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The Kwai Mi tree is vigorous and spreading.

The Brewster tree is vigorous with straight, upright branches.
INTRODUCTION

The lychee (*Litche chinensis* Sonn.) is a subtropical evergreen tree. It was cultivated in southern China more than 2000 years ago and is now grown in north-central India, South Africa, Australia and other countries. On the U. S. Mainland, it is cultivated only in Florida.

The first lychee tree was brought to the Hawaiian Islands in 1873 by Ching Chock. It was planted on the property of Chun Afong at the corner of Nuuanu and School Streets on what is now the Chun Hoon Market property; it is known as the “Afong” tree, and has been identified as the variety Kwai Mi. Other introductions were made by the United States Department of Agriculture, the University of Hawaii Agriculture Experiment Station, and by Luke Chan, Sing Choy, David T. Fleming, E. W. Jordan, Wong Kwai, Wong Leng, and others.

Most lychees are grown below the 1500-foot level, but trees are found from near sea level to an elevation of 3000 feet on the five major islands. There are about 15,000 lychee trees in Hawaii, all of them in backyard plantings except 75 acres in small semicommercial plantings. A commercial lychee-growing industry has not developed because of the erratic bearing habits of the trees, and because of the quarantine against fresh fruit shipments to the Mainland which was in effect for a long time. The situation has improved somewhat, and the outlook for lychee growing is considered more favorable for the following reasons: (1) Trees of some varieties can be induced to yield better crops by girdling and proper nutrition; (2) fresh fruit can now be shipped to the U. S. Mainland after fumigation; (3) the fruits have a somewhat longer shelf-life than previously because of improved packaging and storage methods; and (4) lychee fruits can be processed and used in fruit salads and cocktails or eaten as frozen lychees.
Figure 1. Kwai Mi, or "cinnamon flavor."

Figure 2. Hak Ip, or "black leaf."

Figure 3. Pat Po Hung.

Photos on this page courtesy Hawaii Agricultural Experiment Station.
VARIETIES

The only variety developed locally that has attained prominence is Groff. The most popular imported varieties are Kwai Mi, Brewster (Purple Chen or Chen Tzu) and Hak Ip. Other lesser known introductions include the varieties Kwa-luk, Wai-chi, Shan-chi, Chong Un Hung, No Mai Tsz, Pat Po Hung, Fi Tsz-siu, Tim Ngam, Tsz Heung Lai and Mauritius. The variety introduced as Mauritius is indistinguishable from Kwai Mi. Mauritius has been described as a seedling from Mauritius, an island east of Madagascar in the Indian Ocean.

Varieties of lychee may be distinguished by differences in the physical characteristics of the fruit (color, shape, taste, size of fruit and seed), the leaves (petiole length, shape, color, number and size of leaflets) and the tree (form, branching characteristics). However, ecological factors and management practices can influence the characteristics of a variety to some extent. Principal varieties of lychee are:

Kwai Mi,\(^1\) or “cinnamon flavor,” (Figure 1). Fruits are bright red with smooth to moderately prickly skin. The flesh is firm and sweet when fully ripe, but acid when not fully ripe. Fruits average 30 to a pound. Clusters are large and loose with 15 to 30 fruits per cluster. Seeds are usually large. Trees are vigorous and large with spreading branches generally curving upward; crotches are weak. Bark is light-colored. The large green leaves are usually divided into six leaflets. Kwai Mi ripens early and is the most widely grown commercial variety in the state. Season: May to June.

Hak Ip, or “black leaf,” (Figure 2). Fruits are dark maroon-red with a smooth tough skin. Flesh is firm and sweet when fully ripe, but acid when not fully ripe. Fruits average 28 per pound. Clusters are large and moderately compact with 15 to 25 fruits per cluster. Fruits have broad shoulders with a noticeable suture on the sides. Seeds are usually large. Trees are slow growing with spreading branches closely spaced, rather compact. Bark is dark in color. The large leaves are dark green and usually divided into six and four leaflets. It is considered a midseason variety and a good one for home gardens with possibilities as a commercial variety. Season: July.

\(^1\) According to Groff there is another type of Kwai Mi called “Yah tou lu.” Characteristics of Kwai Mi trees observed in Hong Kong and Taiwan are somewhat different from those grown under Hawaii conditions.
Figure 4. The Brewster variety.
Photo courtesy Hawaii Agricultural Experiment Station.

Figure 5. The Groff variety.
Photo courtesy W. B. Storey.
Pat Po Hung (Figure 3). Fruits are deep purple-red with a thin, rough, pliable skin. The flesh is soft, wet, and very sweet even when the fruit is not fully colored and ripe. Fruits average 35 per pound and are very fragrant; shoulders are sloped. Seeds are small to large. Trees are slow growing with sprawling branches. The light-green leaves are divided into six leaflets. It is considered as good a bearer as Kwai Mi. Season: May to June.

Brewster (Figure 4). Fruits are bright red with spiny skin. The flesh is fragrant, wet, and sweet when fully ripe, but very acid when not fully ripe. Fruits average 20 per pound and clusters are loose with 6 to 20 fruits per cluster. Seeds are large. Trees are large and vigorous with most branches growing upright. Bark is light-colored. The large, dark green leaves are usually divided into six leaflets. Season: July.

Groff (Figure 5). Fruits are dull red with spiny rough skin. The flesh is firm and moderately sweet when fully ripe, but very acid when not fully ripe. Fruits average 38 to 40 per pound and clusters are compact, with 20 to 40 fruits per cluster. Seeds are shrivelled in 90 to 95 percent of the fruits. Trees are of medium vigor, upright, with branch forming a V-angle. It is a late-bearing variety often ripening in August and early September and is recommended for home gardens.

No Mai Tsz,² or “glutinous rice cake,” (Figure 6). Fruits are light reddish-yellow with a thin brittle skin. Flesh is soft and very sweet when fully ripe but slightly acid when not fully ripe. Fruits average 25 per pound; sometimes the shoulders are broad but sloping. Seeds are small and underdeveloped. Trees are slow growing with branches closely spaced and spreading. Bark is smooth and light-brown. The small light-green leaves are divided into six leaflets or sometimes four. Fruiting of No Mai Tsz has been very poor in Hawaii. Season: July.

PROPAGATION

Air-layering (marcottage) is a form of asexual reproduction by which a branch on a tree is made to root while still attached to the parent tree, then it is removed and planted. Most lychee seedlings produce mediocre or poor fruit. Trees grown from an air-layered branch bear fruit earlier and the fruits are also identical in size, shape, and color with those of the parent tree.

²Also spelled No Mai Tze, No Mai Chi.
Figure 6. No Mai Tsz variety.

Figure 7. Air-layering the lychee. (a) Left, a branch with the bark removed and cambium tissue scraped off. (b) Right, vinyl plastic with sphagnum moss ready to be wrapped around branch.

Figure 8. The left plant has new roots growing under plastic cover, approximately 2½ months. The plastic cover of the right plant has been removed before planting.
In Hawaii, lychees may be air-layered the year round, but a good
time is during the spring before active growth starts. The drier
months of the year are also satisfactory because the moss is less apt
to become saturated with moisture.

Choose a good bearing tree of the desired variety. The branches
for air-layering may be from $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter and preferably
in a position easy to work.

Many techniques are used in air-layering, although the general
principle is the same. Girdle the branch where you want the roots to
form and remove a ring of bark $\frac{1}{2}$ to 1 inch wide. Scrape the
cambium from the girdled area. The cambium is a single layer of
cells, under the bark, that form new tissues. Wrap the girdled area
with moist but not soaking-wet sphagnum moss held in place by a
plastic sheet approximately 10 inches square. (Figure 7).

The plastic material is easy to use and retains the moisture until
roots have formed and the air layered branch is ready to be removed
and planted (Figure 8).

Usually about 2 to 3 months after layering, you can see roots
beginning to form. When enough roots have formed and have turned
slightly brown, remove the branch with a pair of pruning shears.
Cut just below the plastic wrapping, remove the wrapping, and
plant the branch in a container. The terminal may be removed or
capped to reduce the number of leaves. Protect newly air-layered
trees from direct sunlight and leave then in shade or semishade

![Figure 9. Inarching is done by taping a branch of the desired lychee variety (shown outside the container) to a seedling tree (in container). Where the branches are to be joined, a 3-inch slice is made so that $\frac{1}{2}$ to $\frac{1}{2}$ of the diameter of each branch is taken off at the point of contact. The exposed parts are tied together securely.](image)
for a few weeks. Then place the potted plants in the open and keep in the pots until the new flushes harden.

The Hawaii Agricultural Experiment Station has propagated the lychee by side-wedge and bark-graft methods with some degree of success. Inarching, sometimes called approach grafting, has also been effective. Inarching is adaptable when there is a large number of seedlings available. (Figure 9).

**PLANTING**

Young lychee trees can be transplanted at any time of the year; however, those transplanted during the rainy season are less likely to be set back than those planted during the drier, hotter months. Freshly cut air-layered trees need high humidity, cloudy days, and rainy weather to establish good plants. For orchard plantings, well-established trees in 1- or 5-gallon containers are preferred to freshly cut air-layered trees.

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**Figure 10.** In the square system of planting, shown at left, the distances between trees and between rows are the same. In the rectangular system, shown in the middle, the distance between trees is less than the distance between rows. In the contour system, shown at right, distances between trees vary according to the terrain.

**Figure 11.** The square system at left is started with 56 trees per acre, 28 feet apart. When thinned, 28 trees per acre, 39.6 feet apart, remain. The square system at right is started with 54 trees per acre, 28.3 feet apart. When thinned, 27 trees per acre, 40 feet apart, remain.
Trees may be spaced in the square, rectangular, or contour systems (Figure 10). The square system is the most popular method for orchards in Hawaii. For sloping land, the contour system is recommended.

The proper planting distance for lychee trees depends on rainfall, wind, contour of land, and variety. The suggested spacing between trees and rows is 30 to 40 feet (48 to 27 trees per acre). Filler or temporary trees are sometimes included in the original planting. When the trees begin to crowd each other, these temporary trees are removed. Figure 11 illustrates two ways of getting closer spacing in the square system.

**FERTILIZATION**

The specific fertilizer requirements of lychee trees have not been determined. All Hawaii soils lack nitrogen; phosphorus and potassium may also be inadequate. A complete fertilizer containing these three major elements usually is applied. A general garden fertilizer (10-10-10 or 14-14-14) contains equal proportions of nitrogen, phosphoric acid and potash. Since all Hawaiian soils fix phosphorus at a rapid rate, making it in a form unavailable to plants, additional phosphorus at planting time is recommended. Mix 1 pound or more of superphosphate with the soil at the bottom of the hole before setting in the tree.

With a general garden fertilizer, the following schedule may be used:

<table>
<thead>
<tr>
<th>Year</th>
<th>Application</th>
<th>Age of Tree</th>
<th>Amount of Fertilizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>First year</td>
<td>First application</td>
<td>At planting time</td>
<td>¼ pound</td>
</tr>
<tr>
<td></td>
<td>Second application</td>
<td>4 months old</td>
<td>¼ pound</td>
</tr>
<tr>
<td></td>
<td>Third application</td>
<td>8 months old</td>
<td>½ pound</td>
</tr>
<tr>
<td>Second year</td>
<td>First application</td>
<td>12 months old</td>
<td>½ pound</td>
</tr>
<tr>
<td></td>
<td>Second application</td>
<td>16 months old</td>
<td>½ pound</td>
</tr>
<tr>
<td></td>
<td>Third application</td>
<td>18 months old</td>
<td>½ pound</td>
</tr>
<tr>
<td>Third year</td>
<td>2 or 3 applications</td>
<td>1 pound per application</td>
<td></td>
</tr>
<tr>
<td>Fourth year</td>
<td>2 or 3 applications</td>
<td>2 to 3 pounds per application</td>
<td></td>
</tr>
</tbody>
</table>

After the fourth year, the amount applied on bearing trees depends upon the condition of the tree and such factors as rainfall, kind of soil, location, and the size of the fruit crop. A tree with a heavy fruit crop requires a heavier application than one with a small crop.

A minimum of 1 pound of fertilizer per inch of trunk diameter per year is suggested. The importance of the relation between fertilization and fruiting was shown in replicated plots at Keapana, Kauai. In July 1966, some Kwai Mi trees were given 10 pounds of 10-20-20
fertilizer broadcast on the soil surface from the tree trunk out to the drip line of the branches. The rate was based on 2 pounds per inch of trunk diameter. The annual rainfall at Keapana is between 80 and 90 inches. The soil pH was 5.8.

All of the Kwai Mi trees that were fertilized in 1966 flowered and fruited in 1967; the unfertilized trees developed few flowers and fruits. In 1968, both groups of trees flowered profusely. The unfertilized trees probably flowered during the second year as a result of a sufficient accumulation of starch in the tree, which was inadequate during the first year. Commercial growers should consult their County Extension Agents for additional information on fertilizers.

**PRUNING AND TRAINING**

Most air-layered lychee trees have a tendency to form poor crotches and to send out many branches near the ground level. It is important to train trees properly during the first year. A good practice is to prune off all branches to a single leader before or at the time of transplanting. When the trees have reached sufficient height and are firmly established, leave about four strong, well-spaced scaffold branches and remove all others.

In scaffolding, permanent branches can be developed at different heights and positions on the trunk by allowing only one branch to grow at each point or level. If several terminal branches or leaders

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Figure 12. Two common problems in growing lychee are severely angled branches and two leaders growing from one terminal. Both conditions may result in splitting, left above (a). To train a tree, cut severely angled branches as shown at X, and set back one of the two leaders as shown at Y, right above (b).
are allowed to develop at the same rate, the mature tree may be weak with poorly formed crotches that split easily. The tree may also split later (Figure 12a). A good practice is to allow one upright terminal to develop. The remaining leaders are either cut off or, if they have wide strong crotches, they can be trained to become supporting branches.

Young trees may be pruned at any time of the year to provide a well-balanced tree. Remove branches that come out from the main trunk with sharp V-shaped angles as they usually split off in later years. On older trees, prune off poorly spaced branches at the end of the fruiting season (Figure 12b).

Severe pruning of terminals after harvesting to encourage bearing is usually not as effective as girdling or fertilizing.

**HARVESTING**

Since all fruits on a panicle do not ripen at the same time, harvesting is best done when most of the fruits are ripe. Ripeness can be determined by the degree of coloring of fruits. Most red-skinned varieties, such as Kwai Mi, are ripe and ready for harvesting when fruits are completely red. At this stage the acidity characteristic of immature fruits is gone.

It is customary to harvest by breaking off the branch with the fruits attached. When fruit clusters are too high on a tree for easy harvesting, bamboo or aluminum tree-pruning poles can be used to break or cut the fruiting branches, or ladders may be used.

**PRESERVATION AND MARKETING**

The skin of the lychee fruit loses its bright red color and turns to dull reddish-brown a few days after harvesting, probably due to some enzyme activity. The optimum marketing period of the fresh fruit is limited to the short time that fruit color is attractive. Refrigeration preserves fresh fruit color. In tests, Brewster lychee retained its color and texture better at storage temperatures of 35 F and 40 F than at 32 F, 63 F, and 81 F. Florida tests showed that quality can be maintained up to 50 F. Another approach to preserving skin color for the fresh fruit market is to package the fruits in polyethylene bags. Research in Hawaii showed that polyethylene bags are superior to ordinary paper bags at room temperature because they protect the fruit from drying.

Fresh lychees can be quick-frozen and stored for more than a year and still be edible. Both color and flavor are retained reasonably well when fruits are placed in plastic bags and frozen.
The price of the fresh fruit varies according to the harvesting season. The first fruits to reach the market in late May or early June will command a wholesale price of 50 to 60 cents a pound. As the season progresses, the wholesale price may drop to 25 cents a pound or lower.

The quantity of fresh fruit shipped to the Mainland United States depends upon the size of crops produced during that particular year. Records from the State Department of Agriculture Plant Quarantine stations, where all exported fruits are fumigated with ethylene dibromide (1/2 lb/1000 cubic feet), are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Honolulu</th>
<th>Hilo</th>
<th>Total lb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>969</td>
<td>—</td>
<td>969</td>
</tr>
<tr>
<td>1959</td>
<td>1,932</td>
<td>—</td>
<td>1,932</td>
</tr>
<tr>
<td>1960</td>
<td>11,965</td>
<td>—</td>
<td>11,965</td>
</tr>
<tr>
<td>1961</td>
<td>3,242</td>
<td>—</td>
<td>3,242</td>
</tr>
<tr>
<td>1962</td>
<td>4,877</td>
<td>—</td>
<td>4,877</td>
</tr>
<tr>
<td>1963</td>
<td>3,747</td>
<td>344</td>
<td>4,081</td>
</tr>
<tr>
<td>1964</td>
<td>13,438</td>
<td>1,970</td>
<td>15,408</td>
</tr>
<tr>
<td>1965</td>
<td>3,653</td>
<td>7,800</td>
<td>11,453</td>
</tr>
<tr>
<td>1966</td>
<td>11,631</td>
<td>4,991</td>
<td>16,622</td>
</tr>
<tr>
<td>1967</td>
<td>7,626</td>
<td>11,182</td>
<td>18,808</td>
</tr>
<tr>
<td>1968</td>
<td>19,940</td>
<td>22,000</td>
<td>41,940</td>
</tr>
<tr>
<td>1969</td>
<td>25,068</td>
<td>63,964</td>
<td>89,032</td>
</tr>
<tr>
<td>1970</td>
<td>400</td>
<td>100</td>
<td>500</td>
</tr>
<tr>
<td>1971</td>
<td>6,788</td>
<td>—</td>
<td>6,788</td>
</tr>
</tbody>
</table>

Lychees are also dried or canned. Canned lychee can be packed in a 40 F Brix syrup containing 0.2 percent citric acid. Dried lychee can be prepared by sun-drying fruits for approximately 20 days. When two-thirds of the original weight is lost the fruits have been dried properly.

**GIRDLING**

One of the principal reasons lychee acreage has not been increased is poor and erratic fruit production.

In some varieties, girdling has partially solved the problem of obtaining consistent flower formation and fruit production. It causes carbohydrates to accumulate above the girdle and forces blossoming, which results in increased yields. Girdling has been effective on the Brewster variety at the Paomoho Branch of the Hawaii Agricultural Experiment Station and is now a standard practice with the Kwai Mi variety.
Figure 13. Girdling may be done at X as shown above, or at Y.

The girdle is made by removing a strip of bark about 1/16 inch wide in a circle around the branch of the trunk of the tree (Figure 13). A pruning saw is used to make the girdle. Wider girdles made on the same tree or the same branch for several successive years may injure the trees. After girdling, protect the exposed tissues by covering them with a pruning compound. The time it takes a girdle to heal varies with the vigor of the tree, variety, and size of the girdle. September is the most desirable month for girdling.

Trees that are weak and undernourished may not respond to girdling. Also, girdling has not yet been proved effective on all lychee varieties.

POLLINATION

Little is known about pollination of lychee flowers in Hawaii. Florida research indicates that insects are necessary to insure pollination and fruit setting. Among the important pollinators are the secondary screwworm (Callitroga marcellaria [F]), the honeybee (Aphis melifera Linn.), and the soldier beetle (Chauliognathus marginatus Fab.). In Hawaii and India, the honeybee, hover fly (Eristalis arovorum F.), housefly (Musca domestica L.), and several other insects are known to visit the flowers.
Figure 14a. Shown here is the only type of lychee flower capable of bearing fruit.

Figure 14b. This flower type behaves like a male flower and will not bear fruit.

Figure 14c. The male flower is the first to blossom on the lychee tree.

Photos on this page courtesy S. Nakata.
Thousands of flowers are produced on the lychee tree but few fruits reach maturity. Three kinds of blossoms appear on the Brewster lychee (Figures 14a,b,c). Only one type (Figure 14a) is capable of developing into a fruit. The second flower type (Figure 14b) resembles the first but behaves like a male flower. The third type (Figure 14c) is the male flower and the first to blossom.

Frequently a tree may produce fruits that have shrivelled “chicken tongue” seeds in addition to the normally developed seeds. These fruits are highly desirable because they have a larger edible portion. Some authorities have suggested self- or cross-sterility as a possible cause of shrivelled seeds. Apparently the embryo aborts during its development, but fruits are stimulated sufficiently to continue developing. Groff variety produces a relatively high proportion of fruits with shrivelled seeds.

EFFECTS OF ENVIRONMENTAL FACTORS ON GROWTH AND FRUITING

Soil type, temperature, rainfall, and wind are some of the factors that may determine success in lychee culture. Soil is seldom a limiting factor in Hawaii. Lychees are grown in heavy clay soils such as the dark and heavy magnesium clays of Lualualei, the gray hydromorphics of Manoa, and the loose rock-land soils or “aa” cinder type of the Hilo series. If ample irrigation water is available, the least desirable soil type seems to be the coral sands because of their high pH and infertility. In general, the lychee is best adapted to soils with an acid reaction.

The lychee is cultivated under a wide rainfall range. Trees can be grown in areas with less than 10 inches of rain with supplementary irrigation, as well as in areas with up to 140 inches of rain annually. Under natural conditions the distribution pattern of rainfall is considered more important than the amount because it has a direct bearing on the fruitfulness of the lychee. A wet spring and summer and a dry fall and winter are considered desirable for fruiting of most existing varieties. These conditions are seldom found in Hawaii. The Kona area on the Island of Hawaii comes nearest to having this weather pattern.

Groff variety is an exception and seems to be less exacting in its requirements than other varieties under cultivation. The original Groff tree at Poamoho has flowered and fruited regularly in spite of what appears to be relatively adverse climatic conditions for flowering and fruiting.
Figure 15. Foliage showing mite damage.
Photo courtesy T. Nishida.

Figure 16. Wartlike growth on the bark of the Hak Ip.

Figure 17. Black and decayed ripe fruits as they are when harvested.
Temperature also affects flowering and fruiting of lychees. Varieties, such as Chong Un Hung and No Mai Tsz, flower and fruit only during the coldest years; other varieties, such as Groff, Kwai Mi, and Hak Ip, often flower and fruit in spite of warm winter temperatures. Recent research data of the University indicate that, as long as the night temperature drops to 65 F or lower for about a 30-day period, Kwai Mi will flower if the leaf starch content is adequate. In the Canton delta, home of the lychee, temperatures vary from a mean minimum of 47 F in January to a mean maximum of 92 F in July. In a good lychee-growing area in Hawaii, such as Kainaliu, Kona, the mean minimum is 57.6 F in January and 77.1 F in July. The mean minimum for the Honolulu airport is 62.4 F in January and the mean maximum is 79.5 F in July.

The lychee has been planted at elevations above 2000 feet, such as Waimea, Hawaii, and Olinda, Maui, where the temperature may drop to 45 F or lower for short periods during the winter. The rate of growth in these areas is usually slower and fruit production is extremely erratic and unsatisfactory. Temperature, however, may not be the only limiting factor at these higher elevations.

The lychee cannot withstand strong winds. The branches are brittle and the flowers are readily blown off. It is extremely important to provide adequate windbreaks. Home gardeners should plant the tree on the side of the yard with the best protection from wind. Commercial growers will have to provide permanent windbreaks. Suggested windbreak trees include ironwood (Casuarina equisetifolia), paperbark (Melaleuca leucadendron), and box brush (Tristaria conferta).

INSECTS

The erinose mite (Aceria litchii Kiefer) is the most troublesome pest of lychee. It causes gall-like symptoms on the leaves (Figure 15). The lower surfaces of the galled leaves are covered with a velvety growth. The mite develops on the young leaflets at any time of the year. Good control may be obtained by spraying the leaflets as they begin to emerge. The most commonly used miticide is wettable sulfur at the rate of 5 to 10 pounds per 100 gallons of water, or 5 to 10 tablespoons per gallon of water.

Several kinds of scale insects may attack the lychee. The common species are the green scale (Coccus viridus Green) and the hemispherical scale (Saissetis hemispherica [Targioni]). Parasites and predaceous insects usually keep scales under control. If spraying becomes
Figure 18. The left panicle is normally developed. The middle panicle shows repressed development. The bottom half of the right panicle has no flowers.

Figure 19. Mejiro-damaged fruits beginning to turn red.
necessary, use a 25 percent wettable powder of Malathion mixed at the rate of 2 pounds per 100 gallons of water, or 1 1/2 tablespoons per gallon of water. Oil emulsions are not used on the lychee because they may injure the leaves. Many of the spreader-stickers also cause leaf injury. Spray at 2- to 3-week intervals until the infestation is under control.

Some species of ants maintain scales to obtain the honeydew they excrete. It may be advisable to control ants to minimize scale infestation. A 46 percent emulsifiable chlordane emulsion, prepared at the rate of 1 ounce per gallon of water, is effective. Spray the trunk of the tree and the ground around the trunk with the insecticide. Any ant that ventures into the sprayed area will be killed by the insecticide. Do not use the chlordane emulsion on the foliage as it contains oil.

The Chinese rose beetle (*Adoretus sinicus* Burm.) mainly eats the leaves of young plants, often leaving only the leaf veins or skeletons. To control this beetle, spray with 2 pounds of Malathion (25% WP) per 100 gallons of water or about 1 1/2 tablespoons per gallon of water.

**DISEASES**

There is not a great deal of specific information on the diseases of lychee. An undescribed wart-like growth is found on the maturing branches and trunk of the Hak Ip variety. These projections erupt from the bark and later may develop into rose-shaped structures (Figure 16). Several eruptions may grow together to form a dense mass.

Another common and widespread problem of lychees is black spots or areas on the fruit (Figure 17). Small black spots appear, enlarge, and become watersoaked. A white slimy growth appears in the center of the watersoaked area. Plant pathologists say bacteria or other microorganisms may be the cause of this fruit decay, or it may be a secondary effect of insect damage.

Skins or shells of lychee fruit sometimes split. This may be a physiological or varietal problem. The Kwai Mi variety appears to be more susceptible than other varieties, especially at higher elevations. Some authorities in India associate it with hot winds, but splitting has also been observed in Hawaii when hot winds are not prevalent. Another disease-like condition has been noted on the lychee blossom or panicle (Figure 18).
BIRD DAMAGE

Birds can be a serious pest during the fruiting period, especially in orchards located near forests frequented by the white eye or mejiro (*Zosterops palpebrosus japonicus*). Immature as well as ripe fruit are attacked and damaged (Figure 19). An entire crop of fruit can be destroyed if the mejiro is not controlled. Other birds that will cause some damage to lychee fruits include the Kentucky cardinal (*Richmondena cardinalis*) and the mynah (*Acidotheres tritis*).

REFERENCES


The Hak Ip tree has compact, closely spaced branches.

The Groff tree is upright, with willow-like branches.
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