

CHERIMOYA CULTURE IN SPAIN

Luis Sarasola

Manager of Rancho California, near Almuñecar, Province of Granada. "Rancho California" is in reality a small experiment station, owned by Roger Magdahl of Quillota, Chile, one of the principal avocado and cherimoya growers of that country. Experiments under way include trials of more than 25 avocado varieties on various rootstocks; cherimoya varieties from several parts of the world; peaches, loquats, white sapotes and other fruits from California; and macadamias from Hawaii.

Antigua, Guatemala, 6 June 1960
Mr. Marvin B. Rounds, Editor,
CALIFORNIA AVOCADO SOCIETY,
Glendora, California

Dear Marvin:

Referring to your letter of 25 May, I am enclosing herewith a translation of Luis Sarasola's excellent paper on the cherimoya in Spain. I consider this paper a real contribution to the general subject of cherimoya culture, and especially, the comments as to why cherimoyas bear so well in Almunecar and do not bear well in California. I agree with Luis that it is a matter of climate; in California with our high temperatures and low humidities the stigmas dry out and become unreceptive before the anthers dehisce. I think the photo of a fruiting branchlet in Almunecar is an eye opener, and if I were a cherimoya grower in California I would have it enlarged and hang it on the wall and tell my foreman, "Keep your eye on this and do your best."

Because you folks have told me the cost of printing is so high in California, and because this problem of commercial culture is not so important, for you, as why Fuerte does not bear more regular crops, I have taken the liberty to translate only what I believe are the most important parts of Sarasola's fine paper; but I do hope you will publish all three of the photos included. It will be a long—a very long—time before we will get as interesting a story on cherimoya as this one. We must keep in touch with Luis in connection with avocados; he is doing a wonderful job in a region where avocados are going to be much easier to produce than they are in California, though I hate to say it. Their real problem is marketing, for the Spaniards in general are pretty conservative, just like the Frenchmen. Maybe I have told you the story passed on to me by my beloved old Chief David Fairchild. He went to France sometime around the First World War, and was telling his horticultural friends they ought to raise more sweet potatoes, very productive, very nutritious. No one seemed to know just what he was talking about, until one chap raised his hand and shouted, "Ah, oui, oui, c'est bon pour les cochons, ca!" Which being interpreted means, Sure they make fine hog feed.

Which takes me back to my last story to you, how to use avocados when they are a glut on the market. What I get out of all these stories is this: I am not going to worry too much about feeding the world off our available acreage, for some time to come. Though I have just read an article in some reputable publication saying that we shall shortly be living on pills out of test tubes. I am willing to submit to vegetarianism; I am willing to submit to almost anything except going without some good fruits and vegetables; if necessary, they can give me my vitamins via some pilldisher, though I have a deeply-rooted dislike for pilldishers.

Sincerely,

WILSON POPENOE

There seem to be no published data which tell us when the cherimoya was brought to Spain from the Americas. Quite probably it came to our country through Malaga, which port in the early days was in close contact with the New World. The tree eventually became established in the region between Gibraltar and Valencia, all along the Mediterranean coast, but more particularly between Marbella and Motril, which we call La Costa del Sol, "The Sunny Coast."

As regards Almunecar, by far the most important center of commercial cherimoya culture today—in fact almost the only one—we have a few data of historic importance. During the reign of Isabel II, Cejas Lozano, a native of this town, was several times a cabinet minister. He sent to important positions in the New World some of his friends who also were born in Almunecar, and through them were introduced into southern Spain such fruits as the guava, the avocado and perhaps the cherimoya. It appears that the cultivation of these species may go back somewhat more than a century. It is certain, however, that for a long time the cherimoya did not get beyond the stage of what we call a dooryard tree.

There exist a few small plantings which probably were made more than 50 years ago, but no major developments took place until the 1920's and 1930's. About that time transportation became available, thus making it possible to ship cherimoyas to distant parts of the peninsula, for example, Madrid, Valencia and Barcelona. Even now, however, many important cities have never seen this fruit.

On the valley floor of Almunecar (practically at sea level) most of the land is devoted to the cultivation of sugar cane. Only some 150 acres are in cherimoyas, but as one goes up the valley, towards the village of Jete, another 150 acres are to be seen which gives an approximate total of 300 acres most of which are on the slopes rather than the valley floor, which, for some reason or other, is not considered satisfactory for cherimoya cultivation. I am sure it is safe to say that the area mentioned entitles Almunecar and its surroundings to be considered by far the most important center of cherimoya culture in the entire Mediterranean region, including also Madeira and the Canary Islands.

CULTURAL CONDITIONS AND PRACTICES

Our valley opens onto the Mediterranean and is protected on the North by the slopes of

the Sierra Nevada and by high hills on the East and West. The soils are deep, mainly silts and fine sandy loams somewhat difficult to drain. As soon as drained after irrigation they tend to form tight crusts on the surface which almost prevent the entrance of air except through numerous cracks which open everywhere. As this is a limestone region, the soils are rich in calcium with 250 to 600 parts per million and a pH of about 8.5. Rains occur during 7 months, more or less, the first ones coming in October and the last in April. The total rainfall per year is low.

In general, only grafted trees are planted, but there do not exist in this region any commercial nurseries for the production of grafted trees. Seeds are planted around the edges of orchards and when the seedlings have attained a diameter of about $\frac{3}{4}$ of an inch they are shield-budded in May and June. Budding is usually done before the trees commence active growth after going through the semi-dormant period which occurs in Spring. If budded when in active growth it is considered that the abundance of sap is inclined to "drown" the bud.

Growers prefer to work seedlings of large size and they cut the buds an inch and a half long. Buds are inserted in T-incisions (not inverted T) and a quarter to a half inch of leaf-stalk is left attached to the bud. For tying, Esparto grass is invariably used. It is unnecessary to say that this material is not ideal, since it is hard and inclined to strangle the plant if growth is rapid.

Immediately after budding, the tops of the seedlings are cut off clean about two inches above the bud. This operation although standard practice and almost always successful is not to be recommended. A better union is obtained if the seedling is not cut until 15 or 20 days have elapsed after the bud is inserted; by this time a union has been made.

An interesting point is that budding is not done at three or four inches above the ground (as with citrus), but about three feet. No attention is given to the selection of seeds for the production of rootstocks. It is customary to use any seed that is available at the moment. Transplanting of budded trees is carried out in Spring shortly before the leaves are dropped; the best month is April but success is attained also in March and even in February. It is to be mentioned that the cherimoya is extremely easy to transplant. Trees six or eight years old with trunks four inches or even more in diameter are often moved without difficulty and this seems even more remarkable when one remembers that no care is taken in digging trees for transplanting. Very rarely are the tops cut back to reduce transpiration.

Young trees are given no pruning with a view to the formation of good crowns, which however are commonly developed naturally at a height of two to five feet above the ground.

VARIETIES

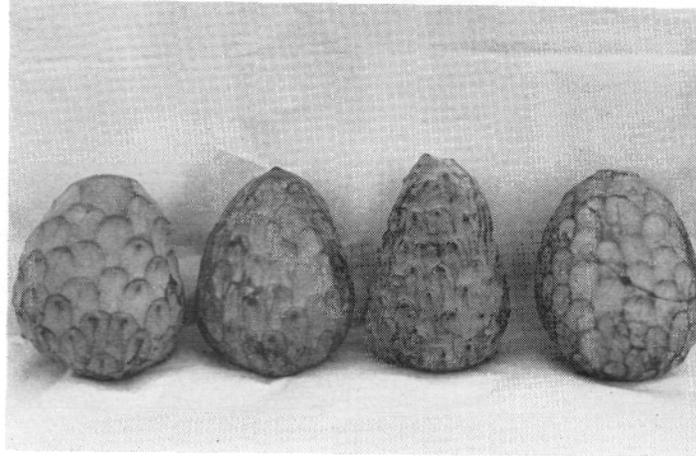
In the opinion of many persons qualified to express an opinion there are nowhere to be found more delicious cherimoyas than those on the Mediterranean coast of Spain. This may be due in part to our climatic conditions, for it has often been stated that many tropical fruits attain their highest perfection when subjected to a considerable amount of cool weather.

Since early days cherimoya growers of Almunecar have recognized what perhaps should be called races, known here as "Castas." In recent years there are one or two varieties which are true clones, that is to say, forms which have been propagated vegetatively from a known mother tree.

The oldest recognized "casta" is the **Pinchudo** which is characterized by well defined protuberances on the surface of the fruits. One strain or variety of this group, which is somewhat like the pineapple in shape, is of unusually fine quality. It is aromatic, with a perfect combination of acids and sugars. Unfortunately cherimoyas of the Pinchudo group are thin-skinned and for this reason much subject to the attacks of the Mediterranean fruit-fly. They are not being planted to any extent. However, insecticides now available for the control of the fly seem likely to solve this problem.



Cherimoyas on a tree at Rancho, California. These fruits are not the result of hand pollination. It is believed favorable climatic conditions result in such crops.



The four important kinds of cherimoyas grown in the valley of Almuñecar. From left to right, Campas, Negrito, Pinchudo and Jete.

Another race, or "casta" which has been cultivated for a long time is the **Negrito** or **Negro**. Many people consider this to be the best-flavored of all the cherimoyas. The flesh has the consistency of ice cream; sometimes rather gelatinous in character. Perhaps for this latter reason many trees of this variety are being top-worked to others.

The commercial races or castas are really only two: **Jete** or **Fino de Jete** and **Campas**. The latter, which has been propagated for not more than 30 years, produces large fruits of uniformly good shape. But Jete is the most important commercial cherimoya, in spite of the fact that it is slightly inferior in quality. It is sweet, but not very aromatic and the seeds are inclined to be what is here called "encamisadas," meaning that they are surrounded by a thin skin which is somewhat annoying when the fruit is eaten.

These cherimoyas and several others which are recognized, such as **Blanco** or **Cristalino** are undoubtedly of local origin. No cherimoya presently well known in this region has been introduced in the form of grafted trees.

While **Annona cherimoya** is recognized as an evergreen tree, here it drops its leaves in Spring just before the commencement of new growth. At this time flowers appear on mature branches, as well as on young ones; and they continue to develop throughout the Summer. The first flowers produce the best fruits, which also have the greatest commercial value because they are the earliest.

The productiveness of the cherimoya tree in southern Spain, as illustrated by one of the accompanying photographs, will perhaps surprise the horticulturists of California and in several other parts of the world. Good crops are not a matter of hand-pollination nor of cultural treatment. Almost certainly they are the result of favorable climatic conditions, most probably temperatures which rarely go about 85 F. and relative humidities which during the flowering season in spring are commonly 60 to 75% during the driest hours of the day. It may well be argued that our climate is rather unusually equable. Compare for example a few figures recorded in August with those of March mentioned above. Afternoon temperatures during this month are in the 80's and relative humidities, also in the afternoon, between 60 and 75%, probably due to the effect of our closeness to the

Mediterranean.

Based on the few observations which have been made there seems no reason to believe that the excellent productiveness of our trees is due to the presence of pollinating insects peculiar to this region. It seems more likely that favorable conditions of temperature and humidity keep the stigmas of cherimoya flowers in receptive condition until the anthers liberate pollen.

THE FRUIT

Returning to this subject, which was discussed to a certain extent under the heading of varieties, it seems worthwhile to enter into a few more details.

There exist great differences in the size and form of cherimoya fruits. Several factors are responsible for these differences. In the first place imperfect pollination, which results in deformed fruits as is well known by everyone has worked with cherimoyas and several other species of **Annona**. Deformed fruits are in quality as good as perfect ones, but their commercial or market value is affected seriously.

Fruits which ripen late in the season are useless—much smaller than those developed from the first flowers to open. Fruits which develop on the lower, and especially on inside branches where they receive little sunshine mature late in the season, have less flavor and are darker in color. The finest fruits are produced among the upper limbs, on vigorous branches exposed to sunshine.

Young trees customarily mature their crops earlier than older ones and the fruits often are of exceptionally large size (two to two-and-a-half pounds or even more) and are inclined to be perfect in form. Old trees, on the other hand, produce a large proportion of small fruits.

Campas tends to yield a smaller proportion of deformed fruits than other cherimoyas. **Negrito** produces many deformed fruits of small size late in the season; these fruits have no market value.



The importance of commercial cherimoya culture in Almuñecar is shown by this view in a packing house, where cherimoyas are prepared for shipment to Madrid, Valencia, Barcelona and other cities.

The ripening season in general varies from year to year. When the summers are warm, maturity may commence about the middle of September. Rarely is it later than the middle of October, at which time it may be said that the harvest really starts. **Jete** may be a few days ahead of others, followed by **Campas**; **Negrito** and **Pinchudo** are the latest. In general, commercial maturity is limited to the months of October, November and December. With cool summers, commercial harvesting may continue into January and February. It must be admitted that fruits which are definitely immature are oftentimes harvested so as to take advantage of the high prices in the early market; while on the other hand immature fruits are sometimes harvested late in the season so as to get the fruit off the tree and proceed to cleaning the land and preparing it for intercropping, which is usually practiced even in mature orchards.

The number of days which pass between harvesting a cherimoya and the attainment of prime condition for eating rarely exceeds six or seven.

PRUNING, IRRIGATING AND FERTILIZING

Little pruning is done except to remove dead wood; reduce the length of the higher branches; and remove lower branches which are so close to the ground as to impede the passage of oxen when plowing. Perhaps the most important objective is the cutting back of tall branches which develop in the top of the tree, so as to admit more light and air. Pruning is done with a small hatchet or ax, as with the olive. The pruning saw and pruning shears are practically unknown. While the hatchet or ax is kept sharp and used skillfully, pruning cuts are nevertheless rough and oftentimes lead to serious decay, since nothing is done to treat the wounds.

Following the annual pruning, the land is plowed. Animal manures and chemical fertilizers are applied before plowing in some instances. Fresh fish, where they are so abundant that the markets cannot absorb them, are utilized with excellent results. The

preparation of compost has been commenced in recent years. It appears obvious that in Almunecar the addition of nitrogen to the soil is essential. On the basis of considerable experience it is held that ammonium sulphate, much used with sugar cane, is an excellent fertilizer; potash and superphosphate are sometimes added.

Irrigation is not based on the needs of the tree so much as on irrigation cycles which are established officially for the valley and which vary from year to year. After seasons of good rainfall the cycles may be 12 to 15 days, but in dry years irrigations may be as far apart as 40 days.

The life of a cherimoya orchard naturally depends on several factors. There is an interesting practice here, aimed to rejuvenate the trees. This consists in cutting back large limbs almost down to the point of origin on the trunk; a new crown is formed from the sprouts which arise. This operation may be carried out all at one time or half the branches may be cut back and the other half left for later treatment.

Varieties of low commercial value are sometimes top-worked, using especially **Jete** and **Campas**. Top-working does not involve heavy cutting back of large limbs. Water-sprouts which develop from limbs toward the interior of the tree are shield-budded. Large limbs are, thereafter, removed gradually during a period of two or three years.

DISEASES AND PESTS

Fortunately these are few. On wet soils a tree occasionally suffers from decayed roots. In certain areas leaves become chlorotic, sometimes to a serious degree. This problem has not been investigated thoroughly but due to the high calcium content of these soils, which in some areas tend to be too wet, it has been thought possible that this may be a lime-induced iron chlorosis.

The Mediterranean fruit fly, mentioned above, is a serious pest of those varieties which produce fruits with thin skins. **Jete** and **Campas**, the two most important commercial cherimoyas, are relatively thick-skinned and not seriously attacked by the fly. Malathion might be used for control where necessary.

MARKETING

Aside from small shipments made to Paris occasionally, the entire production of Almunecar goes to the markets of the peninsula and North Africa. The relatively short time during which cherimoyas can be kept after harvesting makes shipment to distant markets difficult.

One of the accompanying photographs shows how cherimoyas are prepared for shipment. The baskets called "banastas" hold about 70 pounds of fruit. Smaller containers of 25 pounds or so are used by some shippers. The fruits are not classified by size.

It seems doubtful that commercial cultivation of this excellent fruit will be expanded to any considerable extent in the near future. Climatic limitations and the delicate nature of the fruit which makes shipment to long distances difficult and expensive are the two

major factors which are operating against placing cherimoya culture on any such basis as that of the orange.