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

1. Soil Preparation

1.1 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 holes and spread it generously around each tree after planting. Add more compost around each tree monthly.
- If you do not make compost, refer to the file at ***Section 3.7*** called: ***How to Prepare the Soil with and Without Compost***. Scroll down to ***Section 3.7.*** **Click here**.
- Soil preparation with a lot of compost made with Bio-Plant will be invaluable in increasing growth and plant health. The soil must be soft so that the roots can spread out and form potatoes.
- Plant the potatoes in trenches. Each trench should be about 30 inches apart.
- Dig trenches about 12 inches deep for your seed potatoes. Add a thick layer of compost in each trench and plant the seed potatoes into this compost. Cover the seed potatoes with about 4 inches of soil. As the potatoes grow you will cover them with a further 4 inches of the remaining soil so that the potatoes are never exposed to the sun.
- Do not fertilize with fresh manure, as this can cause scab disease.
- If you want to grow potatoes no-till without disturbing the soil at all, watch Charles Downing's video as well as the others. Click here.

1.2 Preparing the Soil with a Cover Crop

- One of the best ways to prepare the ground for potatoes is to grow a cover crop before planting. Cover crops or "green manures" greatly improve the soil's tilth, organic matter, microbial activity, and water holding capacity, and significantly increases nutrient availability for the next crop.
- Legume cover crops (peas, beans, vetches, clovers, alfalfas, etc.) have the unique ability to extract Nitrogen from the air and return huge amounts of it to the soil in plant-available form. Rye, buckwheat and sweet clover mine insoluble phosphorus from the earth and return it in plant-available form. In most areas, a cover crop which contains cowpeas (for Nitrogen) and buckwheat (for phosphorus), will provide an easy and cost-effective way to prepare the ground for potatoes.
- If you plant a cover crop before you plant the potatoes (or vegetables) wait for 2-4 weeks after turning under your cover crop, to allow time for it to break down in the soil. It would be beneficial to spray the cover crop with Bio-Plant in the usual dosage of 20 cc in 20 litres of water just before ploughing it into the soil in order to increase the microbial life of the soil and to speed up the decomposition of the turned over cover crop.

1.3 In the Case of Libya

- If potatoes are grown in large 50-hectare, circular fields and water is applied via large sprinkler arms, and compost is not used, do the following:
  - Adjust the soil's pH, such as with Calcium Hydroxide. Soil bacteria need a pH of 6.0-6.5.
  - Spray 4 litres mixed with 4,000 litres of water over the 50 hectares.
  - Leave the fields for 2 weeks for the micro-organisms to grow before planting the seed potatoes.

- But for a much better result, plant a legume cover crop to increase the soil's nutrients, Nitrogen, and soil food web. Plough in the cover crop just before the cover crop's seeds appear. Then spray Bio-Plant mixed with water as above. Wait 2-4 weeks for the crop residue to break down and then plant the seed potatoes.

2. Prepare the Seed Potatoes

- Lay out your seed potatoes in a single layer on the floor, on a planting tray or on flats and expose them to indirect sunlight. If you have a large amount, the trays can be stacked on racks or similar, as long as there is good ventilation and equal light. Let the potatoes sit in that warm environment for a week or two, until the eyes start to sprout. The sprouts will start to green up and you should let them grow to at least 1/2 inch (13 mm) long before planting.

Potatoes in flats being greened ready for planting.

- Short, stout, green sprouts are reasonably tough and can be handled without being broken. If the potatoes have started sprouting in the dark they will likely be too long for good greening. It is best to rub them off and let them sprout again under the correct conditions. Long sprouts are much more delicate and are easily broken off during handling and planting.

3. Cutting Seed Potatoes

- You do not need to cut potatoes before planting. But, if the seed potato is very big and has several eyes, cut it into small pieces, each with an eye, to make the potato go further. If you plant a large potato, you will get multiple smaller potatoes. If you plant a small potato with an eye, you will get large potatoes. Make sure that they have enough time before planting for the cut surfaces to harden. The cut pieces should be left to dry out for 2-4 days before planting. Provided that each piece has an eye or two for the new growth to develop, the cut potatoes will grow well.

4. Apply an Organic Fungicide

- If you wish to apply a fungicide to the cut area before you plant the cut piece of potato, dip it in an organic fungicide.
- You could dip the cut area into wood ash to protect it. Leave the potatoes afterwards for a day with the ash on them before planting.
- Sulfur in powdered form is often applied to cut potatoes to hasten healing. Apply it to the cut area and allow it to dry for 3-4 days.
- The best way to apply the wood ash or the Sulphur is to apply it right after the cuts are made while they are still damp so that the ash or powder will stick.

5. Planting the Potatoes

- Once the trench is dug, line the trench with compost and place the seed potatoes on the compost.
- Place the seed potatoes in the trench with the suckers (eyes) facing up. It is important that the suckers face up.
- Space your potatoes in the trench about 12 inches apart, if you want to produce high yield with large potatoes. If you want to produce small-sized potatoes space the seed potatoes about 6-8 inches apart.

- If you add field peas (6-7 per foot) among the cut potatoes, you will increase the growth because the peas will add mycorrhizal fungi to the soil, and the potatoes will receive more nutrients.

6. Spraying Pro-Plant

- *Shake the bottle vigorously before opening it.* Pour it into a suitably-sized container and mix it with water according to the amounts below. Turn on the water tap so that the water pours into the container very rapidly.
- For one hectare spray 500 cc of Pro-Plant mixed with 500 litres of water onto the leaves before 9 a.m.
- **In the case of Libya**, if potatoes are grown in large 50-hectare, circular fields and water is applied via large sprinkler arms, and compost is not used, have two 5,000-litre tanks next to each other. One is filled up while the other tank feeds water to the sprinklers. Or use a 25,000-litre tank for each 50-hectare field. A 5,000-litre tank will need 5 litres of Pro-Plant. One litre of Pro-Plant can be mixed with 1,000 litres of water.
- Spray on Days 10, 20, 30, 40, 50, 60, 70, 80 until 10 days before you harvest. Alternatively spray every 10 to 15 days, but spray every 7-10 days once the flowers appear after about 60 days.
- Wait 7-10 days after the leaves have appeared before starting the spraying.

7. Hilling the Potato Plants

- Once you have placed your seed potatoes in the ground cover them with soil, and continue covering the plants in each trench with a few inches of soil as the stem emerges and grows.
- Once the plants have grown the full height of the trench let them grow up to be about 8 inches tall, and then hill a mound of soil all around the plant almost covering it again. Let it grow another 8 inches and then hill again with a hoe. Sprinkle more compost on the top of the soil around the plants each time you hill the potatoes to ensure proper nutrients. The larger the hills and the looser the soil, the better the crop will be.

Hilled potatoes.

- Hilling helps to support the green stems as they grow taller. Also, if the potatoes get exposed to the sun for long, they will turn green, and eating green potatoes will make you ill.
- Never hill potatoes that have started to bloom. Once a potato plant has started to flower, the tender suckers that produce new potatoes are developing. Hoeing around the plants to form a hill could sever these tender suckers killing all of your new potatoes.

- Potatoes need a steady supply of moisture in order to develop into good sound vegetables. Good moisture combined with good nutrition will produce the best potatoes around. Keep up the hard work until the blossoms die on the plants and then you can harvest your potatoes.

8. Mulching

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

Straw mulch around potato plants.

8.1 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.

8.2 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.

8.3 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 potato plants. Keep mulch 2 to 3 inches away from the stems of the potato plants. This will prevent decay caused by wet mulch.

8.4 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.

9. For Extra Yield - Applying Additional Bio-Plant

- Because potatoes grow over 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.

10. Harvesting Potatoes

- **Harvesting New Potatoes:** After 60 days or so, the plants will flower and little tubers will begin to form. You can harvest new potatoes usually about two to three weeks after the plants flower.
- **Harvesting the Main Crop:** In order to get larger potatoes, leave the potatoes until the vines naturally wither or until the tubers have reached the desired size. Allow the tubers to remain in the soil at least two weeks after the vines have died back. Do not water plants during this period. This provides time for the skins to "set," which increases storage life. Dig deeply and at a distance of up to 18 inches from the plant to locate all the tubers.