



## GUAM ENABLED GARDENING: ADAPTIVE GARDENING SERIES Pest Management

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In the U.S. today, gardening is considered a favorite outdoor activity, right alongside golfing and jogging. Approximately 75% of U.S. households, whether novice or experienced, participate in some type of gardening activity.

However, gardening is not only a recreational hobby. It can also help one's physical and mental well-being, regardless of age. For instance, people affected by health conditions that limit mobility can benefit from increased physical activity. Furthermore, through the activity of nurturing plants to bear vegetables, fruits or flowers, one can experience the product of the effort. Also, decreased stress and an increased sense of well-being are reported as other benefits of gardening activities.

Nevertheless, there are barriers for those who experience physical and mental limitations. For example, people who experience arthritis may be challenged due to joint pain from bending or stooping to tend to the garden. An enabled garden allows an individual with specific challenges to participate. This series of fact sheets explain gardening methods, technique adaptations, and how to create enabled gardens specific to Guam.\*

Some plant pests can cause severe damage and death if not detected and treated early. Common places to inspect for pests are the underside of leaves and new growth. Plants should be checked for feeding damage, as well. Feeding damage can be caused by beetles, caterpillars, and slugs. Furthermore, certain plants are vulnerable to specific insects and plant diseases, especially plants in the same family, such as those in the melon family (i.e., Cucurbits) or tomato family (i.e., Solanaceae).

The first steps in pest management are monitoring the garden frequently (Figure 1) and identifying plant pests and natural enemies, such as praying mantises (Figure 2), parasitic wasps, and specific lady beetles (Figure 3). A gardener who knows what pests attack each crop will find it easier to prevent or intervene quickly when problems appear. For assistance with pest management, contact a Cooperative Extension & Outreach Agriculture Extension Professional at 735-2080.

\* The references used for the Introduction of each fact sheet in the Guam Enabled Gardening: Adaptive Gardening Series is listed in the Bibliography of Site Selection.



Fig. 1 - Inspecting for pests.



Fig. 2 - Praying mantis (Photo: Washington State University Extension)



Fig. 3 - Ladybeetle larva eating aphid. (Photo: University of Maryland Extension)

These are the main types of plant pests:

- **Common insect pests:**
  - Beetles (**Figure 4 and 5**)



**Fig. 4 - Adult Philippine ladybeetle on tomato plant.**



**Fig. 5 - Philippine ladybeetle larvae.** (Photo: Linda Usita)

- Caterpillars
- Aphids (**Figure 6**)



**Fig. 6 - Aphids on citrus.** (Photo: Steven James Flores Guevarra)

- Scales
- Thrips
- Whitefly (**Figure 7**)



**Fig. 7 - Spiraling whiteflies on backside of leaf.** (Photo: Flickr Creative Commons)

- Mealybug (**Figure 8**)



**Fig. 8 - Mealybugs on underside of eggplant leaf.**

- Mites
- Leafminers (**Figure 9**)



**Fig. 9 - Leaf miner on eggplant** (Photo: Dara Renee Sailler)

- **Common animal (vertebrate) pests:**
  - Pigs
  - Chickens
  - Deer
  - Cats
  - Dogs
  - Mollusks
  - Slugs and snails (e.g., Giant African Snail) **(Figure 10)**



**Fig. 10 - Slug feeding on eggplant leaves.**

- Most active at night.
- Usually tear holes in the leaves, fruit, and stem of plants.
- Can feed on entire seedlings.
- **Some common weed pests:**
  - Broadleaf **(Figure 11)**
  - Grasses **(Figure 12)**
  - Sedges **(Figure 13)**



**Fig. 11 - Broadleaf weed (Beggar's tick, Guam daisy)**



**Fig. 12 - Crabgrass** (Photo: University of Maryland Extension)



**Fig. 13 - Yellow nutsedge** (Photo: University of Maryland Extension)

- **Common plant pathogenic diseases are caused by:**
  - Fungi **(Figures 14 and 15)**
  - Bacteria
  - Viruses **(Figures 16 and 17)**
  - Nematodes



**Fig. 14-15 - Anthracnose on pepper leaf (left) and on pepper fruit (right).** (Photo: Flickr Creative Commons)



Fig. 16 - Papaya Ring Spot Virus (PRSV) on papaya leaves.



Fig. 17 - PRSV on papaya fruit (Photo: University of Hawaii College of Agriculture and Human Resources)

Proper identification of plant pests and natural enemies is part of a strategy called Integrated Pest Management (IPM). The goal of IPM is to keep pest populations to an acceptable or manageable level. IPM uses a variety of strategies. With IPM, pesticides are used after other practices have been implemented. Some of the practices used in IPM include:

- **Biological control:** Use of natural enemies to reduce pest populations. (Figures 1 and 2)
- **Cultural control:** Modify environment or condition of plants in order to prevent pests.
  - Use resistant varieties, if available, to prevent or reduce certain fungal diseases and root-knot nematodes.
  - **Sanitation:** Remove diseased shoots, leaves, and fruit on plants and on the ground. Destroy plants or plant parts that may harbor pests.

- Maintain healthy plants by minimizing plant stress and making plants less susceptible to pests.
- **Crop rotation:** Do not continuously grow the same vegetables in the same place, year after year. Alternate plants from different plant families to reduce pest population. For example, grow beans, then a different plant family, such as tomatoes, cucumbers, or green onions. (Figure 18)

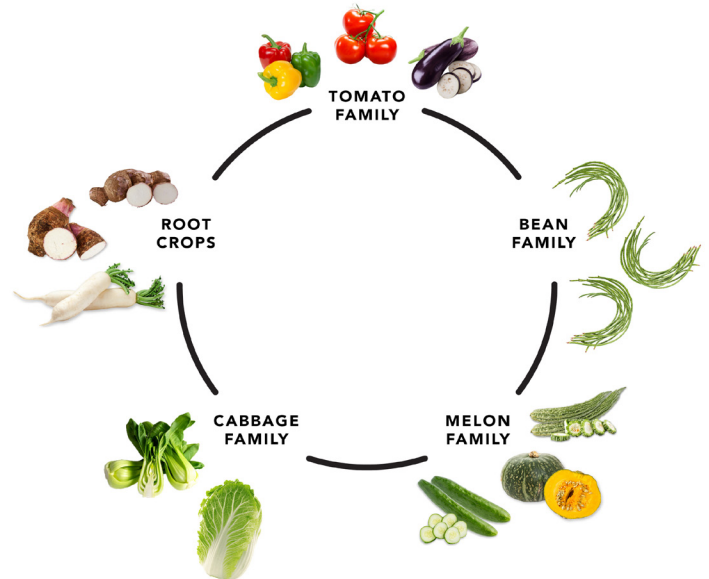


Fig. 18 - Crop rotation.

- **Weed control:** Diseases and insects can accumulate on weeds and spread pests. They compete with garden plants for sunlight and nutrients.
- **Spacing:** Increase to improve air movement between plants and reduce plant diseases.
- **Sanitation:** Remove dead plants, plant debris, and fallen fruit to prevent spread of pests.

- **Pesticides (Figure 19):**
  - Pests should be properly identified before choosing a pesticide.
  - Follow labeled instructions. Note pests and plant restrictions.



Fig. 19 - Insecticide

**Glossary:**

**Natural enemies** - specific organisms that suppress pests and their damage.

**Pathogenic** - infectious, can spread from plant to plant.

**Vertebrate pest** - pest that has a backbone.

**Weed pest** - any plant that is growing out of place or is undesirable.

Table: Some common crops grown on Guam with associated pests and diseases

Pests and Diseases	Crops
Aphids	Cucumbers, melons, tomatoes, eggplants, okra, citrus (e.g., calamansi), tomatoes, beans, spinach, banana
Thrips	Onions, tomatoes, eggplants, peppers
Leafminers	Crucifers (e.g., Chinese cabbage), melons, cucumbers, squash
Whitefly	Melons (e.g., cantaloupe, watermelon), eggplants, tomatoes, cucumbers
Mealybug	Eggplants, papaya
Mollusks and Other Animal Pests	Melons, cucumbers, squash, eggplants, tomatoes, peppers
Cucumber Mosaic Virus	Carrots, cucumbers, eggplants, melons (e.g., muskmelon, watermelon), onions, peppers, potato (sweet), tomatoes, squash
Root-Knot Nematode	Bittermelon, banana, bok choy, crucifers (e.g., radish), melons, carrots, cucumbers, eggplants, okra, onions, squash, basil
Powdery Mildew	Leafy lettuce, cucumbers, melons (e.g., watermelon), squash
Anthracnose (Fungus)	Beans, banana, potato (sweet), peppers, tomatoes, melons, papaya, guava, mango, eggplants, citrus (e.g., calamansi)

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