Orchard issues and Economics of Cacao Production in Kona

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Site

Colder sites have lower yields.

Dry sites less than 60 inches/yr require irrigation.

Trade wind exposure:

- lowers yield
- or requires planted wind breaks
- and young tree protection.

Rock land should be ripped at least 2 ft and smoothed to allow wheel equipment.

Always take soil sample and amend as recommended.

Orchard layout

Spacing – best for yield is unknown in Hawaii.

Current spacings:

Intensive Planting System (IPS): double rows of trees spaced 3 ft in row, 6.5 ft between rows, and 13 ft wide alley approx 1500 trees/acre

Single row: 6 ft x 12 ft, equipment on both sides approx 600 trees/acre.

Equal distance: 10 ft x 10 ft, allows natural tree shape approx 435 trees/acre.

Nursery : Seedling vs. grafted

Virtually all cacao planted on farms are seedlings. Cacao generally is a open-pollinated crop like macadamia and does not grow true to the seed parent. Criollo appears to be an exception.

A seedling orchard will be variable in pod size, seed size, yield, quality, time of harvest.

A well selected grafted orchard will be much less variable. In Hawaii we have not yet identified which grafted trees will do well in any of our environments. We are working on this.

Seedlings are less expensive to produce. Grafted trees require a rootstock that might be a seedling and a scion which might be from another grafted plant or selected seedling. Grafting experience and nursery are required.

Currently seedlings are produced by planting in pots, bags, and dibble tubes. Seedlings are planted at 4 to 12 months old usually after a ‘hardening’ period in brighter light to avoid sunburn.

Seedlings in
6 inch pots

Seedlings in 2x2x8 inch free standing dibbles, 25 tubes per plastic box.

Seedlings in 3x3x12 inch pots

Alternative to seedling nursery: Planting seeds in orchard

These shelters are reusable made of opaque plastic sheet over fencing. The pink tube on right is sold by Plantra.com 3 ft is $1.50 each in 1000 units plus shipping.

Planting: Windbreak Options

Establish before planting cacao.

None – if calm protected site like Kona.

Tree shelters vs. wrapped cages – only for establishment.

Permanent windbreaks

- Orchard- between banana other fruit trees
- Bana grass - cane grows 20 ft in one year, plant stems horizontal.
- Wiliwili haole – parasite of Erythrina gall wasp appears to be controlling, try it.

Cacao between banana

Bana grass and stem piece for planting.

Cacao with wiliwili haole

Planting: Irrigation

If you need irrigation simplest is hard poly pipe with 1-2 gal /hr drippers. Close spaced trees use microsprinklers between trees or built-in emitters.

Note 1-2 month slow release 10-10-10 in planting hole.

Sustaining : Fertilization

If irrigating most efficient method is by irrigation or fertigation.

Before bearing - balanced N:P:K fertilizer

After bearing - N:P:2-3 K perhaps more P

Unfortunately tissue analysis is difficult to use due to growth pattern but recently matured leaves as best to try.

Sustaining: Weed control

Use herbicides to control weeds in plant row before planting.

After wards mowing or 3-4 ft wide black ground cloth in row.

Heavy leaf drop and accumulation plus shade will greatly reduce weeds within 3-4 years.

Sustaining: Pruning

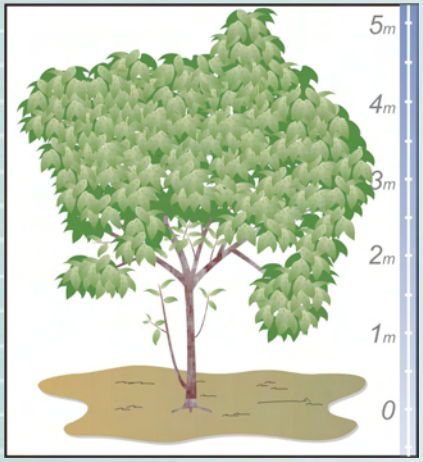
Goal is create a tree structure 12 ft high with 3-4 fan branches in jorquette about 3 ft high so make harvesting easier.

Remove excess branches.

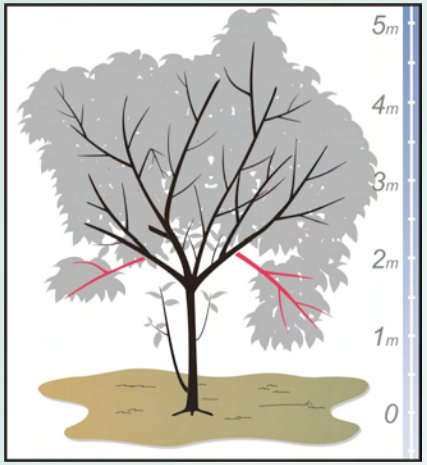
Maintain an open center.

Loppers, clippers, knives, pruning saw

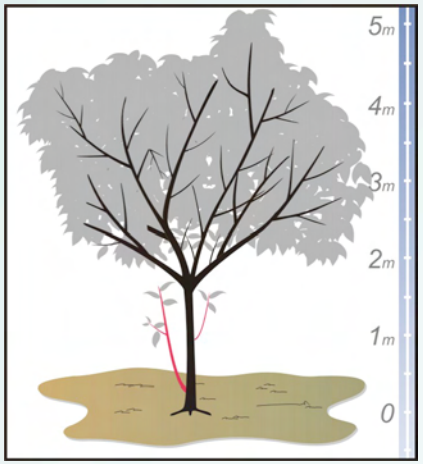
After harvest



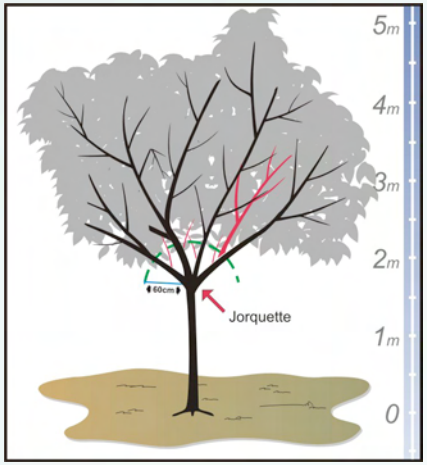
Remove drooping



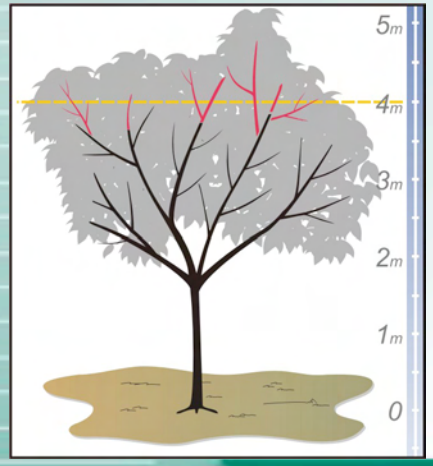
Remove chupons



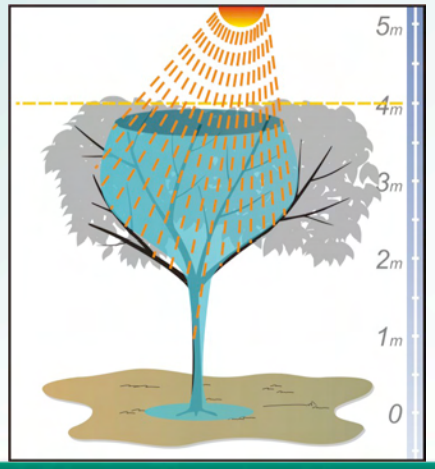
Remove within 1 ft of jorquette

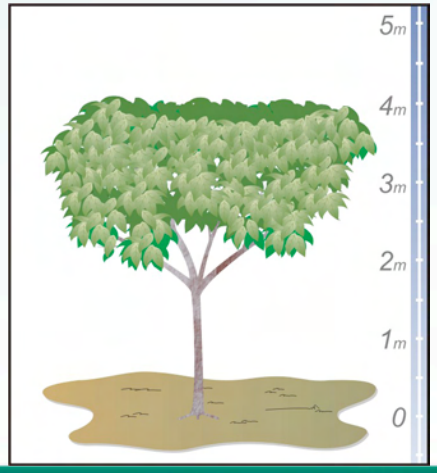


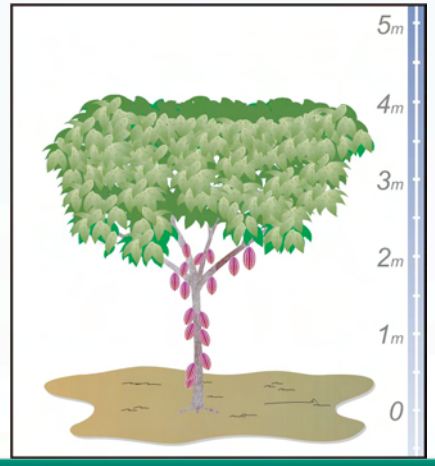
Top at 12 ft



Open center for light







Sustaining: Harvest

When green pods turn yellow, and red turn orange.

Use clippers or knives don't pull or twist off.

The Economics

All agree that sustainable agriculture must be environmentally and socially responsible and **profitable.**

But what is "**profit**"?

Is it simply cash sales minus cash expenses?

No, that is "**cash flow**" -- all cash in minus all cash out.

Cash flow is important for many reasons:

1. CF is relatively easy and quick to compute, even when one is especially busy with other time demands. (This why a CF is usually the only recordkeeping farmers do.)

2. CF is a good indicator of survivability ("liquidity"), the ability to pay what is owed in a timely manner.

3. With appropriate modifications, accountants and the IRS base their calculations on cash flow: "accounting profit" and "taxable income."

- *But* CF is only a short-term measure and to be sustainable a business must, in the long-term, be profitable.

By contrast, economists are concerned with *total* revenue minus *all* of the costs (*both* cash & non-cash costs, that is, "opportunity costs")

An "**opportunity cost**" is what one has to give up in order to do something else.

For example, time, a limited resource, must be allocated in one way or another. If you spend all day pruning your cacao trees, then you cannot work at McDonalds.

So if you could make $8 an hour at McDonalds, the opportunity cost of pruning is $64 (8 hrs x $8/hr.)

Presumably you choose pruning because it will ultimately generate more than $64 in added cacao sales revenue (not to mention be more interesting, the "psychic dollar" value.)

Economic profit is positive when *all* the productive resources can be paid their real value by revenue generated by the business.

However, two opportunity costs relatively difficult to calculate:

1. the value of the time you spend managing your business, and
2. the value of the capital you invest in your business ("owner equity")

Therefore, it is more convenient to determine all revenue minus all costs, *except* the **value** of your management and investment. Thus, our "bottom line" is "**Management & Investment Income**" rather than "economic profit."

So for our purposes we will be calculating the **return** to management and investment rather than economic profit, and it will be up to the owner-manager to decide if that return (i.e., the enterprise MII) is "adequate."

Costs:

- All costs are annualized costs per unit of production: that is, cost per pound of cacao, per tree, per acre and/or per enterprise.

Operating costs (sometimes referred to as "variable costs") are those which are incurred for the production cycle being considered. An example is the cost per year to fertilize the cacao crop (per tree or per acre, etc.)

- **Growing costs** are organized by growing activity and include costs of materials, equipment and time.)

- **Harvesting** costs are usually figured on a cents per unit basis to accommodate yield differences.

Gross Margin

The gross revenue minus all the operating costs; the amount available to pay the ownership costs.

- Farmers often say, “I’m doing OK, but my fixed costs are killing me.” So, the gross margin is an important figure to focus on. It tends to be similar for others producing the same crop at the same scale of operations in the same market.

Ownership costs

Ownership costs are incurred for things, such as a tractor, that are not totally used up in one production cycle. A capital item can be annualized by dividing its initial cost by the number of years one expects it to last. The annualized cost can then be deducted from the annual revenue to determine the annual profit.

For example, a small tractor might cost $20,000 and if you expect it to last 10 years, its annual cost to the business is $2,000. (The fuel, etc. to operate it would be captured in the earlier operating costs section.)

Risk

Risk is the likelihood of something bad happening.

- **Break-even analysis**: The price or yield at which point one is able to cover all costs.
- **Sensitivity analysis**: A range of prices or yields that are above or below the break-even point.