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AGRICULTURAL EXPERIMENT STATION

AGRICULTURAL COLLEGE, N. M.



No. 1

No. 2

Number 1 is a promising red variety

Number 2 is one of the variations of the Chile *pasilla* used in the experiments  
The leaves were removed from both plants

# CHILE CULTURE

BY

FABIÁN GARCÍA

ALBUQUERQUE MORNING JOURNAL, ALBUQUERQUE, N. M.

# New Mexico Agricultural Experiment Station

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## CHILE CULTURE

### Introduction

The word chile as used in this bulletin is the Mexican name for the English peppers or *Capsica*. As far as the writer knows the name includes all the garden peppers, (*Capsicum annuum*). The name is in general use throughout New Mexico by both English and Spanish speaking people, and this seems to be also true in Mexico and farther south. The different varieties seem to be distinguished one from another usually by a descriptive adjective following the word chile, such as chile *Colorado*, chile *Negro*, chile *Pasilla*, etc.

The chile is used in many different ways and it is quite an important article of food among the Spanish speaking population in the Southwest and in Mexico. It is eaten both in the green and ripe state. Chile is being canned green in Los Angeles, California, and in Las Cruces, New Mexico. The use of chile in the United States is increasing every year; the American people are beginning to cultivate a taste for it, and thus a greater demand is being created for this vegetable.

In this bulletin no attempt will be made to enumerate the different ways in which chile is used, nor to describe the methods of preparing it. It is the intention that such information will be published in a later work.

### Soil

While the chile plant prefers a rich friable loam, it will grow well in heavier soils. The more clay the soil has the more difficult it is to secure a good stand from field planted seed, and more careful cultivation and irrigation is necessary to keep the plants growing well.

### Ridge and Level Culture

In its native home in tropical and southern America the chile seems to be a perennial, though under cultivation in the temperate zone it is always grown as an annual. It may be grown on ridges or in level plats. The former method is the more common in New Mexico. In the spring after the ground has been plowed and leveled (the plowing of the land can be done in the fall or winter) and just a little before planting the ridges are made, with a two horse plow, three and one half feet apart, leaving a narrow furrow between them. These ridges may vary in height from 8 to 12 inches. It is better to irrigate the ridges before planting, though this is not always done. The object of irrigating before planting is to get the water mark on the side of the ridges and to settle the newly plowed soil somewhat. As soon as the soil is dry enough so it can be worked, which is generally from four to seven days, the seed is planted usually on one side of the ridge and just above the water mark. The seed is planted by hand in hills about every two feet in the row. A very good way is to carry a small can along with a little water in it to keep the seed moist enough so it will stick together. An old teaspoon may be used to dig the small holes on the side of the ridge and to dip out the seed. Most chile planters use about a quarter to a half teaspoon full of seed to every hill. This seems to be an unnecessary amount of seed, but it insures a very good stand and it is better to use more at first than to have to replant later. The soil being moist, the seed starts to germinate immediately and very frequently it comes up before the ground needs to be irrigated again. In case, however, that the chile does not come up or that the soil dries up too much, an irrigation should be given in order to complete the germination, though care should be taken not to allow the water to cover over the hills because the soil is liable to bake. If the soil bakes very much, germination is retarded and frequently prevented. When the seed is planted in dry ridges it should be

irrigated immediately afterwards, taking care that the water does not go over the hills for the reason given above. Sometimes a second and even a third irrigation may be necessary to complete the germination.

Planting the seed in level plats is very rarely practiced by the Mexican farmer, though it is believed that under certain circumstances it will give as satisfactory results as the ridge method. After the land has been plowed and properly harrowed and smoothed, the rows are marked off with a marker three and one half feet apart. The seed is then planted by hand in hills two feet apart in the row, or still better, as it is done at the Station, drilled in by means of a Planet Jr. garden drill so arranged that it drops the seed in hills every two feet. After the seed is drilled or planted it is irrigated or flooded. This flooding tends to pack the ground and if the soil is heavy it bakes considerably and cracks open when it begins to dry.

If, after the first irrigation, the soil bakes and retards or prevents the small plantlet from coming up, it is advisable and oftentimes absolutely necessary that a second irrigation be given just about the time the seed is breaking through the crust. This second irrigation should be as light as possible and the water should not remain standing in the squares. If too much water stands in the lower spots the germination is likely to be poorer at those places. If the irrigation could be given in such a way that the water simply moistens the hard crust formed over the seed the stand would undoubtedly be better.

### Time to Plant

The chile being native of tropical countries does not stand freezing weather, though it will stand a little more cold than tomatoes. On the night of October 1st, 1907, the temperature at the Station dropped slightly below freezing. This temperature barely injured the most tender growth of the chile plants while the tomatoes showed the effects of the freeze

quite considerable. The blossoms on the chile plants were slightly hurt, but the pods were not injured. The time to plant the seed out in the field is about the same as for tomatoes, being after danger of frost is over. In the Mesilla Valley there is more or less established date among the Mexican growers for planting the seed. This date is the 19th of March or immediately after. While this is somewhat early, the seed as a rule does not come up until danger of frost is practically over. During years with backward springs, like in 1907, the 19th of March would be too early. At the Station the practice of planting the seed out in the field during the first week in April has given good results.

#### Distance Apart to Plant

The distance at which to plant the chile seed varies with different growers; there seems to be no fixed rule among them. The writer has inquired of a number of local growers and none of them seem to have a definite idea about the distance, except that it is well to plant the seed far enough apart so as to permit cultivation with ease. In looking over a number of chile fields it has been found that the distance may vary from three to five feet between the rows and from one to four feet between the plants in the row. After having studied the matter carefully as to the best distance, everything considered, three and a half feet between the rows and two feet in the row has been adopted by the Horticultural Department as the most desirable distances. These distances have given satisfactory results. For the convenience of intending chile growers the following table which gives the number of hills per acre at different distances has been prepared:

DISTANCE	NUMBER OF HILLS PER ACRE
3½ feet between rows x 2 feet in the row.....	6222
3½ feet between rows x 2½ feet in the row.....	4978
4 feet between rows x 2 feet in the row.....	5445
4 feet between rows x 2½ feet in the row.....	4356

### Planting

As already explained under the heading "Ridge and Level Culture" the seed is planted on the side of the ridge, when the ridge method is practiced. The southern exposure of the ridge is always preferable since this is usually warmer and the germination, other factors being uniform, is quicker. If level culture is practiced there is no choice of exposure. Whatever method of planting is followed care should be taken not to bury the seed too deeply. As a general thing the seed should not be deeper than three-fourths of an inch to an inch and a half. Shallower planting, if the moisture is kept normal, will give quicker and better germination. More seed is required per acre when the planting is done by hand on ridges than when it is drilled with a garden drill in plats. At the Station it has taken 6.87 pounds of seed per acre on ridges, and 4.38 pounds per acre in the level plats. In case some of the hills fail to come up it will be necessary to reseed or transplant in the vacancies.

### Thinning

Chile started from seed planted in the field must be thinned to one or three plants to the hill. As a rule, most of the chile growers do not thin enough, and some do not thin at all. The results at the Station show that thinning to two plants to the hill is very satisfactory. When the chile has been thinned out properly the plant or plants in the hill branch out considerably and produce a heavier and better crop. If too many plants are left to the hill there is a marked tendency for the plants to grow too tall and more or less top heavy. The chile is thinned out when about 3 to 5 inches high. If a good germination takes place it is more difficult to thin the chile, because there are more small plants to the hill to be pulled out. Care should be had in selecting the strongest plants in the hill and in injuring as little as possible the roots of those which remain.

The thinning can be done more easily and quickly if the soil is quite moist. If the plants have come up in bunches those which remain in the hill are necessarily more or less

disturbed by the operation of thinning and these may wilt afterwards, especially if the day is hot and dry. It is advisable to irrigate after thinning, to prevent the wilting of the young plants. The more bunched the plants that come up are the more expensive the thinning will be. The cost of thinning chile in ridges and in plats was noted this year at the Station. The cost per acre on ridges was \$3.33, while on level plats it was \$1.50. The difference in cost of thinning is explained by the fact that considerable more seed was used for the ridges and the plants came up all in a bunch, while in the level plats there was less seed used and the plants were not so close together.

### Transplanted Chile

While the common way of growing chile is to plant the seed out in the field in the spring, it can also be grown by starting the plants in cold frames early in the season and transplanting to the field as soon as danger of frost is over. In fact the crop can be had considerably earlier by this method. The earlier the plants begin to bear, other conditions being equal, the larger the crop, since the chile plant keeps bearing as long as it is growing or until it is killed by frost in the fall. In the fall all stages of the chile may be found upon the plant, from the blossoms to the ripened pods. The plants can be transplanted from the cold frame to the field when they are from three to five inches high. Two plants can be transplanted to each hill in the row. Immediately after transplanting, the plants must be irrigated, and again about a week later. The more stocky the plants are grown in the cold frame, the less the shock they will receive when transplanted. Aside from being nearly as cheap to transplant as it is to plant the seed out in the field, an earlier crop of green chile may be produced. The trouble that is frequently experienced due to field mice eating the seed and the small plants is largely done away with by this method.

The ground should be prepared the same as for seed

planted in the field. The small plants can be transplanted in rows in level plats, or ridges, or on the side of small furrows. The furrow system has been practiced with good results at the Station. After the ground has been plowed and smoothed over, small furrows are made with a small plow every  $3\frac{1}{2}$  feet. The plants may be irrigated through these furrows with less danger of covering them over with too much water as is often the case in the plats, and, again, less water is necessary for the first irrigations than when the ridge system is practiced.

### Cultivation

The cultivation of chile is similar to that for tomatoes, which consists in keeping the ground as loose as possible and free from weeds. If the ridge method is practiced the cultivations consist in plowing a furrow to the row of chile plants which are planted on the side of the ridge. Since the plants are growing only on one side the dirt plowed against them comes off from the next ridge from the side not having any plants growing. It is customary, though not necessary, to pull up the plowed dirt to the plants with the hoe as the weeds are being hoed out. By means of *this method of cultivation* the ridge is enlarged on the side on which the plants are growing, so that by the time cultivation stops the rows of plants are in the middle of the ridge which appears as though the plants had been started in the middle instead of on the side.

The cultivation for the chile grown in level plats and for that transplanted on the side of small furrows is somewhat different. In the level culture, the five tooth Planet Jr. cultivator is used to keep the soil loose in the middle between the rows. There is always less hoeing to do in the level culture plats than in the ridges. The cultivation should be kept up during the earlier part of the season so that by the time the plants are bearing, there will be no more need of it, except an occasional hoeing of a few scattering weeds. Some addi-

tional information on this subject may be had by referring to the discussion (page 21) on the cultivation of the experiments conducted at this Station.

### Irrigation

The irrigations necessary to produce germination and to secure a good stand of chile need some consideration, as on these depend to a large extent the success of the crop. After the irrigations to get the crop started have been given, the frequency of the subsequent irrigations depends upon the weather and soil conditions, and for that reason no specific statement can be made just when and how often the chile should be irrigated. One thing, however, is important to keep in mind, and that is that the chile plant keeps bearing as long as it is growing. If the growth should be checked by the lack of irrigation the plant stops bearing and the blossoms and the very small pods are likely to drop off. The grower himself should study his local conditions and decide for himself when and how much to irrigate. While the chile plant resists considerable drought, at the same time, it should not be allowed to suffer from the lack of irrigation. When the chile is grown on ridges the space between the ridges should be allowed to fill with water almost up to the plant. If the water is simply turned in and allowed to rush down the furrow to the other end the ridges will remain practically dry, necessitating frequent irrigations to keep the plants from suffering. In irrigating chile on ridges always aim to hold the water long enough in the furrow for the ridges to get fairly well soaked through.

In the level plat the irrigation is more simple and the soil around each hill gets wet sufficiently while the water is running down to the end of the plat. When the plats are quite long and are made up of a series of squares as soon as each square is filled with water the border, dividing that square from the next one, is cut and the water rushes into the next square which is treated the same as the one before.

### Green Chile

A large amount of the chile is eaten in the green stage. In fact, practically all the chile used during the summer months is green. Before the chile is ready for use it ought to be almost full grown. This stage can be recognized by the green pod having a noticeable bright or shiny luster, and being firm enough to resist considerable pressure when pressed between the thumb and fingers. If pressed tightly the pod will emit a slight crackling sound. When the chile is picked too immature the shrinkage in weight is soon noticed and the pods shrivel so much that the peeling of them becomes more tedious. Green chile for canning purposes should be mature and the pods ought to be smooth and as large as possible. A typical pod for canning should be from 4 to 6 inches long, or longer, and about an inch or more in diameter at the stem end, gradually tapering down to a point. It should be smooth, straight, and fleshy. Aside from taking more time to peel a short wrinkled pod and one sunken at the stem there is more waste to it.



Figure 1. Picking Green Chile.

A number of pickings of good, mature, green chile for canning purposes can be made during the season. The earlier the plants come into bearing and the better care they receive, the more green chile they will produce. At the Station during the season of 1907 the experimental field planted plats were picked six times, while the transplanted plants from the cold frame were picked nine times. The picking of the green chile is somewhat slow and the pickers, aside from being careful not to break the branches containing smaller pods and blossoms, should be quick with their hands and able to tell at a glance a pod that is mature enough for the cannery without having to stop and examine it. It takes some little experience to pick good chile and pick it fast. At the Station it was observed that young inexperienced pickers at first picked very slowly and the larger part of the chile they picked had to be sorted over before it was sent to the cannery. The amount of chile the average experienced person can pick depends upon the crop of mature pods the plants have at the time. Since the amount varies it is impossible to give definite figures for all cases, but from six different pickings at the Station in 1907, the men picked from 35.5 to 45.5 pounds per hour.

Figure 2.  
Green Chile  
Picked for  
the Cannery.



Green chile can be kept for home use for some time after the crop has been gathered, by placing the green pods in dry sand, or, by piling up the vines and keeping the pods from freezing. In this way green chile may be had for use part of the winter months. If green chile is placed out in the sun it will turn yellowish white and become worthless, while if placed in the shade it will color up, and can be used as red chile.

### Red Chile

*Red Chile* is the term generally used for ripe pods whether they are red, black, or other colors. If no green chile is picked from the plants during the summer season two different pickings may be made of ripe pods. The first picking may be made whenever there are enough of the ripe pods on the plants to pay, while the last picking is made just before it freezes. The pods ought not to be picked until they are perfectly ripe. If picked partially unripe the green parts of the pods will be of a yellowish white color when they are dried in the sun. After the red chile is picked it has to be dried before it can be stored. Two methods for drying the chile are practiced by the Mexican chile growers. The most common



Figure 3. Ripe Chile in Piles Preparatory to Spreading it Out to Dry in the Sun.

way is to pile it up in medium sized piles, (See figure 3) from 4 to 6 days. At the end of this period the chile is spread out on the ground about two pods thick, and left there until thoroughly dried, when it is sacked and stored or shipped away.

It is claimed that by leaving the chile in piles for a few days before it is



Figure 4. Drying Ripe Chile Tied in Festoons.

spread out the dry pods will be more fleshy than when not submitted to this treatment. The other and less common way of drying it is by tying four or six pods together and making long festoons which are then hung out where they will dry (See figure 4).

Air dried chile is very light and bulky. The dry pods will not stand any pressing without breaking. The time it takes chile to dry when spread out on the ground in the fall varies from 6 to 8 weeks. The red chile loses considerable in weight during the drying process. The amount of weight lost depends to some extent upon the quality of the pods. If the pods are all perfectly ripe and sound when picked the loss will be less than if the pods are more or less green. From 2819 pounds of fresh ripe chile, containing some pods that were not perfectly ripe, put out to dry November 8, 1907, 747 pounds of dry chile were sacked and weighed January 2, 1908. According to these figures there were 2072 pounds loss, or 73.5% of the original weight. On November 8, 1907, fifty pounds of selected fresh ripe pods were spread out to

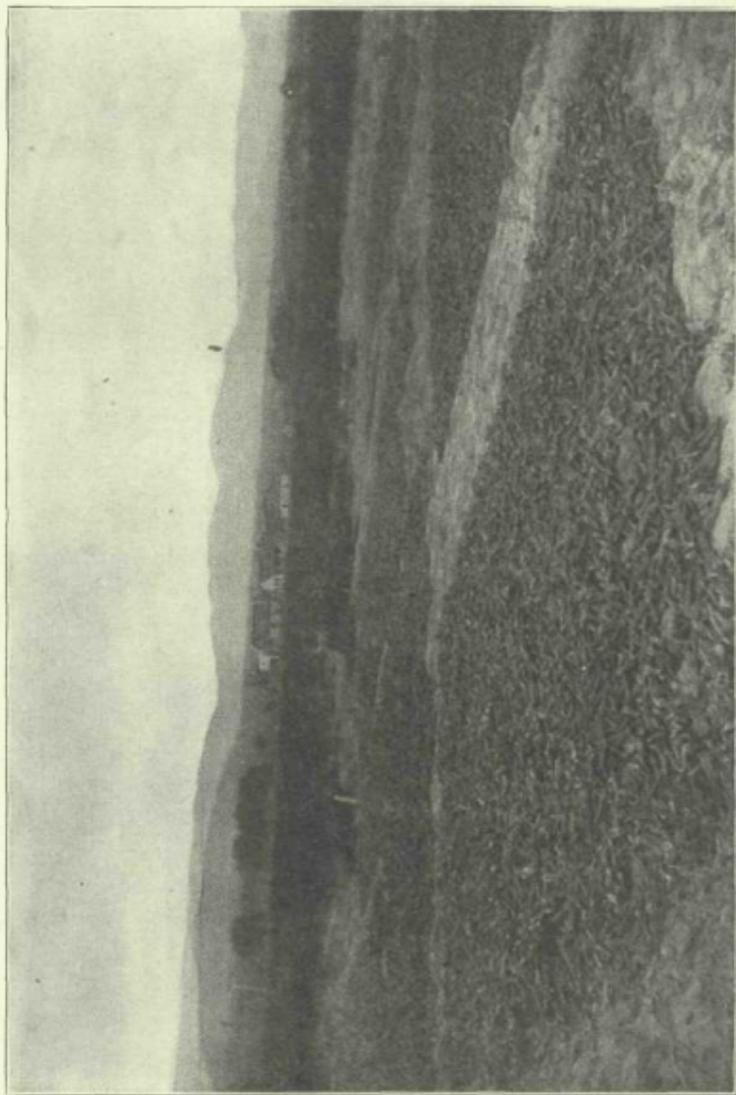


Figure 5. Ripe Chile Spread Out to Dry in the Field.



Figure 6. Sacking the Dried Ripe Chile

dry and from this lot 16 pounds of the dried chile were weighed and sacked January 2, 1908. Thus it is seen that the loss in weight was 34 pounds or 68%. Another 50 pounds of good, matured green chile were spread out on the same date and when dried it weighed 10 pounds. In this case the original weight was reduced 40 pounds or 80%. From these two tests it is noticed that the difference between the green and ripe chile was 6 pounds or 12% in favor of the ripe pods. The amount of red chile produced per acre can be increased by drying the green chile picked in the fall in the shade.

In the preparation of the red or green chile for use the flower stems, seeds, and veins\* are discarded, and represent so much waste. Aside from being quite a task to remove the

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\*The word veins as used in this bulletin is a literal translation of the Spanish word *venas*, which is the common Spanish name given in this section to the *placenta* or the pithy core in the chile pod. The author has adopted the word *veins* on account of not having found a better common term for the *placenta*.

stem and seeds from the pod, the fine dust coming off from the chile is exceedingly irritating to the nostrils and eyes. In order to obtain some data on the proportion of stem, veins, and seeds to the pod and the time necessary to remove these, 50 pounds of ripe, dry pods were weighed and the waste removed. The following are the results in figures:  $29\frac{3}{4}$  pounds of clean pods,  $5\frac{1}{4}$  pounds of stems,  $\frac{1}{2}$  pound of veins, and  $14\frac{1}{2}$  pounds of seed. It took  $23\frac{1}{2}$  hours to remove the stems, seeds, and veins from the pods. From these figures it will be seen that there is a large waste to red chile. Taking into consideration so much waste and the amount of work required to remove it and the disagreeable features of the work, it would be better for the consumer to buy the cleaned pods. Ordinarily the red chile is retailed locally at 15 to 20 cents a pound. Taking the 50 pounds of red chile they would bring from \$7.50 to \$10.00. Then according to these figures the consumer pays 15 to 20 cents per pound or \$3.03 to \$4.05 for the  $20\frac{1}{4}$  pounds of waste in the 50 pounds of chile bought, plus \$2.35, the cost of removing the stems and seed. In other words, the  $29\frac{3}{4}$  pounds of cleaned pods cost the consumer \$9.85 to \$12.35 or approximately at the rate of 33 to 41 cents

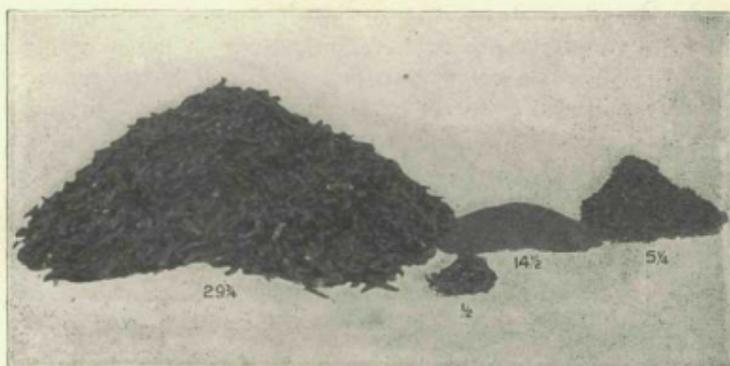


Figure 7. 50 lbs. of Ripe Dry Chile Showing Proportion of Clean Pods  $29\frac{3}{4}$  lbs. Veins or placenta  $\frac{1}{2}$  lb. Seeds  $14\frac{1}{2}$  lbs. Stems  $5\frac{1}{4}$  lbs.

per pound. Without dwelling too long upon this point it might be said that the consumer could better afford to pay 30 to 40 cents per pound for the cleaned pods than 20 cents for the uncleaned pods.

Red Chile, as now dried in this country, is very bulky and very light. One *fanega* in bulk which is equivalent to  $2\frac{1}{2}$  bushels weighed 12 pounds, and  $7\frac{1}{2}$  pounds without the stems and seeds.

### Seed

The chile seed resembles the tomato seed except that it is brighter in color and smoother. The same amount of care should be exercised in the selection of chile seed as for any other vegetable. As a matter of fact, our New Mexico chile-growers do not pay any attention to the selection of the seed, and as a result of this we are producing a very variable product.

### Diseases

So far there are no diseases troubling the chile. Once in a while a grower complains of some of the plants dying out. This occurs as a rule with plants growing in the lower spots in the field and where the soil is very heavy. It seems that the probable cause is too much water being allowed in the low places, causing the souring of the soil. Last year one or two growers complained of the very small chile pods and blossoms occasionally falling off. On investigation of this trouble no disease of any kind could be discovered on the plants, but it looked like the trouble was due to the plants having been allowed to dry too much, and thus, materially reducing the plant food of the more delicate parts of the plant. When the plants were irrigated they freshened up and new growth and fruit buds were stimulated, while the blossoms and newly formed pods which had suffered dropped off.

### Insects and Mice

There are few garden crops in New Mexico which have less insect enemies than the chile. The worst insect pests at present are the grasshoppers and the large green tomato worm.

The field mice do considerable damage in the spring, by eating the seed planted in hills. The little plants are also cut off just below the seed leaves. This trouble is likely to be worse in new and sandy loam especially if the adjoining field is unbroken and full of weeds. The only way to reduce the loss from these mice is to kill them, which may be done by putting out baits such as poisoned wheat and chile seed.

### Station Test

During the year 1907 the following chile experiments were conducted at the Station: Ridge vs. level culture from field sown seed; field sown seed vs. transplanted plants from seed started in cold frames; yield and cost of production of green and red chile per acre; effects of sodium nitrate upon yield. The land used for the field planted chile was the same which was used for melons during 1906. The soil in these plats is a very light loam and easily worked. On some of the plats there were a few small alkali spots on which it was almost impossible to secure a good stand. The land was winter plowed and disced. Two acre plats were laid off, one was ridged and one was not. On the ridged plat the seed was planted on the side of the ridge two feet apart according to the method already described under Ridge Culture, page 5. The ridges were made with a two-horse plow three and a half feet apart. On the level plat the seed was drilled in with a Planet Junior drill. The rows were first marked off three and a half feet apart with a hand marker. The drill was so regulated that it dropped the seeds in hills every two feet in the row. The plats were not irrigated before planting the seed as is often done. The seed was planted in the dry soil, and the first irrigation to produce germination was given immediately after planting the seed.

## Field Planted Chile

The following is a statement of the different operations on both the ridged and level culture one-acre chile plats for the season:

		Ridge Culture Plat	Level Culture Plat
April 3-4, 1907	Making ridges 3½ ft. apart with a 2-horse plow .....	\$ 2.40	.....
April 4, 1907	Disking ground before planting.....	.....	\$ 1.20
April 4, 1907	Smoothing after disking.....	.....	.60
April 5-10, 1907	Planting seed every 2 feet on side of ridges by hand .....	3.35	.....
April 10, 1907	Marking rows 3½ feet apart with hand marker .....	.....	.40
April 10, 1907	Drilling seed with garden drill.....	.....	.50
April 12, 1907	Irrigating with well water, gasoline and labor .....	1.94	2.41
April 20, 1907	Irrigation with ditch water.....	1.00	1.00
May 7, 1907	Replanting vacancies with drill .....	.....	.35
May 14, 1907	Irrigation with ditch water.....	.60	.60
May 20, 1907	Irrigation with ditch water.....	.60	.60
May 27-29, 1907	Hoeling .....	.60	1.20
May 30-31, 1907	Transplanting in vacancies and irrigating with well water. ....	1.50	3.80
June 4-5, 1907	Hoeling .....	1.50	.....
June 6, 1907	Cultivating with 1-horse cultivator.....	.....	.40
June 7, 8-11, 1907	Transplanting and irrigating .....	.....	2.65
June 20-21, 1907	Cultivating with 1-horse cultivator.....	.....	.50
June 22-24, 1907	Hoeling .....	.....	1.95
June 28-30, 1907	Thinning plants .....	3.23	1.50
July 1, 1907	Hoeling .....	.80	.....
July 5, 1907	Partial cultivation .....	.....	.35
July 12-13, 1907	Irrigation with well water.....	1.17	1.25
July 17-18, 1907	Plowing dirt up to plants .....	2.40	.....
July 18, 1907	Hoeling and drawing dirt up to plants .....	1.70	.....
July 19, 1907	Hoeling .....	.....	2.45
July 19, 1907	Cultivating .....	.....	.60
July 29, 1907	Cultivating .....	.....	.40
Aug. 6, 1907	Irrigating from ditch .....	.60	.67
Aug. 15-16, 1907	Irrigating from well .....	1.20	1.20
Aug. 21, 1907	Cultivating .....	.....	.40
Sept. 2, 1907	Cultivating .....	.....	.40
Sept. 9, 1907	Irrigating from well .....	1.00	1.98
Oct. 7, 1907	Irrigating from ditch .....	.50	.70
		\$26.19	\$28.36

From this table it is seen that the plats were irrigated with ditch and well water. The reason for this is that oftentimes the water from the ditch was not available and it was more convenient to use the pump. The first irrigation, which was given with well water, cost more than any other subsequent irrigation. As a rule it takes more water for the first irrigation in the spring after the ground has been plowed and worked over. Again, it is noticed that it cost considerable to irrigate the plats when ditch water was used. This is ex-

plained by the fact that the farm is irrigated from a high and very long lateral that is not yet well established. Every time the farm is irrigated extra help has to be hired to watch the ditch to keep it from breaking at the weak places and also to watch the headgate at the main ditch. Notwithstanding the high cost of irrigating from the ditch due to the necessary extra labor, it was still cheaper than well irrigation.

Owing to the fact that there was poor germination in the level culture plat, probably due to the seed having been drilled in too deeply, it was necessary to reseed most of the plat. During May 26, 27, 28 heavy winds blew from the southeast and caused considerable damage to all the chile, but more particularly to the level culture plat since this was close to a sandy area and the sand blowing in from this side covered up and killed a great many of the chile plants. On account of these winds injuring so much of the chile, it was necessary to do considerable transplanting later in the season. In the level culture plat there were a few alkali spots in which it was almost impossible to secure a stand and for this reason no doubt the yield was somewhat reduced. On account of the very unfavorable spring, the plants were exceedingly slow in getting a good start, making the crop very late. The thinning, which was done about the 28th of June, would have been done considerably earlier if the season had been normal. The first green chile from these plats was picked August 26th. The cost of production, not including the picking, of the ridged and level plats was \$26.19 and \$28.36, respectively. If all the irrigations had been given with ditch water and if the farm lateral had not given so much trouble, and if the season had not been so unfavorable the cost, it is believed, would have been somewhat smaller. In most cases, it cost a little more to irrigate the level plat than it did the ridged acre. It cost \$2.17 more to produce the level acre plat than it did the ridged acre. It is believed, however, that if the seed had not been drilled quite so deeply in the first place, and if the wind and sand had not injured such a large percent of the plants on the

level culture plat, the reseeding and transplanting of this plat might have been avoided and the cost would have been considerably less than for the ridged plat. The ridged plat was irrigated 10 times and the level culture plat 11 times during the season. Two of these irrigations would have been avoided if transplanting had not been necessary.

### Transplanted Chile

In order to get data on the cost and on the yield of transplanted chile a plat\* 38/100 of an acre was prepared among the trees in the peach orchard and transplanted with plants started in a cold frame.

The following is a statement of the cost of producing the transplanted 38/100 of an acre plat, not including the picking:

Feb. 8	Planted seed in cold frame	\$ .45
Feb. 8-April 30	Care of cold frame	1.20
April 30	Preparing plat—man and team	1.00
April 30	Transplanting and irrigating	2.05
May 3	Irrigating	.15
May 14	Irrigating	.15
May 20	Irrigating	.15
June 3	Irrigating	.15
June 6	Cultivating	.15
June 8	Hoeing	1.00
June 21	Cultivating	.10
June 26	Irrigating	.25
June 29	Hoeing	.55
July 6	Hoeing	.80
July 10	Irrigating	.25
July 15	Irrigating	.25
July 29	Cultivating	.15
Aug. 6	Irrigating	.25
Aug. 9	Cultivating	.15
Aug. 21	Cultivating	.15
Aug. 28	Irrigating	.25
Sept. 3-4	Hoeing	.80
Sept. 9	Irrigating	.25
Oct. 5	Irrigating	.15
		\$10.80
	Per acre	\$28.42

By means of this statement a comparison can be made of the cost of production between the transplanted and field planted chile. The cost of the irrigations is estimated because in irrigating the chile in the four middles in the peach orchard, four rows of peach trees were irrigated at the same time. The cost of producing the 38/100 acre transplanted plat which was

\*All the chile in this plat was picked in the green state.

\$10.80 or \$28.42 per acre, is 6 cents more than for the field planted level culture plat and \$2.23 more than for the ridged plat. The soil selected for this experiment is quite light, easy to work, and not very weedy. After the plat had been plowed and leveled, shallow furrows were plowed out with a single horse plow at a distance of three and a half feet apart. The plants, which were quite stocky and averaging about four to five inches in height, were transplanted on one side of the furrow, two plants to the hill, every two feet. Immediately after transplanting the plants were irrigated. The first few irrigations were given through the furrows. After the first cultivation the furrows were filled up and thereafter the whole surface was flooded over every time the chile was irrigated. Very few of the plants failed to grow. The stand was so uniform that it was not necessary to transplant any of the vacancies. A portion of the plat, containing  $11/100$  of an acre was fertilized with sodium nitrate.

#### Yield Test

Four  $1/8$  acre plats were measured off in the ridged acre and used in the yield test. Two of these plats were fertilized and two were not. The chile from one fertilized plat and one



Figure 8. Transplanted Chile in a Young Peach Orchard.

not fertilized was picked green and weighed as fast as it was ready; in the other two plats the chile was allowed to ripen before it was picked. Four other  $\frac{1}{8}$  acre plats were laid off in the level culture plat and similarly treated to get the yield of green and red chile.

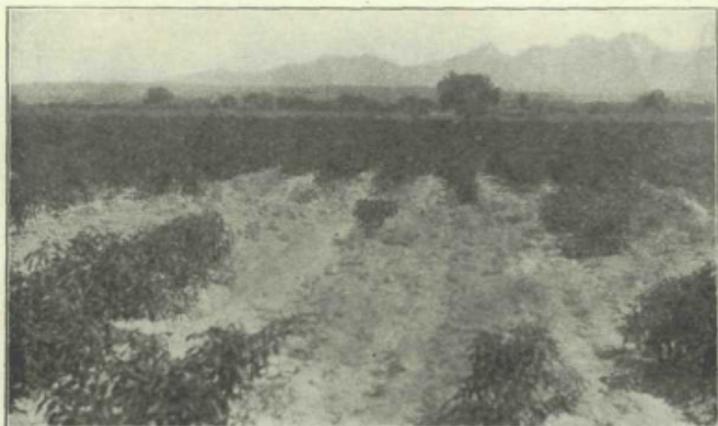


Figure 9. Vacant Spot in the Level Culture Plat Due to Alkali.

In the field planted chile, 6 pickings of green chile were made and none of the plats produced at the same rate that the transplanted plats did. With the single exception of plat 4, ridge culture, the ridged plats produced more than the corresponding level culture plats. Probably the vacant spots in the level culture plats, due to alkali, were responsible for some of the differences in yield. It is interesting to note that the fertilized ridged and level culture green chile plats produced less than the corresponding plats not fertilized.

The following table gives the dates and amounts in pounds of the different pickings, the yield per plat, and estimated yield per acre, of the transplanted, ridged, and level culture fertilized and unfertilized plats:

Table I.

Date harvested	Area in acres	Green or ripe plant	Picked Green										Picked Ripe		Estimated total yield per acre pounds	Estimated gain in pounds		
			8-1	8-8	8-12	8-26	9-4	9-17	10-11	10-15	10-25	11-6	Estimated yield in pounds	Piat yield in pounds				
			46	62	84	170	125	620	353	.....	722	52					20250	58
I Fertilized	11-100	Green	87	140	116	378	470	1205	815	.....	1174	274	4660	17250	153	677	20817	2600
II Not Fertilized	27-100	Green	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17927	.....
Field planted level culture plants																		
I Fertilized	1-8	Green	.....	.....	.....	135	92	225	445	.....	317	150	1374	10692	192	1536	12528	.....
II Not Fertilized	1-8	Green	.....	.....	.....	218	92	245	326	.....	284	118	1383	11064	198	1584	12648	130
III Fertilized	1-8	Ripe	.....	.....	.....	.....	.....	.....	.....	.....	375	.....	91	466	617	4936	8064	.....
IV Not fertilized	1-8	Ripe	.....	.....	.....	.....	.....	.....	.....	.....	523	.....	151	674	655	5240	10632	1068
Field planted ridged plots																		
I Fertilized	1-8	Green	.....	.....	.....	154	104	438	479	.....	430	118	1723	13784	135	1000	14784	.....
II Not Fertilized	1-8	Green	.....	.....	.....	153	160	427	687	.....	280	95	1808	14462	160	1280	15744	960
III Fertilized	1-8	Ripe	.....	.....	.....	.....	.....	.....	.....	.....	724	.....	142	866	552	4416	11244	1236
IV Not fertilized	1-8	Ripe	.....	.....	.....	.....	.....	.....	.....	.....	605	.....	228	843	408	3264	10008	.....

The yield of ripe chile from any of the four plats grown for this purpose was somewhat low. On October 15 practically all of the green chile on the vines in the four ripe chile plats was picked, because a freeze was expected just about

Table II. The following data will give an idea as to the number of pounds of chile that may be picked per hour:

Date Picked	Area	Aug. 26		Sept. 4		Sept. 17		Oct. 1		Oct. 24		Nov. 6		Total Number		Average number lbs picked per hour
		lbs.	hrs.	lbs.	hrs.	lbs.	hrs.	lbs.	hrs.	lbs.	hrs.	lbs.	hrs.	lbs.	hrs.	
I	10-50	548	14	403	14½	1825	40	1169	32	1800	48	916	25.5	6847	174	39.3
II	1-4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1462	36.75	1462	36.75	39.7

then, and green chile will not stand freezing. After the green chile had been picked the temperature rose and there was no freezing weather for about three weeks later. Had not the green chile been picked it is believed that most of it would have ripened by November 6 and the yield of red chile would have been materially larger. In the level culture experiment the total estimated yield from plat 3, which was fertilized, was 1968 pounds less than from plat 4 not fertilized. Part of this difference in yield in favor of plat 4 not fertilized may be due to the fact that it had a somewhat better stand. The total estimated yield from the ridged and fertilized plat No. 3 was 1336 pounds more than from plat 4 not fertilized. This is the only fertilized plat in the field planted chile which produced more than the corresponding plat not fertilized. The lack of uniformity of yield from the different plats makes it exceedingly difficult to say whether the fertilizer was a benefit or not. These conflicting results make the investigations that much more interesting, and the value or detriment of the fertilizer on the crop can only be ascertained by future experiments.

On the whole the transplanted plats produced more per acre than the field planted chile. The average estimated yield per acre of the transplanted, level culture, and ridged culture plats was

19373, 11118, and 12970 pounds, respectively. Noting the large difference in yield and the comparatively small difference in cost of production with the transplanted and field planted chile, it would pay the chile grower to start the plants in a cold frame and transplant them instead of planting the seed out in the field.

Sodium nitrate was used as a fertilizer and was scattered along the rows in the plats, four different times during the season. It was applied at the rate of 75, 100, 125, and 150 pounds per acre on July 5 and 19, August 8 and 21, respectively. The total amount being at the rate of 400 pounds per acre.

From this table it is seen that 39.5 pounds of chile was the average number of pounds picked per hour during the season. Some men will be able to pick a little more than this, while others will pick less. The amount picked will also depend upon the crop on the plants at the time of picking. The cost of picking an acre during the season will be influenced largely by the yield, and it will be impossible to give definite figures. However, some idea may be had by making the calculation from the data at hand. The average number of pounds picked per hour during the season was 39.5 and the average estimated yield per acre for green chile from the six plats was 14,487. (See table I) Then according to these figures, it would take 366.7 hours to pick the crop which at the present price of labor, 10 cents per hour, would amount to \$36.67 per acre.

### Varieties

The common Mexican chile that has been grown in this section for a number of years is exceedingly variable and of poor grade. The lack of selection and improvement of this chile is clearly seen in the numerous different shapes, colors, and sizes of the pods. On the whole, the old strain of Mexican chile is not large or good enough for the cannery and it is

being replaced in the Mesilla Valley by two other better varieties which have been introduced in late years. These two varieties produce larger and better pods. One of them has very dark red, almost black pods, while the other has bright red pods when ripe. These two varieties are distinguished one from the other by their color and are known as chile *colorado* (red chile) and chile *negro* (black chile). The tests at the station were made with these two varieties, the seed of which was bought of Mr. Theo. Rouault of Las Cruces, New Mexico. The red variety is a good grower and very prolific (See 1 frontispiece). The vines which grow to about 2½ feet high, branch out considerably and are not brittle, being strong enough to hold up a heavy crop without breaking. The pods are very smooth and of good size, being from four to six inches long and about an inch in diameter at the stem and tapering to a point. The crop ripens very uniformly and this variety is more promising than the black.

The black variety has vines from two to three feet in height and are quite brittle, breaking somewhat when the chile is being picked. The pods do not ripen very uniformly and are not, as a rule, as smooth as those of the red variety. When the ripe pods are being dried, many of them tend to discolor or turn yellowish usually around the stem end, while others become musty on the inside around the veins and seeds. This variety was introduced from Mexico in 1903 by Francisco Rivera of San Miguel, New Mexico; while the red variety was introduced from California in 1902 by Mr. Theo. Rouault of Las Cruces, New Mexico.

### Plant Breeding Work

Taking into consideration the adaptability of the chile plant to this section, its usefulness as a vegetable, the marked lack of uniformity of the crop, and the need of better varieties the work of improving the Mexican chile was begun during the summer of 1907. The work will be carried on mainly by

selection. Three varieties were planted from which to select different strains for future work. These were the red and black varieties secured from Mr. Theo. Rouault of Las Cruces, New Mexico, and the chile *pasilla* obtained from Chihuahua, Mexico, through the kindness of Carlos Romero, an agricultural student of this institution. The chile *pasilla* seems to be the variety generally grown in Chihuahua. Seed for thirty hills was secured. The most noticeable feature with the chile *pasilla* grown in the experimental plat was the very marked variability among the hills. There were hardly two plants that were similar enough to be classed together as the same variety. The variability among the plants of this variety manifested itself in many different ways, mostly in shape, size, and color of the pods, in the size and stockiness of the plant, and in the bearing qualities. The variation was so marked that a number of strains were selected from the chile *pasilla* plants for future work, while in the red and black varieties there was less variation.

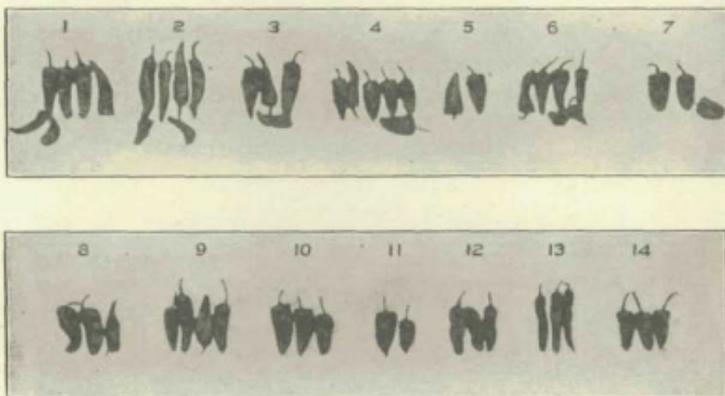


Figure 10. Variations Selected for the Plant Improvement Work.  
 No. 1 is a Black Chile Variation.  
 No. 2 is a Red Chile Variation.  
 All the Other Numbers are *pasilla* Chile Variations.

### Summary

1. Chile is very successfully and quite extensively grown throughout New Mexico. It is an important vegetable among the Mexican population, and the American people are beginning to use it more than formerly.

2. Chile is canned green and it is eaten in the green, ripe, and canned form.

3. The common method of growing chile is to plant the seed on the side of ridges at the edge of the water mark, though occasionally it is grown in level plats. A very good method, but one which is not practiced, is to grow the chile in level plats from transplanted plants started in cold frames early in the season.

4. At the station the transplanted plants from the cold frame bore earlier and produced a larger crop than the field planted chile.

5. The distance at which to plant the seed in the field varies considerably with the different growers, though at the station on good average soil  $3\frac{1}{2}$  feet between the rows by 2 feet in the rows has given very satisfactory results.

6. In field planted chile more seed than necessary is used to get a good stand. At the station, at the distances given above, 6.87 pounds and 4.38 pounds per acre were used in the ridged and level culture plats, respectively.

7. Chile plants are tender, though not quite as tender as tomato plants, and therefore the seed should not be planted in the field until danger of frost is over. In the Mesilla Valley many chile growers begin to plant as early as the 19th of March, but the safest time is probably after the 1st of April. For transplanting to the field the seed should be started in cold frames as early as the last of January.

8. Chile seed is somewhat slow to germinate and should not be planted more than  $\frac{3}{4}$  to  $1\frac{1}{2}$  inch deep.

9. To get a good uniform crop of pods, other conditions being favorable, thin the hills to two plants and when transplanting put two plants in a place.

10. The chile plant keeps bearing, if kept continuously and vigorously growing, until frost, at which time all stages of chile from the flower to the ripened pod may be found upon the plants. Thus careful attention must be paid to the cultivation and irrigation. Ten irrigations were given to the field planted chile at the station in 1907.

11. Green chile for home use or for canning purposes should be picked when about full grown and before it begins to color. The picking of the chile is very slow. At the station the average amount picked for the season was 39.5 pounds per hour.

12. One or two pickings can be made of ripe chile during the season. The pods should be perfectly ripe when picked; if partially green they are likely to discolor when being dried in the sun.

13. According to the common method of preparing the ripe chile there is about  $\frac{2}{5}$  of it by weight, that is waste.

14. As yet the chile is not troubled with any serious insects or fungus pests.

15. On the whole the results with sodium nitrate were somewhat contradictory, though in the transplanted chile the fertilized plat showed up satisfactorily.

16. The common native chile is very variable and needs to be improved.

17. The chile investigations have not been carried on long enough to arrive at definite conclusions and the results in this bulletin are only tentative.