Crop Profile for Pineapples in Northern Mariana Islands

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General Production Information

A commercially viable variety of pineapple was recently established in Tinian as a new cash crop. In 1998, the CNMI Government and the Northern Marianas College imported 3000 pineapple crowns from Hawaii for distribution to local farms for multiplication as planting stock, because of its climate and good soil. In some cases the crowns were split into quarters before planting. Others were planted as a single unit. This variety is the smooth cayenne from Hawaii.

As this was an experimental project other variables were introduced to give the most information possible within the first trial. Some areas were covered with a black mulching cloth for weed inhibition while adjacent areas were left open. Pineapple normally grown on Tinian is of a local variety for family consumption. It is smaller and also said to be sweeter.

In 1978 The CNMI Government imported 3,000 pineapple crowns of the Cayenne variety. These were quartered and planted covering approximately 4 acres of land. There is currently insufficient information as to which islands were planted and what was the outcome of this planting. At this time many of the whole crown plants are in the process of bearing fruit, approximately 18 months after planting. Within the last 2 months 10,000 crowns have been received and distributed, and planted, 5,000 each to the islands of Tinian and Rota.

Pineapples are propagated by three methods: 1) planting the cutoff crown after healing, 2) by sucker from the stem, and 3) by slip (sucker-like growth from the peduncle).

Pineapple production costs are estimated at $12,000 an acre in order to establish the crop and produce the first harvest (18 months).

Production Regions:

Tinian is at the moment the largest grower of pineapples in the CNMI. Until the recent trials most of the pineapples grown were for family consumption. Approximately 80% of the pineapples were grown on Tinian with 10% each for Saipan and Rota. Tinian has the best climate and available soil for producing pineapples.
Cultural Practices

The farmers in the CNMI historically have not had a great incentive to farm large areas for commercial profits. Only when they were forced to use a large amount of land set aside to grow corps for outside profit. Example the Japanese Occupation. In the years following World War Two the islands were reduced to little or no vegetation. Only slowly were the farms featuring local crops replanted.

There are three (3) types of pineapple varieties grown in the CNMI. The German type, the Chamorro type and the Hawaiian type (smooth cayenne). All these varieties are grown locally but are grown in small number, therefore, obtaining planting material to grow for commercial production was not feasible. Pineapples grow best in an acid soil. A pH of between 5.0 - 6.0 is ideal. The planting site should be a sloping, well-drained area. Avoiding areas where water will stand after a heavy rain. Ridging is the final step in preparing beds for planting.

Commercial production in Hawaii is mostly based on strain selections from field population of ‘Smooth Cayenne’. Planting material usually is dipped in a fungicide or dried for several days prior to planting to reduce the incidence of rot. Planting is done by hand or by machine. Crowns are planted 24,000 to 30,000 crown per acre.

Pineapples are ripe when the individual eyes become flattened and glossy and when the shell color turns yellow to yellow-orange. Color development starts at the base and moves toward the top. In Hawaii, pineapples are harvested when about one-third yellow for canning and when mature green for fresh fruit. Harvesting before ripening increases postharvest storage life, although harvesting when ripe is preferable for best fresh fruit quality.

Planting

Pineapple plants in the Northern Marianas can be planted in a manner similar to that used in Hawaii. The plants are placed in raised beds with 43 to 47 inches between beds. A drainage ditch 6 to 18 inches deep should separate each bed. Two rows of plants are placed 24 inches apart and 12 inches between each plant. The plants in one row are planted opposite the space between plants in the second row. This system should yield approximately 15,000 plants to the acre. When planting, care must be taken not to plant too deep or to allow soil into the center of the planting piece as decay and death often results.

Plants are almost always put into the ground during the rainy months of June through December on non-irrigated land. Where irrigation is available, planting can be done at any time of the year.
Normally, three harvests are made from the pineapple plant after which the field is completely destroyed and replanted. Approximately two years after planting, the pineapple plant will bear its first fruit. After fruiting, all slips, and on occasion some suckers should be removed to leave one or two of the lower suckers on the plant. These suckers or ratoons will produce the pineapple fruit for the next year. This is called the first ratoon crop. Slips and suckers that have been removed can be used to plant new areas on the farm.

The following year, after harvest of the first ratoon crop, all slips and selected suckers should again be removed, similar to that after the first harvest. The following years, the second ratoon crop should bear.

At this point, planting material is removed and the field is totally destroyed, using a disc harrow and rotary tiller to completely chop and destroy the old plants. Enough time should be given for the old crop to rot after which the field can be replanted, usually using a sharp planting iron. Proper cultural practices, fertilizing, application of pesticides (especially nematocides) must be used as in the original planting.

**Pineapple Propagation**

All commercial propagation of pineapple is done by asexual methods using planting pieces taken from the mother plant. Three main parts of the planting materials used are the sucker, slip and crown.

The sucker is the "shoot" or new plant coming from the leaves on the mother plant. These are usually removed one month after peak harvest, dried for 1 to 4 weeks and planted. The sucker is the most desirable planting material as it is already growing vigorously and is larger than the other types. Suckers often produce a new plant crop in 16 to 18 months after planting.

The slip is the most common type of planting material used because of the larger number produced on each plant. It is different from the sucker in that the slip comes from the stalk that holds the fruit on the mother plant (peduncle) or from the base of the fruit itself. Slips attached to the fruit should not be used as planting material, as future crops may produce misshapen unsalable fruit. Slips are usually taken from the mother plant 2 to 3 months after peak harvest and are dried like the sucker and planted to produce fruit in 18 to 20 months.

The least desirable planting material is the crown. The crown is the planting piece that arises from the top of the fruit itself. There is normally only one crown for each fruit, which severely limits the amount of planting material. Crowns are taken at the time of harvest, planted and harvested 22 to 24 months later.

**Fertilizing**

As with all other plants, pineapple require plant foods in order to grow and produce fruit. When planting close together (as recommended) or when planting on soils with coral or a high pH this becomes even
more important.

Pineapple can be fed in two ways: 1) dry in the soil through the roots or on older leaves or 2) sprayed or poured directly on the leaves in a liquid form.

When planting materials are small, fertilizer applications should be made to the soil near the base of the plant, three weeks after planting, using 1/2 ounce or one teaspoon of pineapple fertilizer. Pineapple fertilizer can be made from a 1-1-4 ratio of nitrogen in the form of ammonium sulfate, phosphorus in the form of treble superphosphate, and potassium in the form of potassium sulfate. At the present time, pineapple fertilizer is being made up by the Division of Agriculture using 135 pounds 13-13-13, 40 pounds ammonium sulfate, 96 pounds potassium sulfate and 2 1/2 pounds of minor elements. This is applied to the soil near the base of the plant in a similar manner as the regular pineapple fertilizer.

A second fertilizer application should be made four months after planting, and a third application at six months after planting. These applications can be made in the area where the lower leaves attach to the base of the plant (axil). Care should be taken not to drop fertilizer into the center of the plant.

Most pineapple plants require an additional feeding of minor elements directly through the leaves. A mixture of 5 pounds iron sulfate, 1/2 pound zinc sulfate and 100 pounds urea 250 gallons of water can be made with 1/4 cup of the resulting solution added to the center of the plant. Some producers prefer to apply the fertilizer by a sprayer in which 1 tablespoon iron sulfate, 3/4 teaspoon zinc sulfate and 16 tablespoons urea can be mixed in one gallon of water and sprayed until the mixture drips off the leaves. Additional feeding using minor elements should be used every 2 weeks on plants grown in coral soils and every 3 to 4 weeks on red clay (volcanic based) soils.

**Insect Pests**

Pineapples have relatively few insect pests. *Scales (Diaspis bromeiae, Melanaspis bromeliae)* and symphyllids (*Scutigerella sakimurai, Hanseniella unguiculata*) are seldom serious pests in pineapple. Scales, are a cosmetic problem on fresh fruits, are only problems in some fields during the growing seasons.

Mealybugs (*Dysmicoccus brevipes*) and ants (*Pheidole megacephala, Iridomyrmes humilis, Solenopsis*) which tend them are associated with the very serious mealybug wilt disease. Mealybug wilt can occur if mealybug populations become high. Entire fields, up to 50% of the plants in a field, can be lost if control is not undertaken. Most often the ants are controlled which allow natural predators to keep the mealybug population in check.
Thrips (*Thrips tabaci, Frankliniella occidentalis*) are vectors of the Yellow Spot Virus. Thrips are seldom of serious economic concern in pineapple. *Mites* (*Steneotarsonemus ananas,* and *Dolichotetranychus floridamus*) are seldom a serious problem.

**Chemical Controls:**
An effective ant control program makes it possible for the mealybug to be kept under control by predation by natural enemies. Ants control costs usually are less then those incurred in controlling mealybugs. Preplant application of Ambro (1.7 kg/ha) is made to the perimeters of newly planted pineapple fields (2,500 ha). Ambro is also applied postplant at 1.7 kg/ha to approximately the same number of hectares. Diazinon is applied once or twice to a few fields (33%). Diazinon may also be added to the preplant dip if scales or mealybugs are present in the planting material.

Most insecticide applications are based upon existing IPM programs. Applications are not made unless the field has had a history of problems or the growing conditions that favor insect development.

**Cultural Control Practices:**
Vegetation in gullies and roadside provide a reservoir for mealybugs. Reducing the fields abutting the pineapples can reduce the reservoir. However, this is not always practical.

**Biological Controls:**
Natural predators of the mealybugs have been introduced and are well established. With the control of ants, these natural predators keep the mealybug population in check and reduce disease pressures. However if ants are not eliminated, natural predators become ineffective in controlling mealybugs.

**Other Issues:**
Preharvest intervals are not a problem in pineapple because of the plant cycle. Plants grow relatively slowly, requiring 6 months from flower initiation to fruit harvest. It is relatively easy to stop pesticide applications well before harvest and still achieve acceptable yields. Spraying of hormones are used to accelerate fruit productions.

At this point, planting material is removed and the field is totally destroyed, using a disc harrow and rotary tiller to completely chop and destroy the old plants. Enough time should be given for the old crop to rot after which the field can be replanted, usually using a sharp planting iron. Proper cultural practices, fertilizing, application of pesticides (especially nematocides) must be used as in the original planting.

Weeds
All weeds compete with the pineapple for space, sunlight, water, and nutrition. It is evident that to have a successful harvest weeds must be kept at a minimum or better yet totally eliminated. Additionally weeds harbor insects and other diseases. Weeding has to be done carefully so as not to disturb the fine roots of the growing pineapple. Initially weeding should be done by hand. Mulching and plastic covering of the area surrounding the pineapple start helps considerably in controlling weeds and retaining moisture in the soil. If weeds are allowed to grow over the small pineapple "starts", snails can devour the entire plant.

Family Name: Compositae
Scientific Name: *Bidens pilosa* L. (*bidens Alba* L.)
Common Name: **Beggar Tick, Guam Daisy, Spanish Needle**
General Description: An erect, branching, broad-leaf, annual plant, 2 to 3 feet high. Leaves opposite, serrate margins, vary in size and shape, the upper trifoliate in the upper leaves and the lower one simple. Flower heads about 1 inch in diameter with white petals, on long stems at branch tip, ray flower around the outer edge yellow, disk flower in the center brownish-yellow. Fruits an achene, barbed with 2 straight or slightly curved awns.
Propagation: By seeds. Flower head consists of 30-50 achenes. The barbed seed stick to clothes and are dispersed.
Local Occurrence: Very common, all over the island not only in waste ground and along roadsides but sometimes at the fringes of forest, sometimes forming dense thickets nearly 3 feet all.

Family Name: Compositae
Scientific Name: *Mikania scadens* L.
Common Name: **Mikania**
General Description: A climbing, twining perennial plant. Leaves opposite, palmately veined, dentate. Flowering heads white, in terminal clusters.
Propagation: By seeds.
Local Occurrence: Grows in dense mass over vegetation along roadsides or undisturbed areas.

Family Name: Convovulaceae
Scientific Name: *Ipomoea congesta* R. Br.
Common Name: **Blue Morning Glory**
General Description: A broad-leaf, twining, perennial plant. Stems twining, climbing. Leaves heart-shaped, 3 to 4 1/2 inches, entire flowers single or few on each salk, bracts linear-lanceolate; corolla blue in the morning, fading to pink in the afternoon, about 2 1/2 inches long. Fruit a capsule, subglobose, 5/8 inch in diameter. Seeds 2, dark brown, pubescent.
Propagation: By seeds.
Local Occurrence: This is the most common morning-glory in Guam. These vines are aggressive, which quickly cover old fields, especially on limestone soils, and sometimes smothering the shrubs and trees in a dense mat of stems.
Family Name: Cucurbitaceae
Scientific Name: Momordica charantia L.
Name: **Wild Bitter-Melon**
Local Name: Almagosa
General Description: A slender, herbaceous climber. Stems pubescent. Leaves 4-5 inches long, palmately 5-7 lobed. Flowers bright yellow. Fruits warty, orange when ripe. Seeds bright red
Propagation: By seeds.
Local Occurrence: Very commonly found along roadsides and in waste areas.

Family Name: Cyperaceae
Scientific Name: Cyperus rotundus L.
Common Name: **Purple Nutsedge**
Local Name: Chaugan Humatag
General Description: A perennial grass. Stems unjointed, triangular, solid stem, 6 to 8 inches high. Leaves of young plant upright, penetrating, spreading in later growth; involucral leaves 3 to 4, at the top of the stem. Inflorescence a simple umbel 3 branches 4 to 6 in number, slender, up to 2 1/2 inches long, each ending in a cluster of brown, narrow spikelets. Fruits an anchere, 3-angled.
Propagation: rhizomes and underground tubers.
Local Occurrence: A widely spread weed usually found in waste or cultivated areas, often in lawns.

Family Name: Gramineae
Scientific Name: Cynodon dactylon (L.) Pers.
Common Name: **Bermuda Grass**
Local Name: Grama
General Description: A long-lived, prostrate, fine-leaved, perennial grass. Stems smooth, flattened, usually prostrate but sometimes somewhat upright. Leaves narrow, usually 1 to 4 inches long, 1/4 to 1/8 inch wide, rough on edges. Flowering head with 4 to 5 purplish spikes in one whorl in a fingerlike arrangement (digitately) at the tips of the stems. Spikelets in two rows tightly pressed to one side of rachis.
Propagation: By seeds, creeping stolons and underground rhizomes.
Local Occurrence: Frequent in lawns and sometimes in cultivated areas.

Family Name: Gramineae
Scientific Name: Echinochloa colonum (L.) Link
Common Name: **Jungle Rice**
Local Name: Chaguan-Agaga
General Description: A smooth annual grass, 1/2 to 2 feet high, usually prostrate, sometimes erect. Stems flattened, often reddish-purple, usually swollen at the joins, often in large tufts, rooting at the lower nodes. Leaves rather lax, 1 1/2 inches long, 1/16 to 1/2 inch wide. Flowering heads 4 to 7 racemes, green or tinged with reddish purple. Spikelets crowded, nearly sessile, awnless or shortly awned.
Propagation: By seeds.
Local Occurrence: Found in very moist or swamp areas, near marshes and around water pipes.

Family Name: Gramineae
Scientific Name: *Panicum maximum* Jacq.
Common Name: **Guinea Grass**
General Description: A tall, vigorous, tufted, perennial grass, up to 12 feet high, in large bunches with very short, thick rootstalks. Stems stout, somewhat flattened, nodes hairy. Leaves linear finely pointed, 6 to 30 inches long, 1/2 to 1 inch wide, usually erect, yellowish-green, very rough on the edges and usually with long stiff hairs at the base on the upper sides. Flowering heads 9 to 20 inches long, 3 to 6 inches wide, with stiff ascending branches 4 to 8 inches long. Spikelets awnless, alike, symmetrical.
Propagation: By seeds and short rhizomes.
Local Occurrence: Common in cultivated areas and along roadsides. Often rather weedy, especially in ditches.

Family Name: Leguminosae
Scientific Name: *Leucaena leucocephala* Lam.
Common Name: **Tangantangan**
General Description: A small, thornless, shrub or upright tree, 10 to 30 feet high. Leaves opposite, compound, bipinnate, about 20 paired leaflet. Flower white, in globular heads, axillary from branch end, on long stalks. Pods flat, 4 to 6 inches long, 15 to 20 seeds. Seeds glossy brown, ovla-oblong, flattish.
Propagation: By seeds.
Local Occurrence: It is fast-growing, tolerates disturbed habits, preferring limestone soil. Hence it is found more abundant in central and northern Guam than in southern Guam.

Note: It can be used as forage due to high protein content in the leaves and stems. However, it contains a chemical "Mimosine" which can cause loss of hair in nonruminant animals. It is a good source of wood for charcoal and of leaves for green manure.

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