be added to the soil, ideally once a month (every 30 days) on Day 30, Day 60, Day 90, and Day 120. Compost made with Bio-Plant would be an effective way to do this. Apply around 10 kgs per cotton plant.

- If the farmer prefers, he could to apply Bio-Plant by spraying it mixed with water at the base of the plants. Do not spray on the leaves as they will 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 per hectare.
  - 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 cotton plants or to grow a legume crop there so as to suppress the growth of weeds.

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 cotton 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.