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GENERAL EXTENSION INFORMATION ON TOMATO DISEASE

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<< EXTENSION INFORMATION ON TOMATO DISEASE >>

Because of the ease of contracting diseases, growing tomatoes is one of the most complex activities in horticulture.

Although a wide range of agrochemicals and pesticides are available to farmers, they are not sufficient to eradicate the major diseases or even prevent them, resulting into terrible chemical contamination by pesticides, for the product, people and the environment.

It is known that bacterium *Ralstonia solanacearum* is the cause of bacterial wilt in tomato and agent harmful to more than 200 plant species.

There are reports that this bacterium is present and can initiate the infection in layers of up to 1 meter in depth of the soil.

Therefore, in the soil, the bacterium is completely protected from the action of pesticides and, then, for being a microorganism difficult to reach, the search for an integrated preventive control becomes necessary.

In the case of bacterial wilt, its control is very difficult after its manifestation in the field. Therefore, one should always consider adopting integrated control, based on the observation of several preventive and complementary control measures.

No single measure is sufficient to avoid crop losses when environmental conditions are favorable to the disease.

This because the bacterium has the capacity to remain and reproduce in the soil for many years and, therefore, to make the cultivation of *solanaceous* species (such as the tomato) unfeasible in lands that were or have been infested for a long time.

Other pathogens can also cause symptoms of wilt and vascular browning similar to those of bacterial wilt, such as *Fusarium oxysporum f. sp. lycopersici and Verticillium spp.*

Finding areas with low *Ralstonia* infestation in the soil and the combination of different techniques is essential to reduce the effect of the disease. "

It is suggested: Soil solarization (for two to three months, although it does not eliminate the bacterium, it significantly reduces its population in soil), tolerant cultivars, crop rotation, grafting and also Composting (ideal: broiler litter base in mixture with

biopesticides), since it was established that the contribution of organic matter in the soil is able to reduce the negative effect of the bacterium through the increase of the microorganisms present in the soil that compete with the bacterium, making its reproduction difficult.

Crop rotation (grasses are most efficient) is a highly recommended practice and is effective for all soil-related diseases.

In planting a species not susceptible to bacterial wilt, there is a reduction or even elimination of the pathogen in the field, which can be cultivated again with tomatoes after two or three years of rotation. This, however, if the area is not heavily contaminated.

In heavily contaminated areas, the period can be much longer, depending on several factors, such as: crop used in the rotation, removal of susceptible weeds and stump, well managed irrigation, machinery and vehicle movement, terrain slope and soil characteristics (clayey soils favor the disease).

A very important control measure, but usually neglected by farmers and of great effect on the development of bacterial wilt epidemics, is the control of the movement of people, machines and implements within the crop. Once the outbreaks of the disease are perceived, movement in these foci should be avoided as much as possible.

For example, all harvesting, spraying, weeding operations, etc. should be done in the disease-free areas, going, then, to the areas where the outbreaks of the disease are located and never the contrary.

If few diseased plants appear in the crop, it is recommended that they be carefully removed, placed in large plastic bags (garbage bags), and removed from the crop, thus avoiding to spread contaminated soil to other plants.

The sick plants should be burned or buried away from the beds. If buried, let them be in deep pits (more than 1 meter), after being covered, if possible, by a thin layer of quicklime.

A cal layer can also be carefully placed on the site of the pulled out plant to avoid contamination of neighboring plants still healthy

<<COMPOSTING AND BIOFERTILIZANTS COMPLEMENTS>>

<<COMPOSTING>>

A Composting as a scientifically proven and approved social and environmental technology consists in creating conditions and disposing in an appropriate place, the natural raw materials, rich in organic nutrients and minerals, especially the carbon and nitrogen (C / N) ratio favorable to the development of agricultural plants and crops. This favorable C/N ratio should be around 30/1, i.e, for each part manure (N-nitrogen host), 30 parts of straw (C-carbon host) should be present. Therefore, the greater the diversity of natural materials for the preparation of the compound is, the better the quality of the final product in nutritional terms, in its physical and chemical aspects. However, when such in natura raw material is taken to some place to be decomposed, but there, it is heaped in any way and/or anywhere, then there is a false composting. Composting becomes false, because lack of care in management cause the raw material to become insufficiently decomposed, or semi-decomposed, as it is randomly subject to the weather. In this state, it can cause the irretrievable loss of its fertile elements through the solubilization and leaching of the soluble nutrients. In addition, with poor management, this semi-decomposed raw material can also cause serious environmental impacts, such as:

1)-Contamination of surface waters and groundwaters through the transport of mineral and organic particles from the host soil;

2)-Supporting of the development of harmful insect and rodent populations as well as undesirable microorganisms that will consume the available nutrients in organic matter, reducing nutrient reserves for plants, weakening them. Example of diseases caused by the mismanagement of composting: coffee wilt disease, the wilt bacteria (Erwinia tracheiphila pathogen) and cassava mosaic, besides others.

Therefore, since the organic compost resulting from composting has the advantage of being an inexpensive and ecologically correct natural fertilizer, which is very easy to obtain, these findings (rodents and diseases) and also the difficulty of obtaining them contradict the main objectives of composting, which are:

1)-Replace chemical fertilizers with economic, social and environmental advantages;

2)-Reduce the amount of wastes produced in agricultural production;

3) Reduce environmental pollution.

Conditions necessary for the realização of the correct compostings: The place chosen to do the composting should:

1)-To be of easy access;

2)-To be close to the place the strawy material is stored, which will be used in great quantity;

3)-To be close to a water source, since the material will be wetted as the layers are placed and also when the material will be revolved, which will happen several times during the composting process;

4)-To be in a place with suave slope (up to 5%), to facilitate preparation and handling of the compost pile, but allowing drainage of rainwater.

Atention: Lowland places, susceptible to flooding, should be avoided. The compost can be made in the open field, in beaten ground, being cemented floor unnecessary, but the ideal is under the top of a shady tree.

Material suitable for the composting process: All plant debris from crops, orchards (leaves, flowers, fruits and their barks), animal manures in general (except of dogs and cats) forage banks, grass trimmings, fruits and leaves of the natural and native flora, small branches (small branches, twigs), wood fuel stove ashes.

Important. Materials that should not be used to do composting are as follows:

1)-Eucalyptus. Eucalyptus is the only plant strictly prohibited from being added to composting, including its leaves. Therefore, do not use eucalyptus derivatives (leaves, branches, barks and roots) under any circumstances;

2)-Thick branches, bulky tree bark, wood treated with pesticides against termites or varnished, glass, metal, oil, paint, leather, plastic. On the other hand, residues as whole stems also delay decomposition, because they retain little moisture and have a smaller contact surface with the microorganisms.

The presence of seeds of invading weeds, pests, pathogens and heavy metals, which adversely affect agricultural production, are also considered undesirable agents. But, the pathogens and seeds of invading weeds will be able to be eliminated through the complete composting process, conducted correctly.

The mounting of the heaps must obey the following sequence:

1)-Distribute a layer of material of plant origin on the soil 15 cm high and 1.5 meters broad or so, the length may vary according to the amount of material to be composted;

2)-Distribute a layer (10 cm or so) of animal manure over this first plant layer;

3)-If there is available wood fule stove, spray a thin layer of these ashes over the entire first layer of animal manure;

4)-Repeat this construction, layer by layer, successively, until the available materials are exhausted;

5)-The height of the heap is free, but it is recommended that it be enough to be handled easily;

6)-Damp the entire heap with a watering can and from top to bottom. The amount of water should be sufficient for the water to flow off in small quantity, at the base of the heap itself;

7)-Cover the ready heap with dry straw or even a plastic canvas to keep moisture and composting temperature constant;

8)-Thoroughly stir the entire heap every two days and, after revolving, moisten it again, repeating step 6;

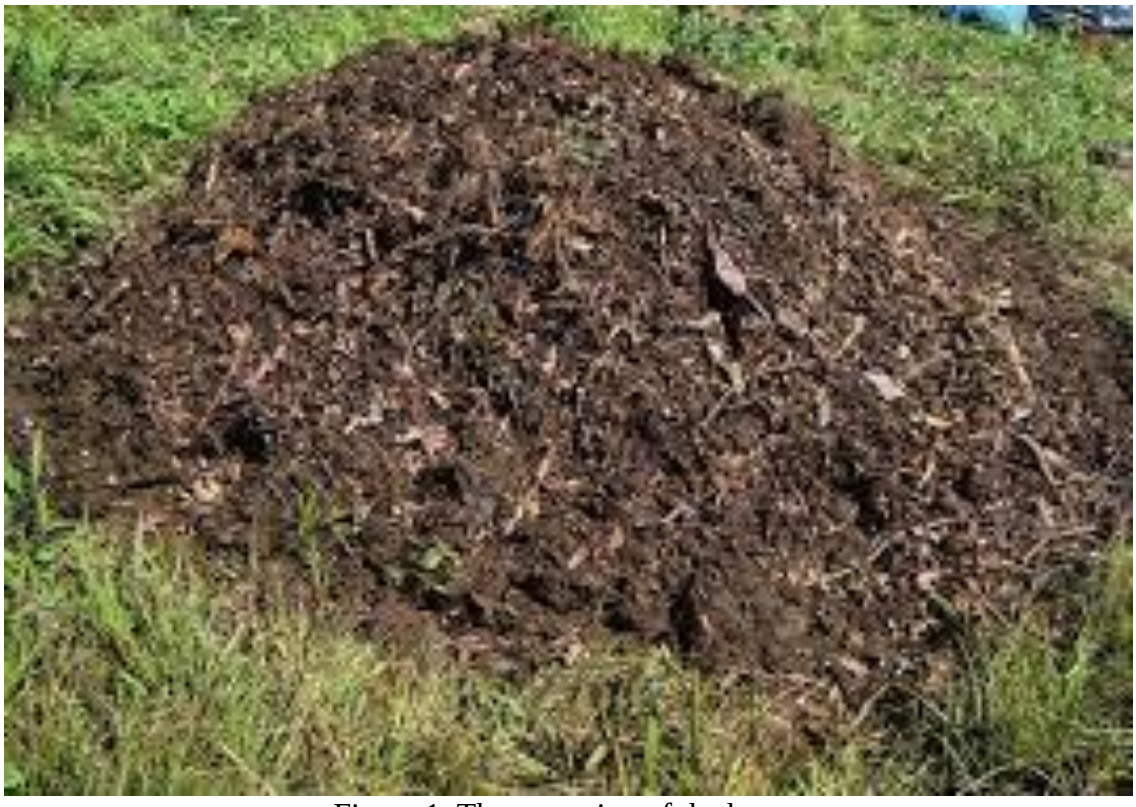


Figure 1. The mounting of the heaps

Time of composting: The time for decomposition of organic matter depends on several factors. The greater the control of temperature and moisture conditions the faster the process will be. If the nutrient requirements of the heap or small cultivated plot are satisfactory, the added materials of small sizes, the adequate moisture maintained and the heap revolved every week, the compound will be stabilized within 30 to 60 days and cured between 90 to 120 days. After this period, it will be ready to be used. It is noticed that the compound is ready when there is no loss of water, it is dark in color, it is loose and it smells of earth. When rubbing the compound between the hands, they do not become dirty.

Moisture: One of the ways to check the moisture content is to tighten the compound with your hands: if it has a suitable concentration of water (60%), we may feel the moisture and aggregation of the material.

Temperature: It is desirable for it to vary from 60 °C to 70 °C in the first 25 days of composting and then naturally the temperature decreases. The temperature and moisture can be controlled with a building iron bar inserted into the heap. This should be withdrawn daily, observing when withdrawn if:

1)-It is hot and wet, so there is no need to wet the compost heap;

2)–In case it is dry, you should wet the heap very well until water appears underneath.

<<Biofertilizants>>

About Toxicity: Biofertilizer, in principle, has indeed a very low toxicity to persons and anaimals and environment. Even, it is advised not to let it come into contact with the mouth, nose, ear and eyes. Then, as a precaution, all contact of the product with the skin should be washed with clean water.

Cares mainly with children is recommended as a priority, when biofertilizers are being obtained, handled and applied. Grown-ups who are handling biofertilizers, even not having evident contact, should wash their hands, arms all the face with clean water after handlings.

There being contact with any part of the body, one should wash this part of the body with clean water.

Attention: These recommendations are only zealous. Biofertilizer, in principle, has very low toxicity indeed. Biofertilizer can be used in all and any crop, but the utilization of Biofertilizers should be controlled to avoid excesses. Even having a number of advantages in its use, the excess Biofertilizer may cause chemical, physical and biological.

Imbalance, making the soil unfit for the cropping of certain species in the same way as chemical fertilizers. The spraying of Biofertilizer should be done always after waterings or rains or in the freshest times of the day. Both the frequency and time of fertilization obey the calendar of each species.

Recommendations: Biofertilizers can be utilized for the direct leaf applications (sprays) on fruit-bearing trees (proportion of 1 L to 20 L of water), vegetables (250 mL to 20L of water) or bean, corn and cassava (500 mL to 20 L de water) and all the other crops, as well as pastures.

These applications can be repeated weekly till the second month of growth of the crops. From the third month on, five applications every 15 days are recommended. Leaf applications during the blooms of the plants are not recommended. Applications before the blooms and after the fecundation are recommended, the application being permitted on the growing fruits. When sprayed directly on the leaves of the vegetables or on the fruits to be collected soon (almost ripe), one should wait at least 45 days for human consumption of these raw products. Even so, before consuming, it is recommended to wash the vegetables and fruits with solution 2% of vinegar in drinking water. The products fresh –cut with boils, roasted, cooked or others are safer.

Fertirrigation: To apply the Biofertilizer directly onto soil, diluted in clean water (2L to 20L of water).

Directly on soil in the form of Fertirrigation, the Biofertilizer also confers excellent growth on plants. and also wash the products before they are consumed.

Biofertilizer without animal manure

If Biofertilizer is obtained only with plant products, in other words, without the use of animal manure, the raw plant products will be able to be consumed after the seven-day waiting period, after being washed with running clean water. But the ideal is for them to be washed with 2% solution of vinegar before being consumed. If it is not possible to use vinegar, then plant products should be very well washed in drinking water. Then in the case of doubts or distrust of the farmer, for vegetables of immediate consumption, only Fertirrigation is recommended.

The solid part of the Biofertilizer, that is, the material which remains retained in the sieve after filtering for the liquid use in the field, also is an excellent source of organic matter and nutrients which can be applied in soil.

Attention: In the pastures, a seven –day waiting period is recommended for the resident animals to return to graze in the place of the application.

The seeds will also be to be treated with the pure Biofertilizer before planting, soaking for 20 minutes into pure syrup. Soon, next, one should wait for them to dry and, then, they are planted.

At last, it is known that the single applications are not be done, since losses of nutrients can occur through leaching, erosion. The application even before collection is recommended, for the plant gets used to the food and when this is lacking it can become sick.

Biopesticides

During the production of biofertilizers, adding plants known as natural pesticides so gets biopesticides.

Exemples*: Ricinus communis L; Tithonia diversifolia; Tagetes patula L*;

But, remember that what distinct the medicine from the poison is the dose of the dilution.

Recipe for obtaining biofertilizers

Ingredients

In approximately 200 liters of clean water, add:

1) 20 liters of fresh manure of animal origin;

1.1) Preferably of goats, cattle, rabbits and horses (less recommended) in which animals have not received antibiotics recently.

1.2) It is recommended that the manure of chickens and pigs (less recommended) be used only after they have passed through a composting process;

1.3) Under no circumstances add manure of dogs and cats;

2) Green leaves of native plants, except of eucalyptus (any quantity);

2.1) If possible, enrich the green portion with leaves of chopped banana trees, sugar cane, bamboo and cassava.

3) Native and non-native fruits, preferably mature, fallen or not, may also be added, recommended to cut them into pieces (approximately 5 kg).

4) Flowers of plants of any species that fell to the ground and that can be swept in good quantities (Eliminate earth, branches and stones.

5) Wood burning ash (about 4 liters).

Preparation

6) Put all the ingredients in a barrel placed in a protected, fresh and dry location.

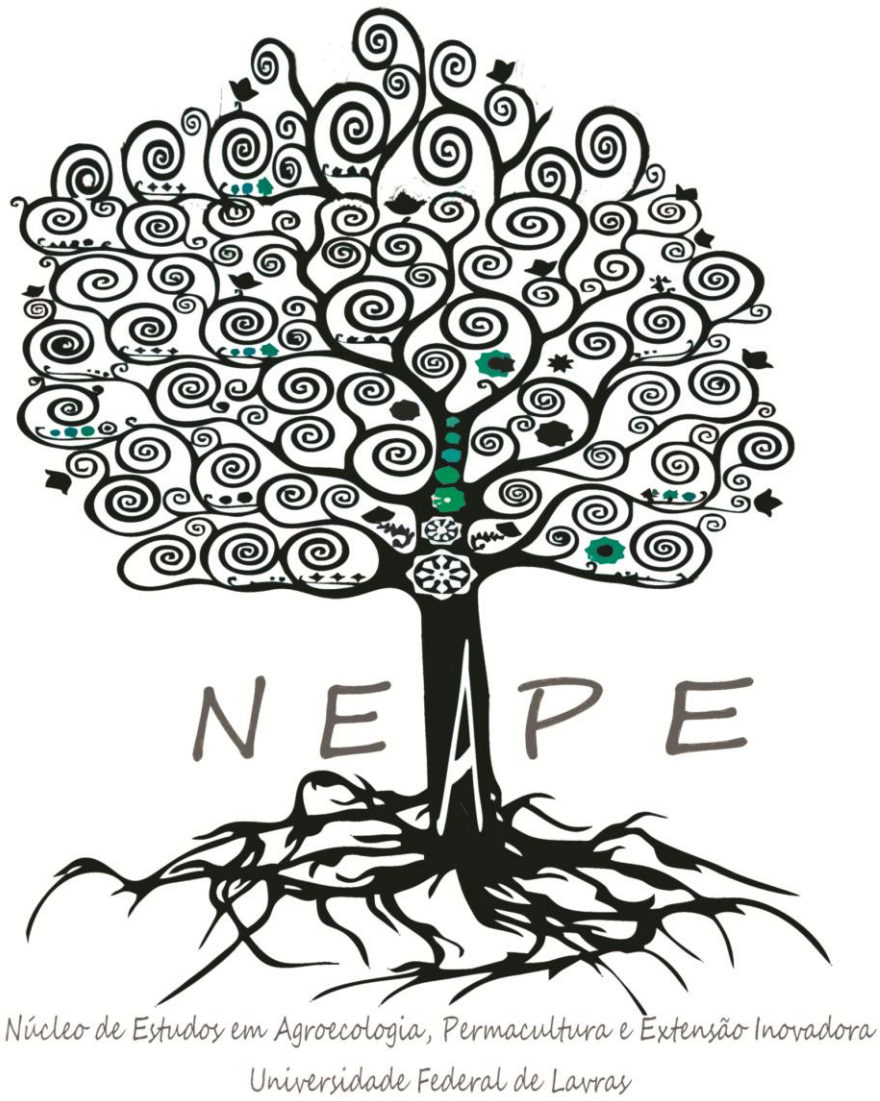
Stir well with a stick. As the fermentation will be aerobic, the cap can be very simple.

6.1) Let ferment for 30 days, stirring the mixture every 24 hours;

7) After thirty days of fermentation, leach it using a common fabric and then split it in containers.

8) The containers should be stored in protected, cool places, sheltered from the sun and rains. That way they can be kept for about a year.

Figure 2. Barrel to produce biofertilizer



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