

Control of Plant Diseases in Organic Cropping on the Nature Island, Dominica

ABSTRACT

The purpose of this project is to explore plant disease in local organic cropping and the methods used for the control of these infections. I had the opportunity to visit with area producers and speak with local representatives of several agricultural organizations. I learned that bacterial, fungal, and viral infections are common problems for organic farmers in Dominica. The techniques used for the control of these diseases include botanical treatment, crop rotation, composting, water management, and pest control.

INTRODUCTION

While visiting with Odile Valmond, organic farm manager at South Chiltern Estate, it was made very clear that the objective of any farm operation is to grow the highest quantity of goods, as efficiently as possible. In order for agricultural systems to produce at their maximum utility, it is necessary that plants and their soils stay healthy. The way crops are grown and maintained can influence whether disease develops and how severe it becomes. Conventional farming methods eliminate the presence of pathogens in fruits and vegetables with the use of commercial fertilizers, fungicides, bactericides, and pesticides. The implementation of these agricultural chemicals can have devastating ecological consequences, however. In addition, farmers in developing countries often find these chemical inputs to be expensive and economically unbalanced (Evans, 32). To minimize the negative effects created by synthetic additives, many Dominican farmers implement more sustainable, organic cultivation practices.

ORGANIC FARMS

In order for produce in Dominica to be labeled "organic," it must first be certified by the UK Soil Association. Certification builds trust between producers and consumers by setting standards for organic production. There are only two such farms in Dominica- one is located in Bellevue Chopin and the other at South Chiltern Estates. Most subsistence farms, however, practice uncertified organics (Valmond).

CROPS AND THEIR ASSOCIATED DISEASES

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|----------------------|--|
| Tomato | <i>Powdery mildew</i> (fungus) **Lack of fruit on mature plant |
| Banana | <i>Leaf spot disease</i> (fungus) <i>Crown rotting</i> (fungus) |
| Passion Fruit | **Skin discoloration; no harm to meat of fruit |
| Lettuce | <i>Soft rot</i> (bacteria) <i>Leaf spot</i> (fungus) |
| Cilantro | <i>Soft rot</i> (bacteria) |
| Tannia | <i>Burning disease</i> (fungus) |

** Indicates unknown

BOTANICAL TREATMENT

| | |
|-----------------|--|
| Bacteria | <i>General: garlic, neem, phyton</i> |
| Fungus | <i>Leaf spot: vegetable oil, citrus oil, copper, sulfur, paraffin</i> <i>Powdery mildew: papaya, tumeric</i> <i>Burning disease: benlate dip</i> <i>General: basil, garlic, gleriecidie, neem, phyton</i> |
| Vectors | <i>General: chilies, ginger, garlic, neem</i> |

The leaves, seeds, and unripe fruit of the above plants may all be used as components of the treatment solution. Their extractions or dehydrated tissues are diluted with water and soap is generally added as an emulsifier and adherent. The mixture is applied to crops using a mist blower. Plants should be treated every seven to fourteen days.

CROP ROTATION

Crop rotation is used to avoid soil born diseases by breaking the pattern of land use. Plant specific pathogens that remain in the soil after harvest are thus unable to develop in the alternative crop. By introducing leguminous plants into the crop rotation cycle, the soil's nutrients can also be replenished (Valmond).

FERTILIZATION

Fertilizers protect crops against infection by putting nutrient rich organic material back into the soil. The use of *tea manure* is common among organic farmers in Dominica. This mixture is made by encasing pig, chicken, rabbit, goat, or cow manure, and gleriecidie, a high protein, leguminous plant, in a breathable sack. The bag is then inserted into a fifty-gallon drum and diluted with water. This organic *tea* is left to brew in the sun, covered, for

three months. The solution is then applied directly to the soil (Raymond).

COMPOSTING

Composting fertilizes soil and provides ground cover to crops. This is important to the health of plants because moisture is retained in the soil and erosion is minimized. Popular composting materials include sugarcane and bay leaf (important for the control of insects.) Both plants are used for the manufacture of rum in Dominica. After the cane juice and bay oils have been extracted from the plants, the remaining pulp is placed around the base of crops (Clarke). Ash and woodchips are similarly applied. The South Chiltern Estate farm has recently integrated plastic mulch into their growing system of pineapples and pepper plants. The plastic sheeting solarizes the soil creating an arid environment, unsuitable to pathogens. Also it minimizes the number one problem facing organic farmers in Dominica: weeds.

WATER MANAGEMENT

Water management is important because most pathogenic fungi, bacteria, and nematodes require moisture in order to infect the plant (Tigiano, 313). Water log is a common problem in the mountain valleys of Dominica. Contoured ditches are often built around small plots to decrease the amount of standing water. Again, composting and mulch is important because it reduces the erosion of nutrient rich topsoil on mountainside farms. While it is rare for plants to receive too little rainfall on this island, drip irrigation provide these crops with water (Valmond).

PEST CONTROL

Pests can act as reservoirs for virus and other plant pathogens. Whitefly, nematodes, thrips, aphids, and mites are common disease carrying vectors in Dominica. Just as botanical extracts can be used to manage plant disease, many also contain pest-controlling properties. Fruit bunches on banana trees are covered with blue plastic that has been treated with a pepper and garlic solution (Clarke). Common commercial organic insecticides are made from neem. If neem seeds are not dried properly, however, they can be highly toxic to humans (Valmond). Other plant-based solutions include soursop, chilies, ginger, gleriecidie, and paw paw. Pheromone traps and biological control are also important pest controlling strategies.

CONCLUSION

While most subsistence farmers on the island practice uncertified organics only two farms are certified. Therefore, the incidence of plant pathogens in the organic cropping systems of Dominica appear relatively arbitrary considering the scale on which organic farmers produce. In addition, because the primary management of diseases incorporate preventative techniques, their detection is typically indicative of a failed crop. While more extensive use of organics is important to the conservation of Dominica's pristine environment, fertility, certification expenses, and weed control problems are considerable barriers for the expansion of organic farming techniques in Dominica (Robin). Further research on these three agricultural dilemmas would provide valuable information for the development of sustainable cultivation practices on the island. Also, the information for this report was gathered primarily using a survey approach. With proper equipment, (a compound microscope, tools for culture isolation, and gram test materials, for example) pathogenic diagnostics could be explored more extensively.

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