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### How to Grow Coffee with Bio-Plant and Pro-Plant

#### 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 coffee 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.



*Coffee trees benefitting from a cover crop.*



*A coffee plantation before and after having a cover crop planted.*

- 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.

## 1.2 Preparing Compost

- 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.
- As a guideline, you will need 2.5 MT to 4 MT of compost per acre. Ideally, 4 MT if the soil is poor, which is the norm. Use 0.5 litres of Bio-Plant in 2.5 MT of compost. Use 0.75 – 1 litre if you make 4 MT of compost. The more compost you use, especially in the beginning, the better in order to get the soil's microbial life multiplying well.
- If you cannot make any compost, read the file *How to Prepare the Soil with and Without Compost*. [Click here](#).

## 2. Preparing the Seeds

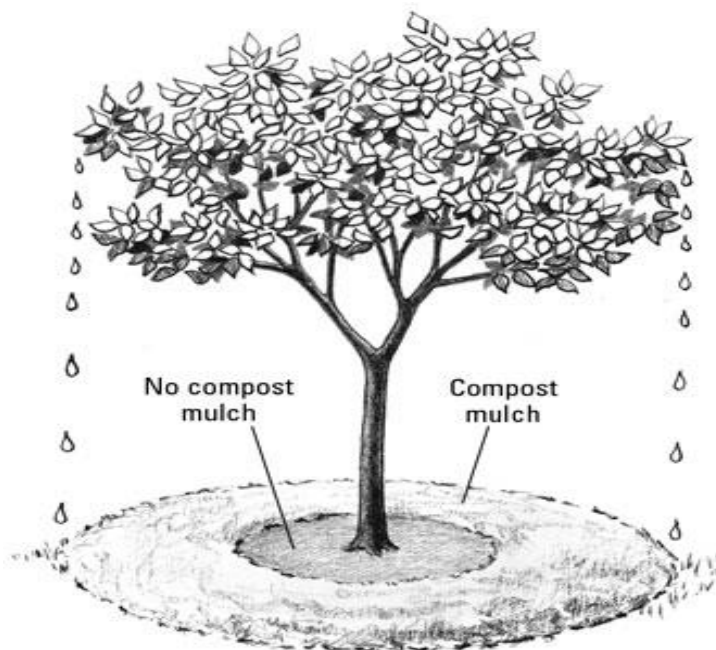
- See the file *How to Prepare Seeds with Bio-Plant*. [Click here](#). Coffee plant seeds will benefit from soaking in water mixed with Bio-Plant. Place the seeds in potting soil or sand. Leaves will appear after about 2 months.
- Then plant 2 seeds in each plastic bag filled with a compost mixture. Leave them to grow for 5-6 months to form 2 branches before planting them in the farm.

## 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 coffee trees 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 coffee trees. [Click here](#) and [here](#).

#### 4. Applying Additional Bio-Plant During the Growth of the Trees

- The key to high-quality coffee and bumper harvest from every stem is to nourish the crop through application of manure and timely weeding. When coffee is well fed, the stems do not shed leaves even in dry season, providing cover for the seeds and ensuring they are of high quality.
- Make sure that you place plenty of compost in the planting hole; on top of the top soil, which should be placed at the bottom of the hole under the compost. The soil, which was at the bottom of the hole should be placed on top of the compost. More compost can be placed on top.
- Once a month place 5-10 kgs around trees which are already growing - a minimum of 5 kgs per tree, if the trees are under 1 metre high, and about 10 kgs around trees over 1 metre in height. But 10 kgs can be applied to trees under 1 meter in height as well. Place 15 kgs, if the soil is very poor or there is a problem with disease.
- If you do not have any bio-compost, pile up leaves around the base of the tree and spray the soil once a month with a mixture of 100 cc of Bio-Plant in 100 litres of water. Pour about 2 litres of the water at the base of each tree where the roots are. *(See the diagram on the next page.)* Apply this mixture once a month. The Bio-Plant provides extra nutrients by dissolving the leaves. We recommend this because often chemical fertilizers have been used for so long that the micro-organisms in the soil have mostly been killed off, and there is a lack of minor minerals. The farmers need to try to restore the soil as quickly as possible.
- The fallen leaves could be raked into a circle around the tree up to the distance shown in the diagram, and the Bio-Plant could be sprayed on the leaves to help them break down. Bio-Plant's micro-organisms will then have organic matter to multiply in. The farmer should do this once a month, and it is a good idea to continue to do this even after flowering.



#### **Applying Additional Bio-Plant During the Flowering Stage of the Trees**

- When the buds and flowers start to appear, add more compost made with Bio-Plant around the trees regularly, such as every two weeks. If the compost was not made with Bio-Plant spray it every two weeks with Bio-Plant mixed with water at the ratio of 100 cc of Bio-Plant in 100 litres of water. If there is no organic matter around the tree spray about 2 litres of the mixture around each tree once every 2 weeks once. Cover the sprayed bare soil with mulch.
- Continue to do this every two weeks throughout the flowering and fruiting stages.

## 5. Spraying Pro-Plant

- Spray the coffee trees every 14 days once the leaves have appeared in the nursery. For a hectare, mix 500 cc of Pro-Plant with 500 litres of water.
- **Amount of Pro-Plant:** For a hectare, mix 500 cc of Pro-Plant with 500 litres of water before the flowers and coffee cherries appear, and 750 cc if the flowers or coffee cherries have appeared. For an acre, mix 250 cc of Pro-Plant with 250 litres of water before the coffee cherries appear and 375 cc if the flowers or coffee cherries have appeared. If you are going to spray at the ratio of 35 cc per 20 litres, add an extra 250 cc of Pro-Plant per hectare and 125 cc per acre.
- In Year 1 and Year 2 before the first buds appear, you could spray once every month because the plants are obtaining nutrients through microbial action from the compost. But when the buds start to appear and when the flowers and coffee cherries are on the trees, spray the whole tree with no less than 30 cc and no more than 35 cc per 20 litres of water every 2 weeks; or just once a month, if you wish to reduce your costs. Every 2 weeks will provide more nutrients and increase the size of the coffee cherries, but your costs will be higher.
- If you wish to reduce your costs in Years 1 and 2 by spraying Pro-Plant every 2 months, consider spraying it every 2 weeks in the last 32 weeks before the harvest. After the flowers blossom there are 32 weeks until harvest. This is an important period for spraying Pro-Plant on the flowers and cherries.
- Spray at the ratio of 20 cc of Pro-Plant per 20 litres of water. Spray the leaves and the flowers or coffee cherries. Continue spraying until 7-14 days before the coffee cherries are harvested.
- **Very Important Note:** Please spray Pro-Plant using spraying equipment that gives a fine, misty spray, and that the spray is directed diagonally upwards so that it hits the pores of the leaves underneath as well as lands on the leaves. Spray the leaves well and ideally before 9 a.m. when the leaf pores are open most.

## 6. Mulching

- It is important to mulch the soil between the coffee trees 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 coffee trees. Keep mulch 2 to 3 inches away from the stems of the plants and trees. This will prevent decay caused by wet mulch.
- Newly planted trees require a circle of mulch 3 to 4 feet in diameter. Maintain this for at least three years. Do not pile mulch against the trunk.
- In the case of established coffee trees try to apply the mulch from close to the trunk of the trees to at least 6 to 12 inches beyond the drip-line of the tree. Because the root system can extend 2-3 times the crown spread of the tree, mulch as large an area as possible.

### **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.