Artemis & Angel Co. Ltd.
99/296 President Park, Sukhumvit 24, Klongtoey,
Bangkok 10110, Thailand
Tel.: (President) +66-86-329-6038; (Sales): +66-993377866
E-mail: artemisandangelcoltd@gmail.com **Website:** www.artemisthai.com

How to Grow Flowers with the Bio-fertilizers

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

1. Soil Preparation

1.1 Plant a Cover Crop

- If you cannot make any compost perhaps the best way to prepare the soil is to plant a multi-species (5+ species) cover crop that includes legumes and grasses, such as cucumbers, 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 flowers.
- **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 flowers 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.

Terminating a crimson clover 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 Preparation

- **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 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.

2. Planting the Flowers

- John Jeavons, in his groundbreaking book *Grow More Vegetables: Than You Ever Thought Possible*, outlines an intensive approach to gardening revolving around close plant spacing. His discovery was that most plants only need a small amount of space to thrive. The key is planting on a grid versus side-by-side rows. A secondary bonus to increasing the amount of plants grown in a small space is that as they fill in their foliage canopy covers the soils surface and blocks out weeds.

- Someone who applied the guidelines with great success has written: "We quickly realized that we could double; possibly even triple our production by adopting this new method of growing. It took a bit of trial and error to figure out exactly how close each variety could be planted without diminishing production or inviting in disease. We finally settled on what worked the very best and simplified things by creating just six separate spacing regimes: 6" ×6", 8"×12", 9"×9", 12"×12" and 18"×18", with the 9"×9" spacing being our most popular."

- If you are not able to plant an entire bed with only one variety, be sure to plant varieties with the same spacing requirements, and roughly the same amount of days to flower in the same bed.

- 6” x 6” spacing = 7 rows per bed
- 9” x 9” spacing = 5 rows per bed
- 12” x 12” spacing = 4 rows per bed
- 18” x 18” spacing = 3 rows per bed
- For vines: 8” between plants and 12” between rows = 2 rows per bed, one on each side of the trellis

3. Compost the Soil

- To start, put down a thick layer (3”-4”) of compost across the top of each bed, making sure to spread it out as evenly as possible.
- Till the compost into the soil and lay down irrigation lines. If the soil is sandy, put down four lines of drip, a foot apart. If you have clay soil, you could probably get away with only two or three.
- In the case of raised beds that are not covered in landscape fabric, mulch the new plantings thickly with straw, shredded leaves or grass clipping to help retain moisture and suppress weeds.

4. Preparing the Seeds

- You might like to refer to the file ***How to Prepare Seeds with Bio-Plant***. Click here. The following section comes from there and describes an effective way to soak seeds with Bio-Plant. Don't use GMO seeds. Why? Because you won't get a high enough Brix level in the plants and this means that insect pests will see the plants as food.

4.1 The Common Approach to Soaking Flower Seeds

- If you are soaking a lot of seeds, put the seeds in a container with water. Soak them for up to 12 hours or overnight in warm water mixed with Bio-Plant. The container of water only needs to cover the seeds by 2 inches. Place a cloth over the top to increase the warmth during the soaking. Keep the seeds in a warm place out of direct sunlight. Soaking them will speed up germination in the soil.
- Soak the seeds 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. It does not have to be exactly 20 cc of Bio-Plant and more than this is fine, so do not worry.

Seed Planting Tray with Sections.

- After soaking, plant the seeds as soon as possible in a seed potting soil tray where there is potting soil in each small section of the tray. Usually, you would place one seed per small hole or two seeds if the hole is large, but you can easily space 20 seeds in the same 1.5 to 2-inch hole. Cover them over with more soil and water them.

Flat Tray with Ditches

- If you do not have a tray with holes for the individual seeds, place them in a flat tray. Put some newspaper on the bottom and cover the newspaper with potting soil. Use a stick and create a small ditch about 0.5 cms. deep from one side of the tray to the other. Place the seeds in the ditch and then cover them over with a little soil.
- It is beneficial to spray the potting soil before use with water mixed with Bio-Plant (at a ratio of 20 cc of Bio-Plant in 20 litres of water).
- Cover the soil with wet paper or a wet cloth. Leave them for about 5 days until the seedling has penetrated the surface, grown 2-3 inches, and formed some good roots, and will soon be too large for its growing space. Then plant each sprouted seedling in an individual pot or black plastic planting bag.
- Once your seedlings have several leaves you will need to move them to a larger pot to give them more room to grow, especially if you placed many in the same potting hole section. Let the plant grow and become sturdy and leafy before transplanting it into composted furrows in a field.

Seeds, which have germinated.

5. Plant a Companion Crop (Intercrop)

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

6. Applying Pro-Plant

- Spray the flowers well with a fine, misty spray and ideally before 9 a.m. when the leaf pores are open most. Spray the leaves, buds, and flowers.
- Spray Pro-Plant every 7-10 days. The productivity increases with more Pro-Plant, but so do the costs. Spraying every 7 days is better for the yield than every 10 days or 14 days, for example. But you could experiment. Spray the flowers every 7 days. Continue until a week before the flowers are picked.
- For an area of about 100 square metres (10 m x 10 m), spray the flowers every 7 days with water that contains 20 cc of Pro-Plant per 20 litres on Day 1 and Day 8. Double the dose for an area of 200 square metres.

- Spray Pro-Plant 125 cc mixed with 125 cc of water for a half acre. For an acre spray Pro-Plant 250 cc mixed with 250 litres of water. For a hectare, mix 500 cc of Pro-Plant and 250 cc of Bio-Plant with 500 litres of water.
- **Roses:** Spray roses on Day 30, 34, 50, 60, and every 10 days until about Day 130. To reduce costs, spray the roses every 15 days from Day 30.

7. Mulching

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

7.1 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.

7.2 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.

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

7.4 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.

8. Hydroponics

- Spray Pro-Plant on the leaves of the plants every 7 days. Mix 20 cc of Pro-Plant in 20 litres of water. For an acre spray 250 cc in 250 litres of water. Spraying on the leaves is more effective than mixing Pro-Plant in the water which the plants are placed in. There is no need for Bio-Plant unless the plants get fungus. Then add 5 cc to each 20 cc of water used for the roots.

9. The Benefits for Flower Growers

a) The flowers look fresher. The colours tend to be brighter than chemical flowers. There is more of a shine on the leaves that you get with chemical flowers.
b) Increased bloom set and size of flowers.
c) The overall quality of the flowers is better than with chemical fertilizers and sprays.
d) The flowers stay fresher longer after being picked.
e) The flowers can be marketed as “100% organic” or “Grown without Chemicals”.
f) The growers do not have to use chemical sprays to prevent disease as Pro-Plant coats the flowers with micro-organisms that protect the plants while Bio-Plant strengthens the immune system. As a result, the customers can smell the flowers without having to worry about inhaling chemicals.
g) The soil’s condition improves with each crop. It becomes crumblier and softer.
h) Bushy flowers, such as bougainvillea bushes, produce many more branches and flowers.
i) A rose grower in Multan, Pakistan reported that his rose crop had increased by 100%. He had been applying chemical fertilizers for several years, and his soil was probably very weak because of over-use of chemicals. When he used the bio-fertilizer on roses, the roses were fresher-looking and smelled nicer. The rose bushes grew more densely, and some of the stems appeared much thicker than the rest of the stems grown with chemicals. The height of the plants increased as well. Flower growers in North Thailand report the benefits outlined above.