



Mechanical of JOJOBA

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Fig. 1. Male jojoba plant found in San Jacinto Valley of Baja California. Total height 14 ft. 4 in., height of trunk 5 ft. 2 in., maximum diameter at crown level 1 ft. 5 in., maximum diameter of foliage 14 ft. 6 in.

If jojoba could be pruned to resemble tree-like plants recently found growing wild in Baja California, nuts could be harvested with existing equipment, making commercial jojoba plantations economically feasible.

The possibility of growing jojoba as a commercial crop in California is largely dependent on the development of a low cost method of harvesting the nuts. Because of the lack of commercial, producing jojoba plantations it is not possible to evaluate various promising methods of harvest at this time. It is necessary, however, to carry out all possible preliminary investigations on potentially useful equipment and on plantation management in anticipation of the problem.

Native populations

Native populations have been harvested by hand when the nuts are close to maturity but prior to dehiscence. On the average one worker can pick 5 pounds of nuts per hour. These nuts contain about 50 percent moisture and 32 percent (which can be removed mechanically after drying), reducing the average weight of clean, dry nuts harvested



Fig. 2. Main trunk of male jojoba plant consists of many intertwined branches.

per hour to 1.7 pounds. At this level of harvest efficiency, jojoba nuts would be too expensive for most of their contemplated uses, even disregarding other handling charges. It is necessary, therefore, to develop systems of mechanical harvesting for cultivated jojoba plantations.

Jojoba nuts naturally drop to the

ground soon after maturity. If jojoba's low, bushy type of growth could be bred or pruned to tree-like growth, existing nut harvesting equipment and techniques could be used.

Could jojoba grow like a tree? In low rainfall areas, such as the Joshua Tree National Monument in California, jojoba usually grows to a

Harvesting

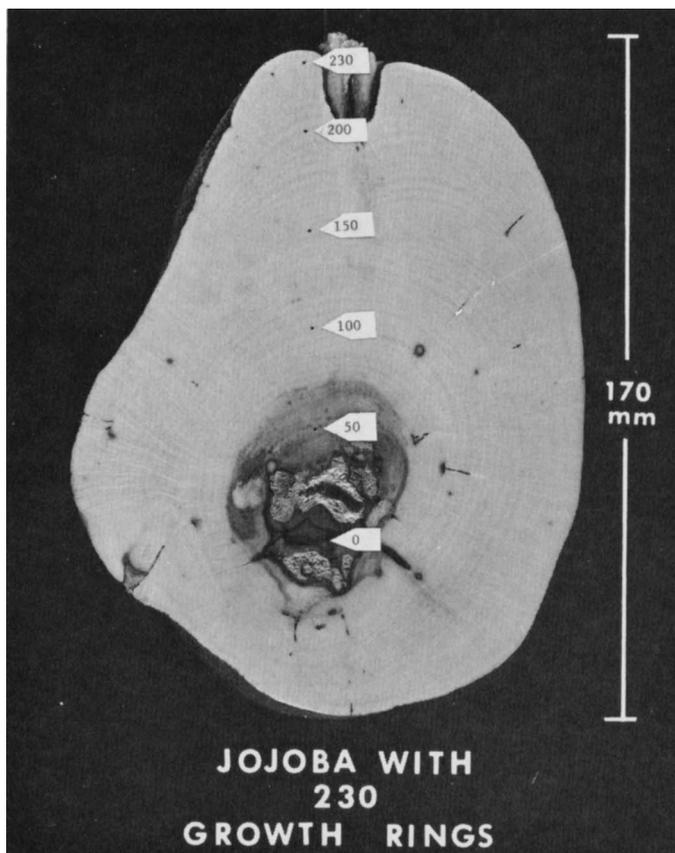


Fig. 3. Section of jojoba stem with 230 growth rings from the Aguanga population in California.

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height of only 3 to 4 feet, and little could be done to alter its growth habit. Where rainfall is 10 to 15 inches, however, jojoba reaches and occasionally exceeds 10 feet in height.

Until a few months ago, it was not known if jojoba could survive the excessive, continuous pruning that would be necessary to make such a plant look like a tree. Several wild, tree-type jojoba plants have now been found in the area of Ensenada and San Vicente in Baja California, Mexico, where rainfall is 8 inches per year (figs. 1 and 2). Most tree-type jojoba plants in this area are inside fenced fields, and it appears certain that their shape is due to the continuous removal of the lower branches by grazing cattle.

Experimental pruning

In the jojoba experimental plots at the U.C. Riverside campus, jojoba was first pruned to a single

stem, to simulate several wild, tree-type jojoba plants found in California. The trunk of these wild plants consists of a single stem, or of very few dominant, older, large-diameter stems (fig. 3) surrounded by a few smaller diameter, younger stems. Single stem pruning was soon abandoned, however, because: 1) jojoba branches are quite brittle and a large single stem tree might easily be lost due to breakage, and 2) lateral branching in jojoba is so persistent at the seedling stage that pruning becomes a major cultural expense and an unending chore.

A multiple-stem trunk is now sought (see fig. 2). When plants are about 2 feet tall they are enclosed in a slightly shorter cylindrical sheath, 6 to 8 inches in diameter, made of plastic screen or perforated heavy construction paper (fig. 4). The sheath forces all branches to grow upright. As the plants grow in height the sheath is slipped upward so as to discourage lateral extension



Fig. 4. Jojoba seedling, 2½ years old, enclosed in paper sheath.

of branches until the main trunk is 4 to 5 feet high. Jojoba plants trained in this way should look much like the plant shown in fig. 1.

Plantations with well - levelled soil, slightly compacted on the surface, will be able to harvest jojoba with conventional sweeper or suction nut picking machines, such as those used for almonds or walnuts. In areas where the soil is too sandy or powdery for such harvesting equipment, plastic netting could be used to catch the falling nuts. In Hawaii, such nets are used to harvest macadamia nuts. Continuous nets are permanently installed under the trees on the row, but elevated between rows so as to allow the passage of men and equipment. Hulls that drop could also be collected in the nets. Although little attention has been focused on the hulls they may not be entirely useless, since they contain, on a moisture-free basis, 58.3 percent carbohydrates, 16.2 percent crude protein, 0.5 percent crude fat, 16.5 percent crude fiber, and 8.5 percent ash.

A 5-acre jojoba plantation at U.C. Riverside is now in its third year of growth. After its fifth year, we will be able to try out some of the above discussed harvesting techniques.

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