



## Cooperative Extension Service

College of Tropical Agriculture and Human Resources  
University of Hawai'i at Mānoa

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eNewsletter for **Hawaii's Cacao to Chocolate Industry**

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Aloha Hawaii Cacao to Chocolate growers and entrepreneurs,

In this second issue of C2C we'll update you on the progress of the Hawaii State-wide Cacao variety experiment, ways to copy your best trees, fermentation and drying, cost of cacao production in Kona, a Hawaii cacao place on the Chocolate Life website, and state support of cacao.

### **Hawaii State-wide Cacao variety experiment - HSCT**

Trees selected for this are:

Three trees (4, 8, and 9) selected at UH Waimanalo, two trees (W1020117 and W1010709) identified by Dr. Chifumi Nagai (HARC) and Dr. Ray Schnell (USDA) in Waialua, two criollos from UH Poamoho and Kauai, two international varieties (ICS 95 and Amelonado) recommended by Dr Ray Schnell and one tree identified by Dr. Francis Zee (USDA) with potential Black Pod disease resistance R5T5.

Locations of the cooperators in Honolulu are Waimanalo, Kualoa, Pearl City, and Waialua. On Hawaii they are in Kona lower Honaunau and upper Holualoa, in Kohala near Hawi, near Hilo in Honomu and upper Hilo.

We had great difficulty rooting cuttings, the propagation method of choice. After two years with insufficient progress we switched to grafting. March 2009 we began multiplying our stock plants using a top wedge graft. These plants will supply scion wood to graft trees for field planting. The original stock plants were made from air layers, and approach grafts. In October as winter approached grafting success declined and our stock plants grew slowly. Grafting resumes this month with the first field planting scheduled for late April or early May.

Top wedge grafting with scion from stock plant to seedling rootstock for field planting.

Fig. 1 Select diameter match scion (top) and rootstock (bottom).



Fig. 2 Cut notch in top of rootstock, cut two-sided point on scion and **don't touch the cut surfaces with your fingers.**



Fig 3. Wrap graft with Parafilm or stretch plastic strip to hold scion and rootstock tissues close.



Fig. 4 Cover to below wrapping with plastic bag to prevent drying of scion before graft union forms.



Once the scion's new leaves are mature, it's ready for transplanting. Use a clear to opaque plastic wrap over a cage made of fencing or stakes or tree tubes to surround the transplant **immediately after transplanting**. This system is essential if the orchard does not have excellent wind control. In addition this system reduces drying of the transplant, reduces exposure to direct sunlight, and protects against the rose beetle. If you are planting seedlings then consider planting seeds directly into the orchard then using cages or tubes. This saves time and money on a nursery. Plant two seeds but thin to the strongest seedling a month after removing the cage or tube. Stake seedlings **immediately after removing the cage or tube**. Tree tubes at <http://www.plantra.com/> .

Below Dan O'Doherty stands in an orchard experimenting with different size tree tubes and cages.



### Copying you best trees

Our new cacao industry is currently based on seedlings which means non-Criollo orchards can be quite variable particularly in yield. The rule of thumb regarding yields in seedling cacao orchards is 20% of the trees make 80% of the yield, and the remaining 80% of the trees produce only 20% of the yield. As your trees begin bearing, mark those trees that start bearing first, also mark those that appear to have a large number of pods at harvest. If you keep records you will find seedling trees that begin bearing good yields at an early age. Then you can multiply these trees either by grafting (see above) or making air layers (see below).

<p>Cut 2" band around 1.5 to 2" diameter chupon or fan branch. Dust on a commercial rooting hormone on bark above cut.</p>	<p>Pack nylon bag or cheese cloth with moist sphagnum moss wrap tightly around branch to cover bark with hormone.</p>	<p>Wrap sphagnum completely with stretch plastic to prevent drying out.</p>

When you roots appear the under the plastic in 5-8 wks cut off upper portion of branch but leave a few leaves above the root zone then cut off the air layered branch just below the sphagnum. The air layered branch should at least 18" long. Carefully unwrap plastic but not sphagnum and plant into large pot or directly into ground and surround with cage until new growth matures above cage. You now have an exact copy of the tree.

### **Fermenting and drying issues**

Wherever you are in Hawaii fermenting in the winter can be a challenge. Even farmers with 25 to 250 lb of seed to ferment encounter problems. These larger fermentations don't usually require added yeast to start but turning and keeping the fermentation warm is important. The ferment should reach 115 F in 72 hrs. It can then cool down slowly until the end of the ferment in another 72 hrs. Any container that does not react to acid such as wooden boxes, half barrels or ice chests can be used. What ever container is used make 0.5 inch diameter holes on the sides and bottom for the mucilage to drain away. Do not place the ferment directly on the ground or cement floor as they will pull heat from the ferment. Sunshine warms the ferment during the day but, the ferment is likely to cool down at night. Its important to prevent nightly cool down especially after turning. Consider fermenting in a plastic-covered hoop house that is situated to catch sun and make sure there are no drafts. A night blanket will help retain heat by preventing large radiation heat loss to a clear night sky.

For drying, you need to encourage drafts of dry air and sun to supply evaporation heat. Yes you want the sun to warm the seeds but you need ventilation during the day to remove the moist air around the seeds. It's the removal of moist air around the seed that does the drying not the heat. At night seed should not be ventilated as the seed will pull moisture from the cool humid air.

We developed a technique for fermenting small (0.5 to 2 lb) amounts of cacao which requires a yeast ( 1/4 teaspoon baker or brewers yeast or much less for 2 lb of fresh seed) and additional heat — this method was presented in our extension publication, 'Making chocolate from scratch'. A modification to the method in the extension publication is to use a controller to increase the temperature of the air surrounding the fermentation container in steps until it reaches 115 F in 72 hrs and then reduces temperature in steps back to ambient temperature in another 72 hrs. This will save some energy cost.

### **Economics of Cacao Production in Kona**

Recently retired CTAHR professor Kent Fleming, recently resigned extension agent Virginia Easton Smith and I published an extension bulletin, The Economics of Cacao Production in Kona, CTAHR AgriBusiness 17, available from the CTAHR website, me, plus it will be posted on Chocolate Life. An interactive Excel spreadsheet is also available. Our industry is so young that the data we gathered is still quite limited and improvements to the spreadsheet will be made over time.

### **Hawaii Cacao 2010 on Chocolate Life**

We have a forum page on <http://www.thechocolatelife.com/> courtesy of Mr. Clay Gordon owner of The Chocolate Life website. This is my attempt to create a network not only for members of Hawaii's cacao to chocolate industry but to promote discussion and networking within and beyond Hawaii where there is a significant niche cacao and chocolate market. This newsletter will be placed there as well other information relevant to our industry.

### **A Report to Expedite the Production and Delivery of Hawaii Cacao to the Marketplace**

Prepared by HDOA in December 2009 in response to HI Legislature resolution no. 362 GH 2 (2008). This is the most recent assessment of the state of the cacao to chocolate industry in Hawaii. If you don't have a copy I can email it plus it will be posted on Hawaii Cacao 2010 forum on The Chocolate Life.

### **What are your issues ?**

Email or call me (808 956 6043) about issues affecting you and the industry as a whole. True I may not have the answer or the funds to address them but let's give it a try.