Rejuvenating The Abandoned Orchard

Y. BARON GOTO and EDWARD T. FUKUNAGA

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THE AUTHORS

Y. Baron Goto was Director, Agricultural Extension Service, University of Hawaii, College of Agriculture, and in charge, Extension Coffee Program. Edward T. Fukunaka was Superintendent, Kona Branch, Hawaii Agricultural Experiment Station, University of Hawaii, College of Agriculture.
INTRODUCTION

People interested in coffee are racing against time.

Rejuvenation of the old, abandoned coffee orchards, most of which were started in the late 1890's and the early years of the present century, seems to be the wisest way of getting into maximum production during the present high coffee market. These trees, many of which are 65 to 70 years old, are found living under kukui, guava, ohia and other large tropical plants. By removing the shade trees, weeding, fertilizing and pruning, most of the old coffee trees and the volunteer seedlings can be brought into production within two years. They have the potential of almost immediately producing heavy crops and of continuing to do so for the next few years.

The authors recently covered all the islands, with the exception of Lanai, Niihau and Kahoolawe, and found that there were many acres of old, abandoned orchard, with volunteer seedlings numbering in the hundreds of thousands growing under the old trees.

The Thrum's Annuals of the final four years of the last century report that coffee was planted in the following areas:


Maui—Honokawai, Kaupo, Honokahau, Kokomo, and Honolulu.


Oahu—Waianae, Makaha, Kaneohe, Tantalus, Maunawili, and Heeia.

In addition to the above locations, the authors found coffee growing at Nahiku, Kailua, Haiku, Iao and Keanae on Maui; Kalae on Molokai; Lumaraha, Kalaleo, and Waialua on Kauai. The trips were taken in a hurry, and the authors undoubtedly missed some of the places on every island visited, where abandoned coffee orchards may be found. This account is by no means exhaustive, but the number of locations mentioned will suffice to indicate how vast is the number of acres which may very well be reclaimed immediately and put into production.

Farmers should not delay in seeing that this is done. Hawaii will benefit tremendously from such a move. Every rejuvenated acre of coffee orchard is a potential one thousand dollars or more added to the economy of the islands annually.

According to Thrum also, in 1898 there were 6,971,524 trees on 13,947 acres, distributed by islands as follows:

<table>
<thead>
<tr>
<th>Island</th>
<th>No. of Trees</th>
<th>Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Olaa</td>
<td>2,015,000</td>
<td>5,353</td>
</tr>
<tr>
<td>Keaau</td>
<td>286,500</td>
<td>573</td>
</tr>
<tr>
<td>Laupahoehoe</td>
<td>256,500</td>
<td>500</td>
</tr>
<tr>
<td>Kaumana</td>
<td>12,500</td>
<td>25</td>
</tr>
<tr>
<td>Kona</td>
<td>3,337,409</td>
<td>6,383</td>
</tr>
<tr>
<td>Puna</td>
<td>136,000</td>
<td>272</td>
</tr>
<tr>
<td>Kohala</td>
<td>38,400</td>
<td>76</td>
</tr>
<tr>
<td>Hamakua</td>
<td>89,500</td>
<td>267</td>
</tr>
<tr>
<td>Kau</td>
<td>9,000</td>
<td>18</td>
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<tr>
<td>MAUI</td>
<td>90,129</td>
<td>180</td>
</tr>
<tr>
<td>OAHU</td>
<td>16,500</td>
<td>23</td>
</tr>
<tr>
<td>KAUAII</td>
<td>114,500</td>
<td>231</td>
</tr>
</tbody>
</table>

Total 6,971,524 13,947
WHAT TO DO TO BRING BACK ABANDONED ORCHARDS

There are two different jobs to be done in bringing back into production the old coffee orchards which have been abandoned for so many decades. The first is the removal of shade trees and weeds. The second is the proper care of old trees and young seedlings by correct fertilization practices, weeding and pruning, and the subsequent replacement of poor producers within four to five years. Old rejuvenated orchards do not look as attractive as new vigorous orchards. The advantage in reclaiming them at a time like this however, when the price is high, is in the fact that most of these old trees will bear the following year and can be expected to yield a fairly large crop for the following four or five years. In the meanwhile, the operator can gradually replace the poor trees with strong young seedlings, and in the course of 6 to 8 years develop an orchard of new trees while harvesting paying crops over at least half of this period.

REMOVAL OF SHADE TREES

In Hawaii there is no need for shade trees, which definitely reduce the size of the crop. Properly pruned and fertilized, unshaded coffee trees can be made to produce well for many, many years. The first job, therefore, is to remove the unwanted shade trees which grew up during the period of abandonment. Some of them are very large, especially where ohia trees have invaded. In most areas, the usual shade trees found are guava, kukui, Java plum and ohia, none of which is very difficult to eradicate.

The use of bulldozers, if they are available at not too much cost, is the easiest and in the long run the least expensive way of clearing the land of guava and kukui trees. One disadvantage of using a bulldozer to be noted, however, is the possibility that, unless the operator is very careful, many valuable volunteer seedlings may be destroyed.

CARE OF COFFEE PLANTS AFTER SHADE HAS BEEN REMOVED

After the shade trees have been removed, there will be some burning of coffee leaves resulting from direct exposure to the sun. Do not be disturbed by this. There will be new growth of leaves and branches as the root system develops.

When the trees were in the shade, evaporation of moisture from the leaves was at the minimum, and the root system of the trees was proportionately undeveloped, but with the removal of the shade, evaporation increases, demanding more moisture from the root system and causing it to develop rapidly.

Fertilizing, selecting, weeding, pruning, replanting and rat control are some of the more important jobs involved in the care of coffee plants after the shade is removed.

FERTILIZING

As soon as the shade trees have been removed and weeds destroyed, broadcast approximately 500 pounds per acre of high nitrogen and phosphoric acid fertilizer, such as 10-10-5, or 10-10-10, throughout the field and not just under the larger trees, especially if there are many volunteer seedlings growing all over the orchard, as is usually the case in an abandoned coffee orchard. This first application of fertilizer will help the root system which is just commencing to develop, and give added impetus to the elongation of vertical and lateral branches.

SELECTING PERMANENT COFFEE TREES

Two to three months after the removal of shade trees, and after the first application of fertilizer, select the best trees to be left in the orchard. If the trees which
were originally planted in the orchard are still living and productive they should be allowed to remain in place. With proper care they may be expected to bear well for several years.

If the original trees are dead, however, or in very poor condition, it is better to leave the younger voluntary trees. It is recommended that a 9 X 9-foot spacing be employed. Some nicely developed volunteer trees will be spaced irregularly, but if they are at a distance of from 7 to 12 feet they may be allowed to stand where they are. Eventually some of these trees must be replaced with better trees, and when this is done, a definite 9 X 9-foot spacing should be followed. What is important at this stage is to have trees in the orchard which will bear as soon as possible, to pay for the cost of rejuvenating, and if possible yield a profit as well from the first or the second year.

The use of several long strings, marked or knotted every nine feet and stretched parallel to one another from one end of the orchard to the other, nine feet apart, is the most practical way of getting a symmetrical planting of 9 X 9 feet. Every tree selected to remain in the orchard permanently should be marked with white paint or a strip of cloth tied to the trunk 2 or 3 feet above the ground. If there is no coffee tree in the neighborhood of the spot where there should be one, dig a hole there and plant a voluntary tree with a trunk diameter of about one half inch or larger at a 40 degree angle.

After the permanent trees have been selected, apply two or three handfuls of the same fertilizer used in the first application to each permanent tree. Broadcast it thinly over an area about three feet in diameter under each tree, starting three or four inches away from the trunk.

Other seedlings in the orchard should by this time have developed fairly good root systems and be ready to be sold or planted in a new orchard. The larger seedlings, two to three feet tall, should be carefully dug out with as many roots intact as possible. Protect the root system from drying out by immediately placing it within a wet burlap bag or keeping it in water. If successfully replanted, these larger seedlings will begin to bear a small crop the following year, and a considerable crop two years later. For this reason, although they are more difficult to transplant and there is some danger of setting them back if not carefully dug, it is highly desirable to use the larger seedlings. It would seem needless to emphasize that the transplanting should be made only during the rainy season unless irrigation water is available.

Two or three months after the last application, give another 400 pounds of 10-10-10 fertilizer per acre. The final application of 400 to 500 pounds of 10-10-10 fertilizer during the first year should be given four months later.

**PRUNING**

Most coffee trees which have been growing under shade trees are spindly, with only a few pairs of short laterals, usually on the upper third of the vertical. With the removal of the shade, weed control and application of fertilizer, both the lateral and vertical branches will begin to produce new growing wood. New suckers will start here and there.

As the months go by, with added fertilization given and better growing conditions provided, the vertical bends over under the added weight of leaves, new growth and developing fruits. An interesting phenomenon with regard to the coffee plant at this time is that when the vertical bends over, the growth of the vertical branch slows down to almost nothing while several new verticals begin
to grow from the old verticals. This is a desirable natural characteristic because it is essential in any case to replace old verticals with new ones.

If the old tree consists of one healthy vertical which is so strong as to remain straight up even with a heavy crown resulting from a new growth of verticals and laterals several feet above ground level, it should be forced to develop new verticals on the stump 1 or 2 feet above the ground, because on such tall trees it is difficult and expensive to pick the coffee fruits. Most trees will produce new suckers near the ground level but some will not. One of the most effective ways to force new verticals seems to be to remove the top, but experienced coffee farmers claim that if the old top is completely cut off at a distance of 1 to 2 feet above ground level, it either produces weak verticals or does not produce any, and dies. A common practice used by successful farmers in rejuvenating such a tree is to not completely sever the top, but cut two-thirds of the way through the trunk and push the top over, keeping it alive for several months by allowing the top to retain sufficient attachment to the trunk to live until three or four sturdy verticals have developed on the stump close to ground level. Then the top is completely severed.

If the tree is very old however, it is reported that even the new vertical growing on the stump begins to give a progressively smaller yield after two or three years. Therefore, this type of strong, single vertical old tree is usually allowed to develop as much as possible without any pruning during the first year, to be eventually replaced by a new plant after harvesting two or three crops. By leaving the top growth during the first year, a strong root system can be developed before any further pruning is done.

**CARE OF SOIL**

In the old days, when labor was less expensive, Kona farmers used to improve the condition of the soil by digging up and removing all the roots and rootlets of guava and other pests which had grown up over several decades and covered the abandoned coffee orchard. Under this treatment the soil was nicely pulverized. Old coffee roots were pruned unintentionally, but it was generally believed by the farmers that this practice forced the growth of new roots, one factor responsible for a large yield of coffee during the first three or four years after an abandoned field has been rejuvenated by this method.

**BEGIN A NURSERY**

Any farmer who rejuvenates an old, abandoned coffee orchard, should start a seedling nursery during the first year because he must eventually replace some of the old trees if the orchard is to be highly productive. Old coffee trees are not different from old cows or sows. They cannot produce at the rate of young trees.

Every effort should be made to plant Guatemalan coffee for replacement. As it takes two years for the seedlings to reach an optimum condition for permanent planting in the orchard, the nursery should be started as soon as possible.

**THE SECOND YEAR**

The care of a rejuvenated orchard during the second year is a routine operation as far as fertilizing and weeding are concerned. Apply 14-7-28 fertilizer four times, 400 pounds at each application. (Note: 10–10–10 was used throughout the first year). The first application should be made before the major flowering, and usually when the trees are semi-dormant. The next application is
made soon after the flowering and the third three months later when the new growth is developing rapidly and the fruits are maturing. The last application is made just before harvest time.

Pruning during the second year in a rejuvenated orchard requires much time and care.

If the orchard is in a cloudy and rainy section it probably requires the practice of the topping system of pruning as is done in Kona at the higher elevations. If this system is to be followed, a strong vertical developing from the trunk, as close as possible to ground level, should be selected. Only this one should be allowed to grow. Although it depends on several conditions, it is probably most desirable to remove the old vertical as soon as the crop is harvested and thus allow all the trees' energy to go toward the growth of this new vertical which should be topped at 6 feet by pinching off its growing tip.

If the climatic conditions permit the use of the multiple-vertical system of pruning, four, five, or six strong verticals growing as close as possible to ground level should be selected, and all other suckers removed.

During the growing season, from April to July, Kona farmers usually go around their orchards periodically, removing all unwanted suckers. It is advantageous to do this because it is very simple to either rub or pull off the very small suckers. However, if the suckers are allowed to grow to a length of 1 or 2 feet, their removal requires more effort. Furthermore, they have taken away valuable plant food, which should have gone toward developing fruits and to verticals and laterals growing for next year's crop.

By the end of the second year, a large number of the old verticals present at the time of removing the shade trees should be removed wherever new verticals have grown large enough to bear fruits during the following year.

Some of the old trees which have not responded to the removal of shade, or to proper weeding and fertilizing should be destroyed and new trees planted in their place, because they probably will not amount to very much due to a poor root system or some other defect in the tree.

**REPLACING WITH YOUNG PLANTS**

This job of replacing the old, poor producer with a young, vigorous coffee tree should be religiously practiced not only in recently rejuvenated coffee orchards but in others as well. Coffee farmers must constantly keep this need in mind, because as one walks through the Kona orchards, for instance, careful observation reveals dozens of coffee trees in any given acre of plantings, which should be replaced with young seedlings. There are also some vacant spots caused by the death of old trees. These should be replanted.

Without the loss of much crop, replanting with young seedlings can be satisfactorily accomplished if the entire orchard is replanted over a period of four to five years by replacing annually only 20 to 25 percent, and following the definite pattern of replacing only those which are the poorest producers. The best method is to plant between the old trees. By carefully planning ahead of time for the entire orchard, orderly spacing of trees can be achieved.

If the existing spacing is 9 X 9 or 8 X 10, holes for new plantings should be made equidistantly from four of the old trees forming a square, with the new planting in the center. If the existing planting is closer, some scheme should be devised so that eventually a 9 X 9 or 8 X 10 spacing in the orchard will result. The holes should be approximately 18 inches in diameter and 18 inches in depth. If planting is to be done immediately, place two handfuls of high phosphate fertilizer in the bottom of the hole, cover it with soil, and plant the new seedling.
The newly planted tree is usually shaded by the branches of older trees nearby, so practically every tree lives, but the planting should be undertaken during the rainy season to minimize loss.

As these newly planted trees grow, the low-yielding old trees should be gradually eliminated, first by trimming off those branches which are shading the new trees, and then by taking out the whole tree. The increased production realized from the new tree after the fourth year, and for the next thirty to forty years, justifies a gradual replacement of poor producing old coffee trees. Only Guatemalan coffee plants should be used for replanting.

**RAT CONTROL**

As most of the abandoned coffee orchards are surrounded by neglected fields or forest with guava and other plants which give shelter to rats, a definite rat control program must be undertaken. At present the most effective method of controlling rats in coffee orchards is by the use of rat poisons. Unless rats are controlled, much damage will be done by them. They chew up the growing wood of both vertical and lateral branches, destroying not only the fruits on these branches but also the growing wood which will bear the next season’s crop. The greatest damage from rats in Kona is observed during the spring months when the sap begins to “run”. Rats also do damage by eating out the pulp of the ripe coffee cherry, causing the bean to drop. The monetary loss from rats runs into big figures if unattended.