

## **Planting and Pruning Avocado Trees**

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### **Introduction**

These remarks are directed, primarily, to those about to plant new groves of avocados. They will add fuel to the fire which rages over the most controversial subject in horticulture—pruning. The writer is herewith stating a position on the pruning of avocados, which is quite the reverse of his opinion expressed in contributions to the literature of the industry in much earlier years. After thirty odd years of development, the industry is approaching a point where the cycle of growth has reached a degree of maturity and this provides a sounder background for a true estimation of the factors involved in a sound pruning program.

There are elementary matters involved in this discussion which should be understood before getting down to a consideration of details. In the first place, the Fuerte variety, comprising more than three-fourths of the California plantings, presents the main problem and therefore most of these remarks deal with it. A few supplementary notes will be added dealing with other varieties. Secondly, the writer does not believe it practicable to separate the discussion of pruning this variety from two other problems inextricably linked with it—planting distances and thinning operations. Lastly, due to the decadence of many hillside plantings, the result of avocado tree decline, their high production costs and low tonnage returns, the industry is tending, more and more, to gravitate to lands of deeper soil and better drainage, situated on benches and valley floors where some heating will be necessary. As most of the past plantings have been on slopes of considerable grade, many operators have no experience in planning planting distances and coping with the problems involved in trees reaching the great size which Fuertes attain on deep, rich valley soils; yet the industry, realizing, that under normal price conditions in post war years, high tonnage will be all important to profits, is rapidly turning to such locations for its future plantings.

Having dealt intimately with some valley plantings for a number of years and having had others under close observation, the writer is offering his observations and opinions for the benefit of those about to embark on such a project.

### **Planting Distances**

It must be understood that a Fuerte avocado tree of good, sound stock and planted on deep, well-drained, rich soil will be, inevitably, a large, spreading tree. How large such a tree might become, only lately has begun to be realized by many of us, who have always felt that they would be much larger than citrus trees. Perhaps it would be well to define relatively what we mean by deep soils. The scope of one's experience in

California seems to set the limits and there is little general agreement. Such soils, in our estimation, range from six to fifteen or more feet in depth with free drainage below that point. They are apt to vary greatly in composition and texture in any given acreage as they are very often the result of alluvial deposits.

On such soils, many of us feel that the ultimate spacing of matured trees may have to be from sixty to seventy feet on the square in order to give full sunlight to each tree. Obviously, it is impractical to consider setting out an orchard in the beginning on such a spacing. The problem, therefore, consists in studying all the factors of stock, soil, water, cold and wind and evolving a planting plan which will give a maximum of returns throughout the life of the grove, yet which will allow the permanent trees always to have satisfactory light and air conditions without wastage of high priced and high producing land. We do not believe that a spacing which barely prevents the trees from touching is sufficient to achieve the best results, as the effect of height also demands consideration. Probably the perimeter of each tree's foliage should be ten feet from that of the next one.

Planting on a square basis is apt to produce the most satisfactory results in the long run, providing the stock used is even enough in vigor and producing qualities to allow of systematic thinning. We already have found that a square planting on a forty foot basis will seriously crowd within twenty years and yet will not have reached its maximum growth or production. That being the case, we are of the opinion that the best results may be obtained by planting on a sixty foot square, interset at thirty feet. The inevitable thinning could be handled most advantageously on that basis. Those trees interset in the rows could produce over a longer period without interfering with the permanent trees and the one tree in the center of the sixty foot square could probably produce for several more years. We do not suggest any closer interplanting, as it is rare that a grower will have the courage to pull out interset trees soon enough, particularly if he has planted good stock which has cost a high price. He almost certainly will be tempted to crowd the permanent trees to their injury. The best plan is to see that the trees are never crowded for light and air, as such crowding always results in losses of the lower fruiting limbs and therefore loss of the fruit which is economically picked from the ground.

### **Setting Out The Young Trees**

There is still some variance of opinion as to whether the young trees should be severely headed at the time they are planted out in the grove or whether they should retain all the growth, particularly the terminal, with which they leave the nursery. Many growers do cut back severely and try to force a new spreading head at the time of planting, but our own observation makes it seem more reasonable to save all the foliage in order to build up new food reserves as rapidly as possible. When full recovery and vigor are attained in the second or third years, the tree is apt to throw out long, vigorous new shoots which lend themselves much more soundly to developing a strong vase type of head with three or four properly spaced leaders. This head should be developed at a height of three or four feet from the ground. If the tree is to be staked at all, it should be tied with open loops between two stakes rather than rigidly tied to one. For economy

and efficiency of operation and application, young trees should be watered in basins for the first two or three years before being required to depend on furrows or sprinklers. Sprinklers are usually not efficiently economical before the third or fourth years, particularly where the spacings are wide.

## **Pruning**

Pruning should be kept to a minimum during the first two years, as every bit of leaf surface is vital to manufacturing the food for rebuilding the tree. Only very wild growth not suitable to the permanent tree structure should be removed. Even this removal could be avoided in most cases if the trees were watched closely enough and this growth tied into a usable position or removed by pinching before attaining size. If full recovery has taken place and the tree is sending forth long bursts of vigorous growth, directional pruning may be begun in the third or fourth year. Well separated arms, three or four in number should be started in vase form. This type of head will be found to have distinct advantages over the modified or central leader form, both as to mechanical strength and as to ease of picking.

From the earliest days of the industry, there has been much complaint of the sprawling habit of growth of the Fuerte variety, particularly of its often stressed tendency to throw so-called strong arms. The parent tree in Mexico had a very pronounced strong arm. However, many Fuerte trees are just as difficult to discourage from growing as central leader types, when you do not wish them to do so. In the light of present day difficulties and excessive costs in picking fruit from high, slender tops, it may be that the Fuerte variety knows better than we do how it should, grow.

Given adequate room to spread out in the beginning, a Fuerte avocado tree will produce much more of its crop in that portion of the foliage which is easily handled from the ground and which is consequently much cheaper to harvest than is usually the case. In order to encourage this condition, all crowding must be prevented. Crowding immediately shades and causes the shaded limbs to lose vitality or to be lost altogether to the tree. Long lateral limbs must be allowed to come out from the trunk near the ground level and then built up into the air and light at a distance from the center of the tree. The breaking up of these large limbs into smaller growth at the perimeter gives an opportunity for a depth of producing wood with the ability to constantly reproduce itself, which will insure a higher percentage of low borne fruit than is at all possible in case such foliage exists only as a thin curtain hanging from a higher point. Such a thin curtain of foliage cannot carry any great amount of fruit and largely loses the ability to produce the new wood which matures in a two year period into bearing wood.

Heavy arms running out from the tree for many feet close to the ground surface present practical difficulties. Many groves which have been and are being laid out on soils of the character involved in this discussion are not equipped to irrigate save by furrows or flooding, which obviously demands at least a certain amount of cultivation. Under the outlined programme, cultivation would eventually become next to impossible as the trees attained size. Trucks could probably wend their way through to pick up fruit and distribute fertilizer, but tillage tools could not be used to make furrows or flooding checks. It would therefore seem that when the first few years had passed, it would

become necessary to arrange for sufficient water pressure to use sprinklers. This pressure can be provided in a number of ways and would undoubtedly effect economies, other than the important one of keeping a very considerable portion of the crop within easy harvesting reach.

In the third or fourth year, the young trees, being fully restored to vigorous growth, should be gone over and such structural and directional pruning as seems to be indicated, administered. Too close set crotches should be removed as they inevitably will split later. The main character of the head should be definitely established. Badly crossed or interfering limbs should be removed. Cutting at any time should be kept to the minimum as severe cutting is apt to upset tree balance and reduce crops by causing a surge into the production of new wood. Dead wood should be removed twice a year. All cuts should be clean, and in the contour of the limb or trunk and properly sealed. Large cuts should be resealed at least twice a year. No stubs should ever be left as the inability of the tree to heal over them will be apt to end in very expensive repair work. Frame work should be spread as much as possible to reduce height. Artificial support should not be resorted to except in those rare cases where certain main framework limbs may need cabling to maintain them intact. Such limbs should be cabled preferably to a center ring rather than cross supported. The tree then moves as a unit.

## **Thinning**

Now we come to the pruning of the interplants, which primarily must never be allowed to interfere with the permanent trees. Up to the point where they approach crowding, they are to be treated just as indicated in the passages leading up to this point. When the crowding point is reached, those sides of the interplants which threaten to interfere with the permanent trees should be reduced to a safe point for the latter, but may, thus reduced from season to season, stay in for the bearing of several years of reduced crops. No hesitation should be displayed in taking out the interplants in the rows whenever that step is indicated by crowding, but the tree in the center of the sixty foot square should be good for a number of years more. We would estimate the life of the interplants in the rows as between fifteen and eighteen years and that of the center tree as something over twenty.

The young trees should be purchased from a nurseryman who can supply the exact parentage of each tree and very comprehensive records of all phases of performance should be kept by the planter throughout the life of the grove. Each tree should have an individual number from the beginning. If after purchasing the best stock available, the planter still finds after some years of record keeping, that an individual tree is not doing its part in production, the cause may be due either to the root or to the bud or their improper combination. If he knows the exact bud parentage, he may try regrafting to another high producing bud parent, providing the tree is in vigorous physical condition.

In large old trees or too heavily loaded trees, a certain amount of breakage seems to be inevitable. The damage should be repaired promptly and properly to prevent more serious loss from decay. If this is done, the tree will soon fill the gap and go on from there. There is no reason why Fuerte trees of good stock should not make some returns in the third year and produce a crop at five. Typical cases to support the conclusions

reached by the author can be cited on application.

### **Hass And Nabal Varieties**

The Hass is rapidly becoming the variety second in importance to the Fuerte. When planted on similar soils to those discussed above and given plenty of room, it seems to be quite spreading in habit and probably should be given similar care. It is too early in its history to safely estimate mature size or planting distances, but more room than is usually thought to be needed seems to be indicated. Due to assured early bearing, often in the second year, interplanting should probably be closer than for the Fuerte.

The Nabal variety is still a large factor in the industry, particularly on the San Diego County Coast. One of the difficult problems associated with this variety is the height at which fruit is produced on vertical limbs, unrelieved by laterals. Experiments, now under way, seem to show that in order to relieve this situation, the tree must be cut back to within three or four feet of the ground just above three or four heavy laterals which are also shortened. These laterals then are allowed to bush out under strict control, the shoots being shortened and thinned out at least once in each six months period and all shoots originating from the lower side of the limb being carefully removed as being weak structurally. Great care must be taken to avoid sunburn injury to the exposed stumps. A new head always starts at the point where the cut is made and builds rapidly in a vertical manner, so that heading the tree at a high point only complicates matters.

### **Conclusion**

If these observations of a lifetime spent in watching the avocado industry grow from infancy to a relative maturity are of any value to the planter who selects the types of soils and locations now becoming accepted as most desirable, they should demonstrate to him the great need of careful planning from the inception of his project. He should select stock with a known background, free from Sun-blotch and budded from high producing parents, he should plan his spacings so that he will get maximum production throughout the life of the grove, he should form low spreading heads for economy of harvesting, he should prune and thin to avoid all shading of the trees by each other and above all have the courage to remove the extra trees as soon as they threaten the structure of the permanent trees.

New planters who can and will carry such a programme to completion are certain to have production beyond anything yet attained in the industry. They may not have so much of their total production in the earlier years of the grove, but the total of all crops will vastly surpass that of the crowded groves which the industry has almost entirely known to date. Above all certain very difficult problems which plague most growers at present should not arise at all.

—**From California Cultivator**