

## REPORT FROM CHILE

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The traveler from the United States of America who visits for the first time the central region of Chile, cannot fail to notice its resemblance to California in relation to climate and landscape. Although there are thousands of miles between the two states from north to south, their similarity is surprising. The same ocean reaches its coast with gentle waves which lash its shores furiously in stormy weather, the same snowy mountains in winter and the arid hills, practically devoid of vegetation during the summer months, the same plains, valleys and cultivated areas.

The warmer zones have been cultivated advantageously with evergreen orchards. Lemons, oranges, grapefruit and olives are scattered over many districts and predominate in the valleys especially in the interior. The more delicate sub-tropical species however, such as avocados, can only be produced with success in certain limited districts.

Avocados are grown in California from San Diego in the south to Goleta in the north, a strip 200 miles in length, with about 40 miles depth inland.

In Chile avocados are grown in a similar coastal strip, which reaches from La Ligua river in the north to the Cachapoal river in the south. (See map).

There are 4 districts of commercial importance. The first one, more to the north, but of minor importance due to lack of irrigation facilities. It includes the localities of La Ligua, Ingenio and Cabildo. The second and most important district however is the Quillota - La Cruz zone (300-400 feet elevation) and other localities scattered along the borders of the Aconcagua river as far as San Felipe and Los Andes. The latter is located at an altitude of approximately 2,500 feet, where frost is common and only avocados of the Mexican race are grown there. Third in importance is the Maipo river district, comprising localities such as Talagante, Penaflor, El Monte, Chinigüe, Isla de Maipo, Buin and Hospital, with elevations fluctuating between 1,000 - 1,200 feet: finally, the fourth and most southern avocado producing center is Peumo, on the Cachapoal river, where many old orchards of the Mexican type are grown, but the Californian varieties including Fuerte, (seem) to be a failure. Peumo district is situated at about 1,200 feet elevation.

Separated from there of more commercial importance, I may mention the Elqui valley, 300 miles north of the Chilean capital Santiago. This valley offers perhaps the most favorable climatic conditions, but due to the great distance between producer and market, local production (Vicuña, Peralillo and Paihuano) is sold in the city of La Serena. Another 100 miles north is Vallenar on the Huasco river which supplies avocados to the mining districts in the northern Chilean desert.

In contrast with California where in the years 1920 to 1930 the avocado was first established and became a commercial possibility, the avocado in Chile (called "palto" the tree and "palta" the fruit) was known and valued since ancient times. Botanists of the past century mention and amply describe the *Persea drymifolia* in their works. However it must be stated that the only species known in Chile until the Californian varieties were introduced here, were of the Mexican type or *drymifolia*, descendants no doubt from seed brought possibly by the Franciscan monks directly from Mexico during Colonial times, as has happened in other South American countries.

In many parts of the country, including its capital, Santiago de Chile (1,800 feet altitude) has many old trees of this type (*drymifolia*) and are to be found in the producing centers. There are numerous specimens 100 or more years old, 40 feet high and more than 4 feet in diameter, and very often with an astonishing productivity. These fruits are fall or winter ripening, small, thin skinned, black, maroon or green colored, often with plenty of fiber and large seed. Surely, they are not of very high commercial value according to California standards, but nevertheless, with all their defects, are highly esteemed by the Chilean public who consume them in considerable quantities. This fruit is commonly produced in small orchards, "quintas," surrounded by adobe walls, that form the old villages. Their owners are people of no complicated living standards, and due to lack of initiative or experience, prefer not to topwork their old trees. As in general the prices obtained for their production are satisfactory, and it may be presumed that this situation will continue. I do not think it would be a mistake in stating that about 50% of the total Chilean production consists of this type of fruit, of incredible different characteristics and as its producers are rather obstinate people, everybody proudly believes that he has the best avocado in the world.

Seasons in Chile (southern hemisphere) are quite different from those in California. Spring is September to November; summer December to February; fall is from March to May and winter from June to August.

Rainfall occurs in central Chile in the fall and winter months (May to August) with a year's average of 12-15 inches in Quillota - La Cruz, 15-20 inches in the Maipo river district and 20 - 25 inches in the Peumo region.

Frost hazard, with rare exceptions in June - August, increases from north to south. Whilst the La Ligua valley may be considered as frost-free, Quillota - La Cruz is affected one or another year by light frost, while the production center in the Maipo district and specially Peumo, are affected by frost almost every year, but as compared with California, the frequency and intensity of frost in the above mentioned districts is much less and no orchard heaters are used.

Furthermore, average daily temperatures during winter months (June to August) are lower than those of southern California, a fact that retards the blossoming time of the avocado, especially of California varieties, up to the months of October to November, with subsequent better fruit—setting in these spring months. Also these low winter temperatures prolong harvest time. Fuerte is picked from July to December.

Actual avocado acreage in Chile covers approximately 3,500 - 4,000 acres, of which roughly 20% may be young orchards. 60% of this acreage is in the Quillota -La Cruz district, about 20% in the Maipo district and the remainder in the Peumo zone and other

scattered localities. There is no exact data available however and we can only estimate details, as official statistics and records unfortunately do not clearly reflect the real situation, are not up to date or simply do not exist.

As previously pointed out, in the early avocado plantings in Chile, little was known regarding the propagation of a desirable selection or variety. Therefore only seedlings were planted. So propagation began practically with the importation of the first varieties brought from California. In 1928 the Ministry of Agriculture imported a batch of new varieties of deciduous fruit trees from the U.S.A. and among them some citrus and avocado trees were received. All these trees were planted in Santiago, in the Quinta Normal under supervision and control of the corresponding Department. The avocados were the varieties Fuerte, Puebla, Nabal and Queen. Unfortunately, due to the unsuitable climatic locality, little attention was paid to these first imported varieties by interested people.

Some years later the author started a nursery in La Cruz, named "California," and began the propagation of citrus and avocado varieties imported from California.

The first shipment was made by Armstrong Nurseries, Ontario, in 1932, including:

Mexicola, Duke, Blackbird, Caliente. (Mex.)

Fuerte, Puebla. (Hybr.)

Nabal, Queen, Anaheim, Mayapan, Dickinson, Benik, Itzamna, Panchoy. (Guat.)

A second shipment was made in 1933, with:

Leucadia, Ganter, Tiptop. (Mex.)

Cole, Newman, Bevan—strains of Fuerte. (Hybr.)

Edranol, Ryan, Carlsbad. (Guat.)

At a later date (1940) was imported:

Jalna, Henry's Select, Middleton. (Mex.)

Helen, Macpherson.

The Hass variety was acquired in 1944 from Mr. Brokaw, due to the kindness and courtesy of Mr. Carter Barrett, of Whittier. Dr. Wilson Popenoe sent me his selection from Honduras, originally grown in the Rodiles avocado grove in Atlixco, Mexico. Dr. C. Oppenheimer, Rehovot, Israel, contributed the "Ettinger." Among the new varieties in experimental stage are the Bacon, Zutano and Rincon.

Due to the similarity of climatic conditions in California and La Cruz - Quillota, the adaptation of almost all the varieties submitted to test was very satisfactory. Many of the new and better varieties acquired today, should undoubtedly displace those acquired more than 20 years ago. Proper variety selection is a permanent problem in Chile, as it is in California and all other countries that produce or intend to produce avocados.

Fuerte, although erratic in its bearing behavior in some localities as Peumo, is by far the outstanding variety. At least 70% of the acreage planted to California varieties is Fuerte. The balance includes Ryan, Nabal, Carlsbad, Mayapan in the Quillota - La Cruz district, while Duke, Mexicola and Jalna are preferred in the more interior production districts. Hass is a relatively new variety. It may become wider known and distributed in the near future, but it is a weak grower and demands the best of soil and climatic conditions. Bacon and Zutano are expected to respond better than Fuerte to adverse conditions in

some localities and could replace many of the more or less unproductive Fuerte trees in the future.

As a whole, I may state without exaggeration, that Chile owes California quite a debt concerning the variety problem. As in other countries, we too have reaped immense benefits from the intelligent study, work and experience of the California experts and we will always remember the debt of gratitude we owe California in this respect.

The unique case present in Chile, that California varieties have been distributed in many areas where years ago only a mass of seedlings of the Mexican type were growing, offers to the horticulturist a great chance for the existence of natural hybrids with desirable superior characteristics. Personally I have selected some of these hybrid types from different localities, which have done very well here but are at present under experimental testing. Among these selections I hope to find the answer to the long searched for fall and winter ripening variety that combines Fuerte characteristics with those of the Mexican type, including frost hardiness. Once their superior quality and commercial value are definitely known, I will fully describe them in this Yearbook and will be very pleased to offer them to California growers for further trial under California conditions.

It may be interesting to compare some factors involved in Chilean avocado production with those under California conditions.

Prices for farmland in Chile are in general, lower considering the fact that water for irrigation purposes is included in the price of the land. Irrigation rights are always included in the possession of title. Without these water rights, farmland here would be practically worthless. The best avocado soil, well situated commercially and climatically as in the Quillota - La Cruz district, is worth U.S. \$1,200 or more per acre, but offers of land purchase are scarce due to inflation in Chile's present situation. Full producing avocado orchards may eventually rise to over U.S. \$5,000 per acre, and in spite of such high prices, there still remains an ample margin for splendid business or investment, provided this were properly handled.

Perhaps, approximately one half of the avocado producing acreage belongs to real estates farms or "fundos," dedicated to all-round agriculture where orcharding is only a supplement to total exploitation and covers a relatively small percentage of the total acreage. Many of these "fundos," thanks to their excellent soil, climatic conditions and geographical situation are highly valued, but their usual exploitation, consisting mainly of grain crops, cattle breeding and pasture lands, does not leave a margin of profit in relation to the actual value of these properties. This tends almost invariably ultimately to division of the property, often due to inheritance or mere speculation. The resulting lots are usually acquired by people desirous of investing their savings or capital in land as a means of arresting actual and permanent inflation which has steadily increased within the past 20 years. As a rule these people lack technical preparation of any sort and acquire a certain degree of experience in the end only through their own mistakes and errors. In many cases considerable capital is invested in these properties as a means of a better form of exploitation, or the new owners simply build comfortable houses on the California standard, including lawns, gardens and swimming pools, etc., in order to thoroughly enjoy country life, not considering even the rentability of their undertakings.



Street Scene — Chile

As a rule, however, a considerable percentage of these new land owners unfortunately work without further technical knowledge and consequently their best efforts in many instances result in failure and disillusion. Of course we must bear in mind the fact that we cannot rely upon help and technical guidance here as from farm advisors as is the case in California, nor with bulletins, circulars, leaflets, pamphlets, etc., published by specialists of unquestionable reputation.

This country is as yet very young and cannot afford costly organizations like the ones in U.S.A., so efficient and admirably instructive. In consequence, many plantings—and not only avocados—never reach a full stage of production and very often are completely worthless within a few years time. Often the selection of unsuitable soil for avocados is the direct cause of root rot, *Phytophthora cinnamomi*, in many districts as verified by Dr. Zentmyer during his recent visit to Chile in 1957.

The irrigation season in Chile corresponds to the months of October to April, approximately seven months. The rainy season, as stated previously, comprises the remaining months, May to September. Irrigation is based on old waterways or canals fed by the rivers running across the country from the Andes to the coast through wide and sloping valleys. Subterraneous water pumping installations are rare exception.

In California, avocado planting is practiced preferably on rolling hill lands, and in former years terracing and contour furrowing was practiced to control soil erosion caused by irrigation practices and rain water. In recent years however these systems have been replaced by permanent underhead sprinkler systems. In Chile the situation is quite

different. As pointed out before, frost is a minor factor in districts dedicated to avocado culture, and therefore practically all the Chilean avocado acreage is on flat land. Irrigation is practiced by furrowing and over-flooding. Furthermore it is also common to utilize in the 5 or 6 first years any excess space available in new plantings by intercropping potatoes, tomatoes, beans, lettuce, cabbage or other vegetables, flowers and so on, for all this land is very valuable, and as a rule of excellent quality with a relatively abundant water supply. The system usually preferred is half partnership by which work is done by peasants who own some horses and have large families in which wives and children often are doing light hand labor as cropping, weed control, etc. According to general agreement, 50% of the harvest sold belongs to the land owner. There is no need to mention the fact that such a system has great disadvantages. Often trees are not watered regularly, some times not enough, and others in excess. Furthermore the trees are not properly cared for in intercropping operations. However it would be a difficult task to abolish this old time system. In the meantime land must produce until the planting reaches bearing age. As a rule the land owner prefers to employ this old time system instead of hiring paid labor, for half partnership reduces the owner's obligations to such operations as pruning, manure applications, fertilizing, spraying, etc., which enables him to attend other activities and often to live in nearby cities.

This situation usually lasts until intercropping becomes impracticable and the trees start producing. Then the owner must assume full responsibility. Standard clean cultivations, disking in winter and spring and additional tillage during the growing season are largely employed. Weed growth is gradually reduced by tree crowding and soil management is restricted to irrigation facilities.

It is understood that in Chile these systems exclude two methods generally adopted in California; weed control by applying orchard heater oil, herbicides or by other chemical means, is a procedure quite unknown in Chile and regarding irrigation of flat land like ours, it is not necessary to apply the underhead sprinkler system, today so widely adopted in California, thanks to inexpensive plastic materials, so easy and simple to install. Also neither the herbicides nor plastic materials are obtainable today in Chile due to severe import restrictions.

A deciding and most important factor in production cost is man labor, and in this connection there is an enormous difference between the two States.

While in California orchard labor is paid at the rate of more than one U.S. dollar per hour, in Chile, considering the present exchange, a whole days labor amounts to less than this figure, a fact that allows the employment of more workmen per acre. Thus, we calculate in Chile an average of one man per every 3 acres, but it is understood that all operations concerning production process are carried out by proper employees, including such as harvesting, packing, tree spraying, etc., all of which operations in California are undertaken by outside people in packing houses or by other specialized private firms. Our farm workers as a rule live on the farmland or plantings, in houses provided by the land owner or farmers. Chileans, by the way, are excellent workers, intelligent, quick in learning and very willing.

The application of fertilizers in avocado orchards is as a rule deficient. In the majority of

cases only nitrogen is used in the form of Chilean nitrate. Phosphates and potassium are mostly imported products and therefore expensive. There are many orchard plantings apparently over-fertilized with nitrogen, resulting in vigorous growth but deficient production. The use of cattle, fowl manure and other organic matter is quite common. Green manure, as vetches, to be under-ploughed is also used. Chlorotic symptoms as lime induced chlorosis are frequent due to a basic reaction of the majority of soils combined with the excess nitrate applied, (which is also of basic reaction) and irrigation water of approximately 8 PH value. Zinc spraying to control mottle leaf is practiced in some cases with good results.

Avocado diseases on the whole are the same in Chile as in California. Our most dangerous enemy is root rot fungus, *Phytophthora cinnamomi*, present in many areas where compact heavy soil conditions and lack of drainage prevail. Second in importance seems to be verticillium, while sun-blotch virus, tipburn, diseases and dothiorella rot are perhaps not so virulent here as in California.



Huerto California

It would be very difficult and practically impossible to compare our crop records with those of California in view of the fact that we have no reliable and accurate statistics to work on. Consequently approximate figures in this respect would only be misleading and of no practical value.

The oldest commercial Fuerte planting in Chile was started 19 years ago, is crowded now, but in healthy condition. Excluding the year 1955 during which this 35 acre orchard was affected by frost, its yearly average crop for nine consecutive years has reached about 14,000 pounds per acre per year. This record is surely exceptional and I doubt whether a similar case has ever been known in California.

Phenomenal yields of large, individual old trees exist. The author topworked in 1943 the first Fuerte scion in Chile on a very old healthy seedling. This tree has a record of more

than 2,000 fruits per year with a top yield of 4,950 fruits, (smaller ones, surely) in 1955. There is no doubt that under proper and favorable environment, plus appropriate cultivation avocado trees of most varieties do better in Chile than in California and this is especially true of the Fuerte and its strains. Most trees yield satisfactory crops every year, and the alternate—bearing tendency of this particular F-variety is less marked or accentuated in Chile. The cold weather conditions through the winter months and subsequent later blooming period may be responsible for this fact.

On the whole, climatic conditions in Chile in the district devoted to avocado culture seem to be better than those in Southern California as far as frequency and intensity of frost is concerned. Furthermore the colder winter months and consequently later blossoming period of the avocados occurs in Chile during the spring month, with ideal weather conditions for fruit setting. Besides the sudden heat waves that affect avocado orchards in California from time to time, are unknown in Chile. Only wind storms however occasionally cause damage in windy localities where windbreak planting (mostly *eucalyptus globulus* has been neglected. All these conditions tend to produce less risks and fluctuation for crops.

In contrast there are quite a number of facts in favor of the California grower in regard to production. Cost of farm equipment, such as tractors, spraying equipment, disinfectants, herbicides and the thousand and one things necessary for a well organized establishment are quite current events in California. Here in Chile many of these things are unobtainable, or their price is so high that they become prohibitive due to our actual economic situation and restricted importation facilities. But to my mind what is worse still is that we cannot rely (as is the case of the California orchardist) on assistance from the Agricultural Extension Service and private specialized firms interested in problems of the particular orchardist, Producers Associations and Committees who deal with these difficulties as if they were their own, and finally technical publicity, information, etc.

None of these things unfortunately are obtainable in Chile and everybody has to resolve his own difficulties, except facilities offered by the Insectary of Biological Control in La Cruz.

The darkest point in our growing avocado industry is beyond doubt the marketing problem. During past years the bulk of production was absorbed at relatively satisfactory prices, but at present production keeps growing year after year while consumers do not increase in the same proportion. Consequently prices drop during certain spells, which fortunately are short. Our actual avocado market is very limited. Probably 80% of all our production goes to Santiago (approximately one million inhabitants) where it is distributed among the Municipal Market place, the city's horticultural products marketing center. Besides Santiago only Valparaiso and Viña del Mar (together 300,000 inhabitants) are markets of any importance. As the distance between Quillota and the two localities mentioned is relatively short, they usually receive their market supplies from "canasteros," basket bearers, who as a rule purchase 2 or 3 baskets of fruit once or twice daily and distribute them among hotels, fruit shops and stands and personal clients in Valparaiso and Viña del Mar. Unfortunately all other cities and localities in Chile are little catered to and fail to receive regular supplies due to inadequate distribution.



Producers forward their fruit packed in wooden (poplar) boxes of approximately 35 pounds net capacity. These boxes are the property of commission agents who compete for the patronage of producers, and who in the majority of cases without further risk or appreciable capital, amass fortunes within a few years time. The commission agents receive and expend the boxes to their clients and simply retain 10% of the value which they state as having received for the sale of the produce. Their clients are re-sellers, fruit shops and stands, dealers, hotels, restaurants and so on, and when the fruit finally reaches the consumer, its price has increased 70 to 100% above the original figure paid to the producer, due to having changed hands many times.

Another aspect of the question is the absolute lack of suitable promotion which would tend to stimulate avocado consumption and as yet no interest is shown in giving the house wives proper recipes such as the ones recognized and used in the U. S. A. The fruit here is served in the simplest way, merely by adding salt or served with salads; the restaurants serve avocado with various meat, eggs and fish stuffing and mayonnaise combinations. The pulp is also used as sandwich spread. Fruit pulp kept in frozen storage for ice-cream manufacture, milk shakes and other fountain drinks is as yet unknown here, and there is no doubt that intelligent and suitable promotion in this respect would notably increase local consumption.

For years repeated efforts have been made to oppose this ancient and inefficient sales system, to guarantee better prices for producers and reasonable and just prices for the consuming public. Unfortunately old and deep-rooted customs still prevail and are hard to eliminate. We have tried and tried again and again to come to some understanding on the subject, but have been stubbornly opposed by the commissionists who have employed all the means and arguments within their reach and have frustrated any move that might affect their interests. And so far they have been victorious.

Lately the "Aspropalchi" organization (Avocado and Cherimoya Producers Association) in La Cruz, has started a new praiseworthy plan, but in spite of all their efforts, they have touched mostly upon secondary problems such as preventing theft and the sale of immature fruit (often windfallen or stolen) but have failed up to the present to improve our actual sales system, and much less to finance the construction of a small packing house that would be necessary to stabilize and standardize production, and conquer new markets within the country or for example in Argentina, which no doubt would be an important consumer. Aspropalchi has not been able unfortunately, so far to realize this program.

Notwithstanding the present situation, prices as a whole are satisfactory, taking into consideration the fairly favorable production conditions in Chile. During the past eight years, the average price obtained for my own production of Fuerte were 18 to 19 cents U.S. currency per pound, which I consider is above those paid to California orchardists during an equal period of time.

I have borne in mind the fact that year after year we have had visitors from the U.S.A., interested in our avocado problems. In 1957 we were honored with a visit from such competent authority as Dean Robert W. Hodgson—Division of Subtropical Horticulture U.C.L.A., who gave us a very interesting technical conference. We also had the pleasure of a visit from Mr. H. W. Montgomery, Director of the California Avocado

Society and Dr. George A. Zentmyer, the *Phytophthora cinnamomi* specialist; and finally of Mr. McCallum, Rural Economics specialist contracted by Point Four. All these visitors were shown over our best plantings, but I doubt, due to limited time, whether they were able to grasp the complex and problematic state of our small avocado industry. To them, together with our thanks for their interest and cooperation which will always act as a stimulant among us growers, I wish to add the possibility of a future and better comprehension of the Chilean situation and outlook.

The amount invested in our small avocado industry, including farmland and all other elements, is close to 8-10 million U.S. dollars, quite an appreciable figure for this small country. Upon the future of this investment depends the welfare and prosperity of many of us Chileans, especially those who have tackled the job wholeheartedly.

Great efforts are made in Chile to help our actual difficult economic situation. Within the national economy and especially in relation to a better nourishment program, avocado producing efforts should not fail to succeed in the future. If unity of purposes prevails, we have nothing to fear from greater production, but on the premise of better marketing development. I personally have made avocados my life work and believe in its future—anyway. It is the most noble fruit existing and when better known the whole world will be open for it.



**Typical Hass Avocao**

*Photo by R. A. Magdahl - Chile*