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Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

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# CALIFORNIA AVOCADO SOCIETY

Organized in 1915

4833 EVERETT AVENUE  
LOS ANGELES 58, CALIFORNIA  
PHONE LUDLOW 7-4291



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May 14, 1958

Dr. Wilson Popenoe  
Rancho California (Granada)  
Spain

Dear Wilson:

Mrs. Rogers, Secretary, permitted me to read your interesting letter written in Spain.

The Editorial Committee would be interested in receiving an article from you for the 1958 Yearbook of the California Avocado Society.

You have no doubt been carrying on some studies on the avocado, and your friends will be glad to read about your studies in relation to the avocado.

We would appreciate receiving something from you for the Yearbook by June 15. You know as well as any one what avocado growers are interested in.

Sincerely,

*Marvin B. Rounds*

MBR:v

Marvin B. Rounds, Chairman  
Editorial Committee  
224 No. Michigan Ave.  
Glendora, California

Rancho California, Almuñecar (Granada) SPAIN  
26 May 1958

Mr Marvin B. Rounds  
224 N. Michigan Avenue  
Glendora, California.

Dear Marvin:

Mighty glad to have your letter of the 14th. I don't believe, however, I should try to work up anything for the Yearbook which will go to press about June 15th. I would rather wait until the end of this year, when I have had a chance to see all of the avocados on this coast in fruit, and to report on what we have been able to do here in the way of establishing a variety collection. We have received scions of half a dozen varieties from California (Fuerte and Hass had already been established here); four from Texas through Bill Cooper; four from Florida - and we hope to get three or four more; and we expect to get two or three from Honduras. If we are successful with our grafting, this will be the best varieties collection around the Mediterranean, with the possible exception of Israel - and I am flying over there next month to see what the boys have done. I think they haven't been asleep.

The interesting thing, to me, is the number of avocado trees which have shown up here on this coast, and more particularly the fact that there seem to be several very good local seedlings. There is only one Guatemalan in fruit here, a grafted tree received from Washington about twenty years ago. I think it is my Benik, and it has borne a fine crop this year; the last fruits just ripening now, and they are fine. There are four West Indian seedlings from Cuba in bearing, and they seem to be doing well - 22 years old. And there are at least 100 to 150 Mexican seedlings, including two trees said to be 120 years old. There are a few seedlings which look to me like Guatemalan x Mexican hybrids, and I can't figure out where they came from; nobody knows. The interesting point is that all three races seem to perform pretty satisfactorily on this coast. I have the feeling that for the warmer areas the Guatemalan x West Indians from Florida are going to be the best bets commercially; for the cooler regions the Guatemalan x Mexicans like Fuerte though I am a little gun-shy of Fuerte.

We expect to hang around this part of the world for at least the rest of this year. While I have the opportunity I want to get fully acquainted with avocado possibilities and do something to help an industry get started. We also hope to introduce some other subtropicals: we already have a fine batch of Macadamia seed from Hawaii and are awaiting some lychee plants from Florida. I don't have much hope for mangos and papayas - they behave just about the way they do in southern California. Fruits do not ripen at all well. I have only seen one fruiting mango tree here, but a number of papayas and one white sapote and a few other things.

Ever yours,

Wilson Popenoe

Antigua, Guatemala, 7 May 1959

Mr Marvin B Rounds,  
224 North Michigan Avenue  
Glendora, California.

Dear Marvin:

I promised you the report on avocados in Spain and Israel and the Canaries in time for the Yearbook which you said would go to press in June. Here it is. I am sorry it has gone to such length, and you may feel it is too long for you; in which case you can perhaps trim it down a bit. I feel in general that it covers a field about which we have known very little in the past and that, as a matter of historical value, it is worth publishing. I particularly feel this way because I am confident that - as I have said in the early paragraphs of the report - the Mediterranean region is going to become a pretty important center of avocado production. If it does, this report will be referred to with interest, 50 years from now. And fifty years isn't so long, when you remember that we can look back on 50 years of avocado history in California.

Please drop me a line, here, and let me know you have received this MS and what you plan to do with it. Helen will send your letter to me; I am leaving on the 10th for Venezuela to help the Fundación Eugenio Mendoza organize a program of fruit improvement; then I shall go on to Costa Rica for the annual meeting of the Am Society of Hort Science, Caribbean Section, June 7 to 13.

Ever yours,

MARVIN B. ROUNDS  
HORTICULTURAL CONSULTANT  
CITRUS AND AVOCADO SPECIALIST

PHONE FLEETWOOD 5-1553  
224 N. MICHIGAN AVENUE  
GLENORA, CALIFORNIA

Mr. Nelson Popenoe  
Antigua, Guatemala.

Postmarked 24  
August 1969

Dear Wilson:

Mr. Cort informed me  
that you did not receive a communication  
from me after I received your good  
article on Spain and other places.

I wrote you also and suggested that you  
send the write up on the Cherimoya  
orchard which you observed.

Since that did not make it I hope  
you will write it for the 1960 book.  
We try if possible to receive the  
articles especially of that kind as  
early as possible. Your article on  
Spain is going to attract a big lot of  
readers to the 1959 book.

Your book in Spanish will add  
much to the useful horticultural  
books of the world.

We hope to hear from you and receive  
your contribution to the 1960 yearbook.

Sincerely

Marvin B. Rounds

Antigua, Guatemala, 17 Sept 1959

Mr Marvin B Rounds,  
Glendora, California.

Dear Marvin:

Many thanks for your letter; I guess the first one miscarried. Sometimes they do. I am glad you received the MS and feel that you can use it. I knew it was long and contained some irrelevant material. I had two objectives in writing it: First, I felt it might be a long time before anyone would cover the northern and eastern Mediterranean with avocados as a particular objective, and second, in view of my belief that there are going to be important developments in avocado culture in several parts of that region, I wanted to have something on record which might be good historical material fifty years from now. I am convinced that avocados will attain at least the importance of the cherimoya in southern Spain; I believe they will gain ground in Italy; and those boys in Israel who are not overlooking any bets are already going to town. And if anybody needs to produce more food it is those poor chaps.

I just happened to be looking over some of the old Yearbooks a day or two ago. In my MS, page 5, I say "I particularly regret that we never got from Juan Murrieta the story of his contact with Atlixco". In the 1918-19 Yearbook I find a brief but fairly adequate statement from him, with comment from C P Taft, which really puts on record Juan Murriet's part in the introduction of the Atlixco avocados. So if it is still possible, you might want to put a footnote to my paper - if it is too late to cut out that statement" to the effect that Juan Murrieta presented a fairly adequate account of his work of introduction, which was published in the 1918-19 Yearbook. I still think Ernest Braunton, whose number of articles on the avocado, according to Ira Condit, is exceeded only by my own! did not tell us in print all he knew of the early history - and he must have known plenty for I think he was there in the time of J.C. Harvey. Incidentally, when I was in Pasadena last February I went over to Montebello and finally found Clarence Harvey, son of J C Harvey, whom I knew well in Mexico back in 1916, and who has some interesting data, though I don't know how old he was when J C left California and went down to the Isthmus of Tehuantepec, where he was ruined by the Diaz revolution and finally died.

As for the cherimoya write up, it was done by my colleague Luis Sarasola at Almuñecar and I have yet translated it. It is rather long but very good; the story of cherimoya culture in southern Spain which I assume is the most important cherimoya-growing region in the world after Chile. I will get it in shape for the next Yearbook and there are several good photos with it.

Always cordially yours,

Wilson Popence



PRAY  
FOR  
PEACE

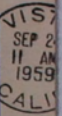


THIS SIDE OF CARD IS FOR ADDRESS

Dr. Wilson Popenoe  
Antigua  
Guatemala



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THIS SIDE OF CARD IS FOR ADDRESS

Mr. Wilson Popenoe  
Calle de la Nobleza Num.  
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Guatemala C.A.

Sept. 22, 1959

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Please state any special descriptions to be added to the reprints.

Marvin B. Rounds,  
Chairman Editorial Committee

Dear Wilson:

I sent you a schedule of prices for reprints obtained from Ray Printing Corp. 386 So. Thomas St. Pomona, care of Ray Pelletier. If you order will you send me a memorandum so that I may follow it up.

Marvin B. Rounds  
224 N. Michigan Ave  
Glendora, Calif.



ESCUELA AGRICOLA PANAMERICANA

APARTADO 93

TEGUCIGALPA, HONDURAS  
CENTRO AMERICA

Antigua, Guatemala, 6 Nov 1959

Mr Marvin B Rounds,  
224 N Michigan Ave, Glendora, California.

Dear Marvin:

Thanks for your card of 24 Sept which got here 30 October, about normal time. I also have card of 22 Sept 22 asking me to Pray for Peace and pay 26 U S bucks for 100 8-page reprints. (The Praying for Peace, a good idea, was not in your handwriting but in Uncle Sam's).

To be serious, I wont ask for any reprints because the cost has gone up so tremendously since the last time I got any - perhaps 15 years ago. I have written Doña Mercedes Rogers to send a copy of the Yearbook to three people who are mentioned in my article and who are not members of the Society. Which suggests to me that perhaps I can scare up a few more foreign memberships. We ought to have them. And incidentally, my colleague Roger Magdahl of Chile is responsible for three Life Memberships - two in his family and one for Luis Sarasola who runs his little experiment station in Spain where I worked without salary most of last year. I mention "without salary" because I want it to be clear that I am not really mercenary when it comes to the avocado industry, in California or elsewhere.

I am terribly sorry that the growers have been getting so little money out of avocados these past two years. Better plant more Habals. That will cut down production and thereby raise prices.

Ever yours,

PRESIDENT  
GEORGE B. BOWKER  
SANTA PAULA

VICE-PRESIDENT  
HUGH T. WALKER  
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TREASURER  
JOHN BOYCE-SMITH  
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March 15, 1960

Dr. Wilson Popenoe  
Calle de la Noble Za Num  
Antigua, Guatemala, C.A.

Dear Wilson:

We are now working on the 1960 Yearbook, and are anxious to complete it if possible earlier than usual.

We hope to finish it and have it ready to send to all members at least a month and one-half after the annual meeting which will be held May 28 at Palomar College at San Marcos in San Diego County.

We shall be very glad to have the article on the Cherimoya. I hope it will be possible to have it in our hands by June 1.

Any re-copying, if necessary, I can take care of here.

We shall be glad to have you in attendance at the annual meeting.

Sincerely,

MBR:v

Marvin B. Rounds

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224 No. Michigan Ave.  
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Dr. Wilson Popenoe  
Calle de la Nobleza  
Num. 2 Antigua  
Guatemala, C.A.

Dear Wilson:

I am assuming that we will hear from you in the near future and learn that we are to receive that looked-for article on the growing of Cheremoyas in Spain.

I wrote two or three months ago, but have not yet received the looked for letter giving us the story on the planting in Spain, about which you have spoken so highly.

Sincerely,

Marvin B. Rounds, Chairman  
1960 Yearbook Committee

MBR:v

Antigua, Guatemala, 15 May 1960

Mr Marvin B Rounds  
224 North Michigan Avenue  
Glendora, California, E U A.

Dear Marvin:

Referring to your letters of 15 March and 15 April, I am sorry I have not been able to translate the Cherimoya article but now that we have what my secretary in Honduras used to call a "death line" I will just simply get at the job and send you the MS even if it is in rough form, to reach you by the first week in June. I will say again that I think this article on the cherimoya is the most important thing which has come from a region where the cherimoya is an important commercial crop.

They are complaining about the behavior of Fuerte in Egypt. I am complaining about the behavior of Fuerte in Central America. And I guess you are still complaining about the behavior of Fuerte in California, with exceptions. I hear avocados are bringing pretty low prices this spring, due to heavy crops of Fuerte. Well, we have the answer; man came in to see me a few days ago; says I want to plant 50 acres of avocados, right near Guatemala City. And I says, now are you going to make any money planting grafted trees, irrigating, and fertilizing them, and then selling the fruits at a cent each? Oh, he says, I am not going to sell the fruits; I am going to fatten hogs on them,

Ever yours,

Wilson Popenoe

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May 25, 1960

Dr. Wilson Popenoe  
Calle de la Nobleza Num.2,  
Antigua, Guatemala, C.A.

Dear Dr. Popenoe:

I was very glad to hear from you, and appreciate the fact that we are to receive the M.S. on the Cherimoya article.

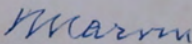
I am glad to receive the valuable information on what to do about the way out when avocados are not contributing much of anything when the volume of production is high and prices low.

We should inform the growers how to handle this situation.

If your Cherimoya story is in the rough form, we will handle it and try to smooth it out for you.

The annual meeting as I may have told you is to be held Saturday, May 28 at Palomar College at San Marcos. We would be glad to have you present.

Sincerely yours,

  
Marvin B. Rounds

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 Almuñecar 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 Almuñecar 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, cal" 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

bc: to Luis Sarasola.

## CHERIMOYA CULTURE IN SPAIN

Luis Sarasola\*

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 Almuñecar, 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 Isabell 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 Almuñecar, and through them were introduced into this valley such fruits as the guava, the avocado and 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 the 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.

\* 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.

Even now, however, many important cities have never seen this fruit.

On the valley floor of Almuñecar 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 Almuñecar 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  $3/4$  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 customarily 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 of 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 Almuñecar 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 now being planted to any extent. However, insecticides now available for the control of the fly seem likely to solve this problem.

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 reason many trees of this variety are being top-worked to others.

To sum up: the commercial races or castas are only two: Jete or Fino de Jete and Campag. 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 by this term 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 cherimola 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 this region, 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 above 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 be well 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 to 75%.

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 who has worked with cherimoyas and several other species of Annona. Deformed fruits are in quality as good as perfect ones, but their commercial or marketing 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 produce 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 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 fruit which is definitely immature is oftentimes harvested so as to take advantage of the high prices in the market; while on the other hand immature fruits are sometimes harvested late in the season so as to get the fruit off and proceed to cleaning the land and preparing it for inter-cropping, which is usually practiced even in mature orchards.

The number of days which pass between harvesting a cherimoya and the attainment of prime conditions 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 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 trees 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 a many instances. Sometimes fresh fish, where they are so abundant that the markets cannot absorb them are utilised with excellent results. The preparation of compost has been commenced in recent years. It appears obvious that in Almuñecar 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 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 irrigation 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 in 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 root. 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 these 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. Malation might be used for control where necessary.

#### Marketing

Aside from small shipments made to Paris occasionally, the entire production of Almuñecar goes to the markets of the peninsula and North Africa. The relatively short time during which cherimoyas can be kept after harvestings 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 almost impossible, are the two major factors which are operating against placing cherimoya culture on any such basis as that of the orange.