

# Taro in American Samoa

## Pests and Diseases of American Samoa

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#### Introduction

- American Samoan families eat most of the taro they produce; the rest is sold in markets or stands, prepared for major social events (*fa'alavelave*) or given as gifts.
- In 1989 taro covered 1,240 acres and 619,000 lb. were brought to the central market; taro is not exported.
- In 1993 786,000 lb. were sold; sales declined to 11,000 lb. in 1995 due to taro leaf blight disease.
- Production is increasing because of leaf blight disease resistant taro cultivars from Micronesia and Palau (Fig. 1).
- Before taro leaf blight disease, taro sold for \$.50/lb; when it returned to the market in 1998, it sold for \$2.25/lb.



Fig. 1. Dry land cultivation of blight resistant taro from Palau.

#### Production Regions

Taro is grown on all islands in the Territory, mainly by the “dry land” method (Fig. 1). “Wetland” taro is grown on Aunu'u and the outer islands of Ofu, Olosega and Ta'u; the taro fields are not flooded, however, as in other countries (see Cultural Practices).

#### Taro Classification and Anatomy

Taro is a member of the plant family Araceae, which includes anthurium, philodendron, caladium and pothos. Three taros are commonly grown in American Samoa: *Alocasia* (giant taro), *Xanthosoma* and *Colocasia*. The latter is the favored eating taro. The taro plant is a collection of long-stemmed, heart-shaped leaves growing from a swollen underground stem, or corm. Leaf stems, or petioles, emerge from the top of the corm at ground level and vary in length from 1-5 feet. The corm is a food storage organ similar in function to the yam or potato. It is eaten baked in a traditional rock oven (*umu*) or boiled. Taro reproduces by forming suckers or runners, both called *lauvai* in Samoan (Fig. 2).

#### General Cultural Practices

Taro is grown in more than 65 countries worldwide and is one of the oldest crops. As a subsistence crop, it is an important source of carbohydrate in the diet of many developing countries. Young,

cooked taro leaves (*lu'au*) are the only ‘greens’ regularly eaten by some Samoans. In American Samoa, taro is part of the culture with more than 20 local varieties, including *Niue*, *Manu'a*, *Pa'epa'e*, *Pula Sama Sama*, *Fa'ele'ele* and *Tusi Tusi*. These cultivars, however, are susceptible to taro leaf blight and severely damaged during weather conditions that favor the disease.

Taro is often interplanted among banana, giant taro, coconut or forest trees and on level ground or steep slopes. Land is usually cleared with a bush knife. New plants are generally obtained from family or neighbors. Planting areas expand rapidly as most taro varieties form *lauvai*, which are replanted along with the tops from harvested corms (*tiapula*). A pointed wooden pole or metal bar (*oso*) is used to make a hole 6-8 inches deep, a *tiapula* is inserted and a small amount of soil tamped around its base. Some farmers apply coconut or banana leaves as mulch but most weed control is done by hand. Fertilizer and pesticides are not usually used. When plants mature in 6-9 months, corms and outer leaves are removed. The remaining leaf stems are cut approximately 12-16 inches above the removed corms and these *tiapula* are either allowed to dry for a few days or replanted immediately.



Fig. 2. *Lauvai* (runners) growing from resistant taro cultivar.

In many fields, taro is continuously cultivated unless pests, diseases, or poor yields force temporary abandonment of the site. Dry land taro is not irrigated in American Samoa and wetland taro is not flooded. The taro fields of Aunu'u Island, for example, were once below the high water table but years of accumulated vegetation have created a deep, spongy mat into which *tiapula* are planted. Deep trenches around and through the fields keep them from flooding. The resulting taro is prized by the Samoans for its taste and texture.

#### Pests and Diseases

The most common pests and diseases of taro in American Samoa are weeds, armyworms, planthoppers, taro leaf blight, and

root and corm rot. Chemicals are not generally used against taro pests and diseases.

**Weeds.** The competitive ability of weeds makes them a problem in taro production. The problem, however, is greatly reduced after 3-4 months when large taro leaves shade the soil. Weed species affect agriculture throughout the Pacific Islands. One of the most important weeds affecting taro production is purple nutsedge, *Cyperus rotundus*. Weed control includes hand clearing, mulching and crop canopy management. The use of herbicides is increasing.

**Armyworm.** Many American Samoan farmers list armyworm (*Spodoptera litura*) as the main taro insect pest. Outbreaks are sporadic and vary in location and intensity. A female moth lays 200-300 eggs in a cluster on a leaf; eggs hatch in 4-8 days. Larvae feed side-by-side on the leaf (Fig. 3) and within a few days, only the skeleton-like leaf veins may remain.



Fig. 3. Armyworm larvae feeding on surface of a taro leaf.

**Cultural Control.** Most taro growers smash armyworms with their hands when infestations are light. Heavily infested leaves are removed and burned.

**Biological Control.** Some armyworm eggs are killed by predatory wasps in American Samoa. Traditional methods are also used, including planting purple *Coleus blumei* around the taro field. Some believe the *Coleus* plant emits an odor that repels the adult moth.

**Taro Planthopper.** The female planthopper (*Tarophagus proserpina*) cuts slits in taro stems and lays two eggs in each slit. There are two adult forms, short- and long-winged; the latter is most common during cool weather, plant senescence or over-population. Long-distance spread is by the long-winged form and by planting *tiapula* with planthopper eggs in the stems. Two serious taro virus diseases are transmitted by the planthopper but have yet to be identified in the Samoas.

**Cultural Control.** Planting insect-free *tiapula* in clean fields can delay the onset of an attack. Some farmers torch the insects with smoldering bundles of coconut leaves to burn them or drive them from the field.

**Biological Control.** The mirid bug, *Cyrtorhinus fulvis*, is effective in controlling planthoppers in Hawai'i, Guam and Ponape. It is present on taro in American Samoa and may be responsible for the low incidence and severity of planthopper infestations. Our research has shown a typical example of biological control: an increase in planthoppers was followed by an increase in mirid bugs, followed by a decrease in planthoppers and a decrease in mirid bugs. *Coleus* is planted by some farmers to discourage planthoppers.

**Taro leaf blight.** Taro leaf blight disease hit the Samoas in 1993-1994. All Samoan taro cultivars are susceptible to the fungus, *Phytophthora colocasiae*, and crops were devastated. *P. colocasiae* is a "water mold", most damaging in cool, wet weather when wind-driven rains spread its spores from leaf to leaf and plant to plant (Fig. 4). Spores either germinate directly and penetrate the plant leaf, or swim in a film of water on the leaf surface before penetration. Of all integrated control practices, only resistant taro varieties have been effective in American Samoa.

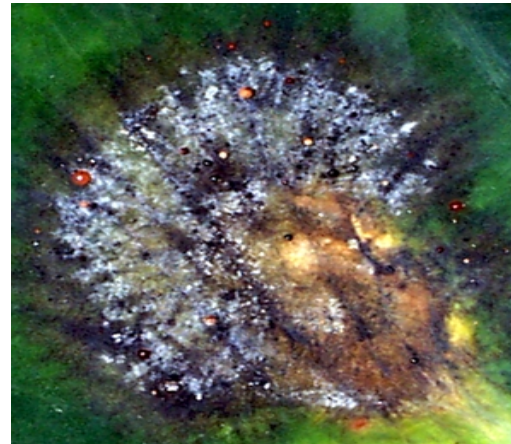


Fig. 4. Infection with whitish spores and orange exudate.

**Cultural Control.** Removing infected plant parts or whole plants from the field is a possible measure if used early or during mild infections. During moderate to severe outbreaks, however, removing infected leaves reduces yield even more effectively than leaves lost to the disease.

**Biological Control.** In 1997, 13 taro cultivars resistant to leaf blight were sent to American Samoa from the University of Hawai'i. The local Department of Agriculture in cooperation with American Samoa Community College Land Grant Program distributed thousands of these plants to farmers. Twenty resistant cultivars were originally collected from the Republic of Palau and numbered for testing. Due to continued use, the cultivars are still known in American Samoa by their numbers. Popular cultivars include P1, P5, P10, P16 and P20.

**Root and Corm Rot.** Species of the fungus *Pythium* are probably best known as "damping-off" fungi. They attack seedlings in nurseries and in the field. Taro root and corm rots caused by *Pythium* species, however, are major diseases throughout the Pacific region.

**Cultural Control.** The best control is to exclude *Pythium* by planting disease-free *tiapula* in disease-free fields. Once the fungus is established in the soil, it is difficult and expensive to control and almost impossible to eradicate.

**Biological Control.** No taro is immune to *Pythium* rots but a few show resistance, including the Samoan varieties *Tusi Tusi*, *Talo Vale*, *Pute Mu* and *Pula Sama Sama*. These varieties, however, are susceptible to taro leaf blight and are not a root rot control option in American Samoa at this time.

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