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

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

1. 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 yams.
- **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 yams 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.

1.2 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).
- 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.**
- 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.

2. Planting Yam Mini-Sets

- Use the mini-set method created by the IITA (www.iita.org). After cutting the mini-sets leave them to dry for 24 hours.
- Soak the cut sets in Bio-Plant (20 cc in 20 litres of water) for 10 minutes before planting them in a nursery in soil for germination, which has been mixed with Bio-Plant and water.
- You can also dip them in wood ash for more protection before planting.
- Experiment with soaking the cut yam mini-sets in water mixed with Bio-Plant (20 cc in 20 litres of water) for 2 days and 2 nights. Then leave them in the shade to dry for 24 hours. The Bio-Plant will provide protection and help the yam to sprout roots.

Mini-setts planted to germinate.

Transplant pre-sprouted mini-setts after 1 month into the field. Plant at a spacing of 25cm on ridges. Plant at a depth of 5-7cm below the soil. Place some compost in each planting hole, if the soil on the ridge has not been mixed with compost.

3. Applying Pro-Plant

- Spray the leaves 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.

- Spray Pro-Plant (20 cc in 20 litres of water) on the leaves after 7-14 days of them appearing, ideally every 7 days at the beginning so that the yams become well established, and then every 14 days from then onwards. You do not have to spray every leaf.
- For a hectare, mix 500 cc of Pro-Plant with 500 litres of water.
- Yams (90-120 days): Spray on Days 10, 20, 30, 40, 50, 60, 70, 80 until 10 days before you harvest. Spray every 7 days once the flowers appear.
- 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.
- The yams will continue to grow in size throughout the growing season, but will reach maturity when there are large spots of yellowing on the leaves. The vines and leaves will eventually die off as the yams reach full mature. The yams will not increase greatly in size the final month before the vines and leaves die away, so there is quite a bit of latitude for when the yams can be harvested. Ideally, stop spraying Pro-Plant a month before the signs of maturity start.

A trellis increases the yield and makes it easy to spray Pro-Plant.

4. Mulching and Adding Bio-Plant

- **Mulch the soil** around the yams or use one of the other methods in section **5.** below to control weeds. Dry coconut fronds, corn stalks, rice straw and other similar materials may be used as mulch. If rice straw or similar material, which rots readily is used, add bio-compost once every 30 days around each yam vine.
- Mulch should be made thick (about 10 cms) so that it will not rot completely within four or five months. Further to protecting the soil from excessive loose of moisture, mulching tends to add some nutrient to the soil from the decaying materials used.

Mulched yam plants.

- Extra Bio-Plant should be added every 30 days either by spraying it on the mulch or, even better, by placing bio-compost around the base of the yam plant.
- If the farmer uses drip-feed pipes, the Bio-Plant could be fed through the pipes. It is better to spray Pro-Plant because it coats the leaves with micro-organisms, which protect the yams from fungal diseases.

5. How to Control Weeds

- **Mulch Yam Fields With Dead Plant Foliage:** Mulching increases crop yield, Nitrogen, and reduces weeds significantly. It involves covering the soil surface with very large amounts of plant foliage, such as rice straw.
- It improves the soil's properties and reduces weed problems.
- Good sources of mulch materials are foliage from leguminous plants, rice straw or husks, coffee hull, and crop and weed residues. Maize stubble is usable, but it takes a long time to rot.

A mulched yam field. No weed problems.

- **Use Cover Crops as Live Mulch on Seedbeds:** You can use food crops such as egusi melon as cover crops, and/or plant intercrops (such as maize) to reduce weed infestation in yams farms. Egusi melon is a good "live mulch" in yams farms. If you decide to use egusi melon as live mulch you should plant it before planting the yams. The egusi melon should be planted very closely spaced on the seed beds to enable it to spread and cover the soil very quickly.

- **Plant Yams in Association with Other Crops:** You can also reduce weed problems by inter-cropping yams with other crops at planting. Crops commonly intercropped with yams are maize, rice, grain legumes, and vegetables. It is helpful to intercrop yams with grain legumes such as cowpea and groundnuts, which manufacture and release nutrients into the soil. You must have diversity of microbial life in the soil. Yams + cowpea gives a higher yield than yams + groundnuts, and a greater reduction of weeds.