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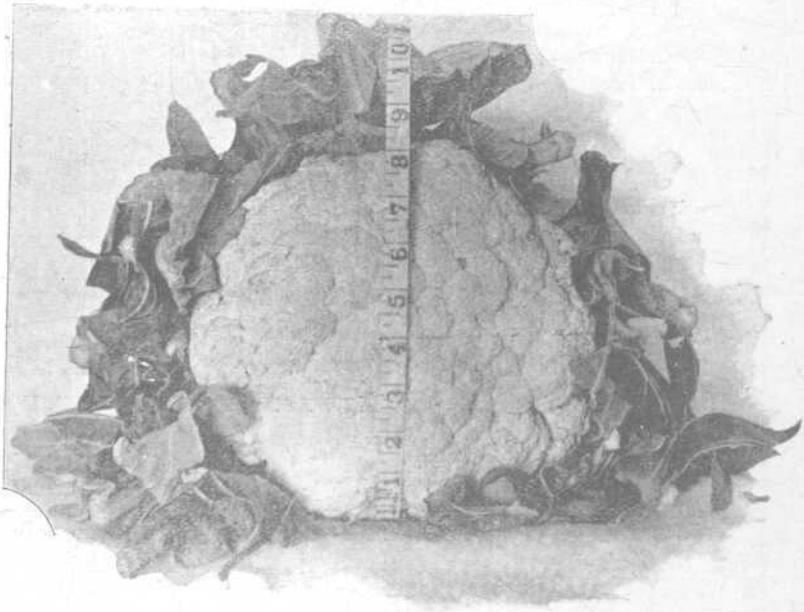

Burpee's Dry Weather Cauliflower.

Vegetable Growing in Southern Arizona.

(REPRINT)

By ALFRED J. McCLATCHIE.

Tucson, Arizona, August 15, 1900.

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FIG. 2. View in vegetable garden at the Station Farm

VEGETABLE GROWING IN SOUTHERN ARIZONA

By Alfred J. McClatchie.

INTRODUCTION

So much relative to vegetable growing remained to be settled by careful experiments, and the requests for information have been so numerous, from visitors and *by* mail, that it seemed important that systematic experiments be conducted at the Station farm near Phoenix, and a bulletin embodying the results issued. Work along this line was begun during 1898, and is still in progress. The farm, situated as it is about midway between the warmer, dryer region about Yuma, and the cooler valleys of the Verde and the upper Gila, is fairly well located to give results that will be applicable to most of southern Arizona.

The data upon which this bulletin is based have been drawn not only from our own experiments, but have been obtained from market gardeners, and other vegetable growers in various parts of the Territory. In this connection, the writer, upon behalf of the Station, wishes to thank Lewis Wetzler and E. J. Gleason, Phoenix; Geo. Cobb, Glendale; T. P. Banta, Mesa; C. N. Nichols, Thatcher; F. Hubbard, Pima; M Winsor, Yuma, and all others who have so kindly contributed data from their experience.

CLIMATIC CONDITIONS.

Our climatic conditions are so different from those of most of the remainder of the United States that the growing of vegetables by those without previous experience here is usually attended with many difficulties. However, acquaintance with our peculiar conditions usually enables one to overcome many of the difficulties encountered.

The climate of southern Arizona is essentially a desert one. The rainfall being but three to ten inches per year, the air is most fo the time too dry for the growth of some plants, even if an

abundance of water be supplied to the roots. There being no large body of water near to modify the temperature, the difference between summer and winter and between day and night is much greater than in the same latitude near the Coast. For some vegetables the summers are too hot and the winters too cold, only a short period between the extremes being suitable for their growth. The change from the cool weather of winter to the hot weather of summer, and from the latter to the cool weather of autumn being usually very rapid, plants that are adapted to one season are often overtaken by the conditions of the next, and their growth checked before reaching full maturity. Vegetables that can endure neither frost nor extreme heat have but a short period during which to make their growth. Another feature of our climate is the variableness of the seasons, causing what will succeed one year to fail or do poorly the next.

The peculiar conditions existing here make it important that suitable varieties of each vegetable be sown,—varieties that are adapted to these conditions. Varieties that thrive elsewhere, even in seemingly similar localities, may fail utterly here, while the proper varieties of the same vegetables will succeed.

Besides the climatic conditions mentioned, there is the ever perplexing question of the proper application, artificially, of the needed water that the clouds fail to furnish;—How much water to apply, how to apply it and when.

In undertaking vegetable growing, all of the above facts need to be taken into consideration. The wise thing to do is to make the most of the natural conditions, expect some failures, and profit by them. Continued effort will usually be rewarded with success.

Notwithstanding the difficulties mentioned, fresh vegetables may be taken from the garden throughout the year. Those not so situated that they can give regular attention to the vegetable garden will have fewer disappointments, however, and more vegetables for the table, if they depend upon the market gardener for their daily supply. But those who do not reside where they can be served by a gardener, and who for other reasons wish to attempt the growing of their own vegetables, will find it possible to provide for the table those they need, if they devote sufficient

time and thought to the work. There are many pleasures connected with gardening, even under the somewhat trying conditions of southern Arizona.

CLASSES OF VEGETABLES.

In respect to their relation to temperature, vegetables may be divided into three fairly distinct classes: (1) those that thrive only during cool and moderately cool weather, and endure temperatures as low as 15 to 20 deg. F., (2) those that grow well only during moderately warm weather and do not endure temperatures below 30 deg. to 32 deg. F , and (3) those that thrive only during warm or hot weather.

To the first class belong the beet, cabbage, carrot, cauliflower, endive, kohl rabi, lettuce, parsley, parsnip, radish, salsify, spinach and turnip. It will be seen that, with the exception of cauliflower, the list includes only those vegetables of which the leaves or roots are eaten. All of these can be grown in southern Arizona during autumn, winter and early spring, but cannot be successfully grown during the heat of summer. They do best if put out during September and October, or during January and February.

The second class includes beans, peas, potatoes and tomatoes, vegetables grown during spring and during early autumn. The vegetative part of peas endures most of the low temperatures of our region, but the blossoms and young pods are quite sensitive to frost. Tomato plants usually remain alive during the heat of summer, but in the warmest parts of southern Arizona produce little or no fruit. Vegetables of this class must be planted so as to make their growth between the frosts of winter and the extreme heat of summer.

To the third class mentioned belong com, cucumbers, eggplant, melons, peppers, sweet potatoes, pumpkins and squashes, including, with the exception of sweet potatoes, only those vegetables of which the fruit (that is, the seed-bearing part) is used for food. These thrive during summer. Corn, however, might more appropriately be placed in the second class, since the seed producing organs are injured by the extreme heat of summer, in some parts of southern Arizona.

Besides the above vegetables, there are two—celery and onions—that require a large part of our year for their development.

WHEN TO PLANT.

Information concerning when to plant particular vegetables seems to be more in demand than any other. For convenience, the facts are tabulated below. The table will indicate approximately when each vegetable may be planted with hope of a successful outcome. The dates are intended to apply specially to the region about Phoenix, the climate of which is intermediate between that of the extreme southwestern part of Arizona, and the valley to the east. At Yuma, for example, plantings could be made as a rule a few weeks earlier in the winter and spring and a few weeks later in the summer and autumn; while at Safford, on the other hand, plantings would be later in winter and spring and earlier in the summer and autumn in most cases. In a few cases, however, even the slight existing difference in climate makes it advisable to plant at quite different times than the ones mentioned. The best time to plant any particular vegetable must be determined for the locality in which one is residing:

Asparagus seed or roots—January to March; October and November.

Beets—January to March; August to November.

Beans—March and April; August and September.

Cabbage seed—August to October; tipper Gila—February and June; plants—January and February; September to November; upper Gila—April and July (F. Hubbard.)

Carrots—January and February; August to October.

Cauliflower seed—August and September; plants—September and October.

Celery seed—January to March; plants—August to October,

Corn—February to April; July; cool valleys—May and June.

Cucumbers—March to May; August and September.

Egg-plant seed—January to March; plants—April to June.

Kohl Rabi—January to March; September and October.

Lettuce—January and February; August to October.

Melons—March to July.

Onion seed—September and October, sets—November to January.

Parsley—January and February; September and October

Parsnips—January, October.

Peas—January and February; August, November and December.

Peppers—January to April.

Potatoes—January and February; August and September

Pumpkins and *Squashes*—February to April; June

Radishes—January to April, August to December.

Salsify—Januaryand February; October.

Spinach—January and February; September to November

Sweet-potatoes—April to June.

Tomato seed—January to March; plants, April.

Turnips—September to January.

With many the question will arise "What may be planted at this season of the year." The following summary will show what vegetables may be planted during any particular month:

January—Asparagus seed and roots, beets, cabbage plants, carrots, celery seed, egg-plant seed, kohl rabi, lettuce, parsley, parsnips, peas, pepper seed, potatoes, radishes, salsify, spinach, tomato seed, turnips.

February:—Same as above with the addition of corn, pumpkins and squashes.

March.—Beets, beans, celery seed, corn, cucumbers, egg-plant seed, melons, pepper seed, radishes, tomato seed.

April—Beans, corn, cucumbers, egg-plants, melons, pepper plants, pumpkins and squashes, sweet-potatoes, tomato plants

May:—Egg-plants, sweet-potatoes.

June.—Pumpkins and squashes for autumn and winter use

July:—Corn.

August—Beets, beans, cabbage seed, carrots, cauliflower seed, celery plants, cucumbers, lettuce seed, peas, potatoes,

September:—Beets, beans, cabbage seed and plants, carrots, cauliflower seed and plants, celery plants, kohl rabi, lettuce seed and plants, onion seed, parsley, potatoes, radishes, spinach, turnips.

October.—Asparagus, beets, cabbage seed and plants, carrots, cauliflower plants, celery plants, cucumbers, lettuce, onion seed, parsley, parsnips, radishes, spinach, turnips.

November.—Asparagus, beets, cabbage plants, peas, radishes, spinach.

December.—Peas, radishes.

PREPARATION OF THE SOIL

A very important step in gardening is the proper preparation of the soil. Much time may be saved and many failures avoided by giving due attention to this part of the work.

Most vegetables grow best in a sandy loam, but with proper care they may be successfully produced in quite a variety of soils. When a choice is practicable, a soil fairly retentive of moisture, but not inclined to bake and crack when dry, should be selected for the garden spot. The majority of the soils of southern Arizona contain a good supply of all the elements required by plants, except nitrogen; but many of them do not possess the physical properties that are desirable in a garden soil. Some are too sandy or gravelly, and hence so porous that they do not retain water properly; while others consist of a fine adobe that is very adhesive when wet and very hard when dry. The sandy soil may be improved by the addition of well rotted manure and other fine material that will cause the soil to be more retentive of water, and more fertile as well. Adobe soil may be improved by applying strawy manure or other coarse material that will make the soil less adhesive when wet and less inclined to bake and crack when dry. The growth of alfalfa upon any soil improves its physical condition and adds the desired nitrogen as well. When possible, it is best to select for a garden a piece in which alfalfa has been grown. If more than one grade of soil is available, the lighter one should be used for winter vegetables, One that is heavier and more retentive of moisture will be better adapted to the growth of vegetables during summer. Having selected a garden spot and applied manure, if it is needed, the next step is to plow it deeply and harrow it thoroughly.

PREPARATION FOR IRRIGATION.

Since in our region all vegetables are irrigated at some stage of their development, the contemplated method of irrigating them must be taken into consideration when they are planted With reference to their subsequent irrigation, vegetables may be planted in four different ways:

1. They may be planted in level soil, as they would be where irrigation is not necessary or practicable, and then furrowed for irrigation when in need of water. This method may be pursued with many vegetables planted during winter in soil fairly retentive of moisture. Prom the latter part of November to February, beets, parsnips, peas, potatoes, radishes, spinach and turnips may be planted in the above manner, and will need no irrigation for some time after coming up. But the soil must be thoroughly irrigated just before its preparation for seeding, in order to make this possible. If this be done, and the seed be planted before the surface of the soil becomes dry, it will germinate before the required moisture has left the soil surrounding it, and for some time the roots will push downward faster than the soil will dry Most of the vegetables mentioned above make a better growth by this method than by any other As soon as they give evidence of suffering for water, it should be applied in freshly opened furrows.

2 A second method is to make furrows the distance apart the rows of the vegetables to be planted are desired, and wet the sides of the furrow by a stream of water run for a sufficient length of time to permit it to soak over several inches from the margin Within a few days, when the soil has become dry enough to be stirred, the seed are planted along the margin of the furrow, and not irrigated until they are up. This method is especially applicable to beans, corn, cucumbers, melons, pumpkins, squashes, and to tomatoes planted in hills where they are to remain; and may be used in planting some vegetables with smaller seeds sown in drills. Most vegetables do better if started without irrigation between planting and germinating, and the aim should be to pursue this method whenever practicable.

3. A third method is to sow the seed in dry or only slightly moist soil along the margin of furrows through which water is run

boon afterwards, the object being to furnish by irrigation water for germinating the seed This is the method pursued with most vegetables planted during the summer and early autumn, when evaporation is so rapid that the soil about the seed becomes dry very rapidly; and is necessary at other times of the year in sowing small seed. Ordinarily, unless great care is exercised, as good a stand of young plants is not secured by this method as by those previously described.

4. A fourth method, practiced by some growers, is to throw up permanent ridges along the sides of which the seed is planted and between which the irrigating water is run. This system is applicable to the growing of nearly all vegetables, and in some soils gives fair results Little or no opportunity is afforded for cultivation, especially with a horse, thus requiring much hand labor when weeds are growing vigorously.

It will be obvious that the preparation needed for irrigation must be varied to suit the soil, the plant to be grown, the time of year the planting is being made, and the convenience of the grower.

IRRIGATION.

In southern Arizona irrigation of all vegetables is essential No definite rules can be laid down to govern those without previous experience along this line. The amount and frequency of the application of water will depend on the soil, the condition of the weather and the vegetables being grown.

The heavier (that is, the finer) the soil, the more water and the longer time will be required to saturate it, and, as a rule, the longer it will remain moist. Coarse sandy soils are more easily and quickly saturated, and retain water a shorter time. During dry, warm, or windy days soil loses its moisture much more rapidly than during moist, cool, or quiet ones; and the need of irrigation will be hastened. But whatever the soil, the weather or the vegetables, it has been pretty well demonstrated that at each irrigation the soil should be thoroughly soaked with water. The frequency of these soakings will be determined by the above factors, but the thoroughness of the operation will not be. One thorough irrigation followed by proper cultivation will, as a rule,

produce much better results than two or more light irrigations with or without intervening cultivation. In all cases, the irrigating streams should be prevented from flowing over the soil about the plants

CULTIVATION.

The effects of the cultivation of growing vegetables are (1) the aeration of the soil, (2) the conservation of moisture, and (3) the destruction of weeds

The aeration of the soil is very important. That the necessary biological and chemical processes may proceed properly in the soil, a constant supply of oxygen is essential If these processes cannot continue, a crop may starve, though there be an abundance of raw material in the soil After rains and more especially after irrigation, most soils form a crust over the surface, or ''bake'' to some depth, and free access of air is thus prevented. Cultivation breaks up the surface and promotes the aeration of the underlying soil.

The conservation of moisture by cultivation is based on well-established principles. During a rainstorm or during irrigation, the water received by the soil moves downward As soon as the supply from above ceases and the free water settles away, by capillary action the movement of the moisture in the soil sets in in the opposite direction, moving upward as well as downward. As the moisture reaches the surface, it passes off as vapor. Only by preventing the water reaching the surface can this evaporation be checked. The capillary action by which the water reaches the point where it evaporates can go only in closely packed soil furnishing the innumerable, minute, irregular tubes through which the water rises. To break up these tubes checks this upward movement. Cultivation not only breaks up the capillary tubes of the surface, but forms over the surface a mulch that prevents rapid evaporation. The moisture will then rise to the mulch, but cannot pass beyond it by capillary action, and evaporation thus proceeds much more slowly than if the moisture were permitted to follow the capillary tubes to the surface.

In order to produce the best results the soil must be so cultivated, however, that it is not left broken up into large clods that will permit the air to reach the underlying strata The finer and looser the surface mulch the better, and in our arid region it needs to be deeper than elsewhere

Weeds injure growing crops by appropriating the available plant food, by removing water from the soil, and, in the case of some small vegetables, by excluding light While a soil may be very fertile, there seldom is present enough plant food, in the form necessary for the use of plants, to support a crop of weeds and a crop of vegetables at the same time But weeds usually do the greatest injury by removing from about the roots of the crop the water needed by it Not only do weeds require water for their increase in size, but water is continually evaporating from the surface of their leaves While they may shade the surface of the soil so as to check evaporation there, the evaporation from their leaves is much more rapid than it would be from the surface of the unshaded soil, if it were properly cultivated Thus, the destruction of the weeds by cultivation not only curtails the loss of plant food and of water, but the process produces all the desirable conditions of the soil mentioned above.

CULTURAL SUGGESTIONS.

In the following pages an attempt is made to give the important facts concerning the growing of the principal vegetables raised in southern Arizona Space does not permit of giving detailed cultural directions. The reasons for giving in a Station bulletin what growers in most states obtain from horticultural books and papers is, that conditions are unique and no published books or articles give information applicable here Wickson's "California Vegetables," however, will be found to be very suggestive and useful

ASPARAGUS.

*Culture** Asparagus is readily grown in southern Arizona, much of the soil being well adapted to its culture. The slight amount of common salt present in most of the soils is favorable to its growth. It prefers a very rich soil, especially a well-manured one Where the soil is not naturally saline, the addition of salt

is beneficial Asparagus may be grown by planting the seed in hills three feet apart each way, where the roots are to remain, but the usual way is to sow seed in a bed and set out the roots when a year old. Seed may be sown in rows two feet apart during early spring (January to March) or during October The growing plants require considerable water, and should be thinned to six inches apart to prevent crowding of the roots The next season they may be set out in well prepared, heavily manured soil, making the rows four feet apart and setting the plants two to three feet in the row No stems should be cut until the third season. The stronger the roots become before cutting is begun, the greater will be the yield in future years. Each autumn the matured stalks should be cut away and burned, and the soil manured and thoroughly cultivated.

Varieties Any variety will thrive, but the old standard variety Conover's Colossal is the one most generally grown here Palmetto is also an approved variety.

BEANS.

Culture. Beans are not easily grown in our region The bush varieties are the ones most successfully grown here, and these sometimes fail. They endure neither frost nor the dry heat of summer, and hence have but a short period of growth. They are planted during March and the early part of April and again during August and the early part of September. They may be planted in hills 15 to 20 inches apart along the side of furrows through which water has been previously run, or they may be dropped in small furrows that are subsequently filled with a small plow.

Varieties. One of the easiest varieties to grow is the Pink Bean of the southwest. Of the sorts more popular elsewhere, the Long Yellow Six Weeks gives the best results. The Pima Indians grow quite successfully on their reservation a small Lima bean of the Sieva type. They plant it during February.

BEETS.

Culture. The beet is a vegetable that is quite easily grown in our region, if a few precautions are taken. When once started

beet plants endure heavy frosts and considerable heat, and consequently grow through our winters and considerable of the summer. The young seed-plants are somewhat sensitive to cold, hence it is sometimes difficult to secure a good stand during the latter part of November, during December, and the early part of January. By irrigation, a fair stand can be obtained from August to November that will result in furnishing beets for the table from December to April. From the middle of January until March is the best time to sow beets. If the soil has been previously irrigated, and is moist when the seed is sown, no irrigation will be required for some time after the beets are up. A better stand can be secured in this way at this time of the year than by sowing in dry soil and irrigating the seed up. Care must be taken not to cover the seed too deep, from three-fourths to one and one-half inches being the proper depth. It may be covered deeper during warm than during cool weather. Beets respond promptly to cultivation, which should begin as soon as they are an inch or two high.

Varieties. All varieties do well here. The most popular ones are the Blood Turnip and the Long Blood. The sugar beet is easily grown and produces a very sweet root much relished by some.

CABBAGE.

Culture. This vegetable can be grown quite easily during the cool part of the year. Seed may be sown from August to October, and the plants set during September, October and November. Seed of the early varieties may be sown later, and the plants set during January and February, but the results are not always satisfactory. The warm weather of early summer soon checks their growth. Seed sown during warm weather requires considerable water, and the young plants should be watered daily.

The cabbage grows best in a rich mellow soil. Well-rotted stable manure greatly improves the soil for cabbage, there being little danger of getting the soil too rich. They are usually set in rows two and one-half to three feet apart, and 15 to 24 inches in the row, the larger sorts being set further apart than the small ones. Cabbage require considerable water, and are benefitted by

frequent cultivation. The space between the rows should be cultivated at least once after each irrigation, that the soil may be kept constantly mellow and free from weeds Fresh cabbage may be taken from the garden from January to June, if settings have been made during successive months of the previous autumn

Varieties. All varieties do quite well during winter, but some do not endure the heat of early fall and late spring as well as others. At the Station farm Succession has during two seasons produced the largest number of heads and the greatest number of pounds per square rod, of the eighteen varieties tested Next in yield has been Fottler's Brunswick All Seasons and most of the Drumhead varieties yielded well. The Flat Dutch varieties do well during cool weather. Burpee's Safe Crop and Surehead were satisfactory. For those who like a red cabbage, the Red Poland will be found to be satisfactory For producing small early cabbages the Early Jersey Wakefield and Winningstadt are good.

CAULIFLOWER.

Culture. Cauliflower is somewhat difficult to grow here, as it requires much water, and most varieties need a damp atmosphere and do not endure as much heat as cabbage. But in a very rich soil some varieties of this vegetable may be successfully grown, if supplied with an abundance of water The soil should receive a heavy dressing of stable manure, and should be plowed deeply and harrowed well before the furrows along which the plants are to be set are made. The seed may be sown during August and September and the plants set out during September and October. Set the plants about two feet apart in rows three feet apart. From the time of setting until maturity the soil about them should be kept constantly moist, that the plants may grow without any check. The more cultivation they receive, the better.

Varieties. The varieties that have succeeded best at the Station farm are Burpee's Dry Weather and Burpee's Best Early The former produced large heads weighing three to ten pounds, and the latter medium-sized ones weighing two to three pounds The California Main Market proved an almost entire failure; Henderson's Snow-ball and Early Erfurt have been grown about Phœnix with fair success. This vegetable is such an excellent one

when grown properly, that it is important that a variety suitable to the region be selected for planting

CARROTS.

Culture Carrots are readily grown in all localities The seed may be sown during August, September and October for winter use, and during January and February for spring growth. The seed, being small, must not be covered deep, about half an inch being the proper depth The more rapidly they are kept growing, by giving sufficient water and cultivation, the more tender will the roots be

Varieties The varieties used most for garden purposes are Danver's Half-Long, the Ox-heart, and the Short-horn

CELERY.

Culture This is a difficult vegetable to grow in our warm, dry climate. It requires a very rich moist soil and a long season. The seed is sown from January to March and the plants set out from August to October As the seed is small, it can be brought up best in a small bed under shade, where the soil can be kept constantly moist When the plants are about three inches high clip off the tops, and during August, September or October clip again and set out. The soil in which they are set should have been heavily dressed with well-rotted manure and rendered mellow. Set in rows two to three feet apart, about six to eight inches in the row. Give them an abundance of water and good culture, keeping the earth away from the plants until they are ten to twelve inches high; then bank up to bleach the stems. Two to four weeks will be required for bleaching.

Varieties. The Giant Pascal is the variety most generally grown here. It seems to be a greater favorite than the White Plume which is so popular in California.

CORN,

Culture. Cora is commonly planted along the sides of previously irrigated furrows. The seed should be planted as soon after irrigation as the soil will permit, and ordinarily need not be irrigated until well up. When irrigation is necessary, water may

be run down the furrows mentioned above. In the warmer valleys plantings may be made during February, March and early April for spring and early summer use, and during July and early August for fall use In the cooler valleys corn may be planted from March to June. With the addition of irrigation, the culture of corn is much the same here as elsewhere.

Varieties. The only varieties of table corn grown with satisfaction during spring are Early Adams, Extra Early Adams and Mexican corn. The latter endures much heat and may be planted later than other varieites The period between the frosts Of March and the heat of early summer is so short that none but a very early northern variety has time to mature None of the sweet corns give satisfaction. Either the heat prevents the formation of the kernels, or, if formed, they are eaten by larvae. The field varieties planted during July produce green corn for table use during September and October

CUCUMBERS

Culture. The culture of cucumbers, although attended with some difficulties, is much the same here as elsewhere Plantings are made from March to May for summer use, and during August and September for autumn use. The dry heat during summer is trying to their foliage. Cucumbers require a rich soil, and are planted four to six feet apart along previously irrigated furrows. They require considerable water, and the soil should be kept mellow by frequent cultivation.

Varieties. The varieties generally grown are Long Green, White Spine, and Boston Pickling.

EGG-PLANT.

Culture. After the plants are once started, the egg-plant is an easily grown vegetable in our region. It is sensitive to cold, but flourishes during our hottest weather, if set in rich soil and supplied with sufficient water The seed may be sown under cover any time from January to March. When the plants are about two inches high, they should be set about four inches apart in a box or bed of rich soil that they may become stocky and robust before being set out in the garden. When the warm weather

of April comes they may be set out three to four feet apart each way. If watered and cultivated frequently, they will now grow rapidly, and will produce fruit through the summer.

Varieties. But one variety is grown extensively—the New York Improved Large Purple

LETTUCE

Culture Lettuce is a very easily grown vegetable during the cool part of the year in southern Arizona, but does not endure the summer heat It will grow in a great variety of soils, but prefers a rich, mellow one The principal difficulty is in getting the seed to germinate. Being small, it must be covered lightly, and consequently soon dries out unless watered frequently. When the young plants are once established, they grow rapidly. For a fall crop the seed should be sown under cover, that the young plants may be protected from the heat of the sun. Sowings may begin during the latter part of July, and the young plants set out four to six inches apart during September. During the latter month seed may be sown in the open ground, and sowings may continue until February. The seed row should be placed near a furrow through which water is to run frequently. The soil between the rows should be kept mellow and free from weeds. When the plants are well established, the heading varieties should be thinned to four to six inches apart. Other varieties may be thinned by beginning their use early.

Varieties. All varieties can be grown with more or less success in our climate, but some are so much better than others that it is well to grow the best. Most persons prefer a head lettuce. The best variety of this type grown at the Station farm has been Henderson's New York. It produces very solid heads of a good size and remains in season about three months in cool weather. The earliest variety of head lettuce we have tested is the Golden Queen, but the heads are rather small and its season is short. A very popular and fairly satisfactory variety is the Improved Hanson. Other good varieties are Boston Market, Denver Market, Iceberg, Deacon, California Cream Butter, Prize Head, Salamander and Wonderful. The latter variety is much prized by some growers.

MELONS.

Culture. Southern Arizona is preeminently a melon growing region. Melons of all varieties thrive here as they do in few other places in the United States. Melons prefer a rich mellow soil, and do best in our region on land upon which alfalfa has been grown for some time. A heavy dressing of manure is also beneficial. Planting may begin as soon as danger from frost is over. This will be during March, April, or May, depending on the locality. The first care is to plant the seed in soil sufficiently moist to bring the young plants up without further irrigation. This is accomplished by making furrows (about six feet apart) through which water is run for a sufficient time to permit the sides to become wet to a distance of about a foot. As soon as the soil beside the furrows is dry enough to be stirred without causing it to bake, the seed is planted in hills six feet apart. A covering of one to two inches is best. The soil immediately above the seed should be pressed firm, and a mulch of drier soil thrown on top to prevent baking and check evaporation. This method should bring the seed up without further irrigation, but if the soil about them seems in danger of drying out before germination is completed (owing to cool, windy weather, or other causes) irrigation through the adjacent furrow must be resorted to. By supplying sufficient water and by frequent cultivation, the young plants should be kept growing without any check When the vines have attained a length of three to four feet, it will be necessary for cultivation with a horse to stop, but they should be kept free from weeds during the entire period of their growth. If they have been planted five to eight feet apart, as they should be, the ground will soon become entirely covered, and the increasing heat from the sun will be thus moderated among them.

Varieties. All varieties do well. Three characteristics should be kept in mind by those growing for market:—earliness, size and firmness of rind. To those growing them for home use, quality is of first importance, although earliness is very desirable, since melons are most enjoyed early in the summer season. The earliest watermelon we have tested at the Station farm is the Augusta. The quality also is excellent, and the size satisfactory.

It is very productive, and continues bearing longer than other early varieties tested. Fordhook First is also a good early melon. Phinney's Early and Cole's Early have been the popular early melons heretofore, but the quality of neither is satisfactory, and the remunerative season short. For a main crop Florida Favorite, Georgia Rattlesnake, Sweet Heart, and Kleckley Sweets are among the popular varieties of watermelons

Among varieties of muskmelons the Rockyford, or Netted Gem, is probably the most popular. Other desirable varieties are Nutmeg, Hackensack, Cassaba, and Banana.

ONIONS

Culture. The onion is grown quite successfully in our region, if planted at the right time and treated properly. It endures both low and high temperatures, if supplied with sufficient water. Since their season of growth is long, considerable labor is involved in growing them While they will grow in quite a variety of soils, they enjoy a fertile, loamy one, especially a soil rich in humus The latter may be supplied by the application of an abundance of well rotted stable manure that is thoroughly mixed with the soil. They may be planted in the same soil for years, rotation not being essential as in the case of most other crops. The best time to sow the seed is from the middle of September to the middle of October. Either of two methods may be pursued: they may be sown in rows where they are to remain, or they may be sown broadcast in beds from which they are to be transplanted. There is little difference in the amount of labor required, and the latter method has some advantages: The seed is confined to a small area that can be kept moist more easily, the soil to which they are to be transplanted can be more readily kept free from weeds during the time when it would otherwise be occupied with the young plants, and an even stand is assured. Some growers sow in single rows 18 to 24 inches apart; while others sow in double rows 6 to 10 inches apart, with a space between wide enough to permit cultivation with a horse. When the plants are a few inches high they should be thinned to four to six inches apart, if they have been sown where they are to stand; or transplanted out that distance apart, if the young plants have been grown in a bed. They will need to be irrigated frequently and

should be cultivated after each irrigation. They mature during the summer, having occupied the soil a large part of the year.

Varieties. The Prize Taker is in many respects the most satisfactory variety we have tested at the Station farm. The White Portugal or Silver Skin, the Silver King, and the Australian Brown are also good varieties. The latter has the reputation of keeping well. The Barletta is a small early variety that is

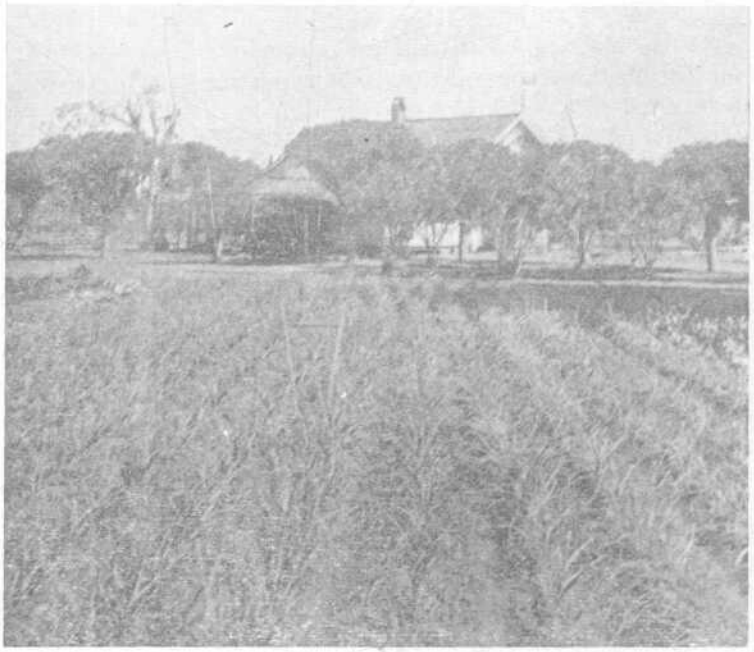

FIG. 3. Onions sown Sept. 16; side to right of cultivator growing where sown; side to the left sown in bed and set out Dec. 4; photographed April 6.

grown some. A larger and more satisfactory early onion is the New Queen. At the Station farm it has produced marketable onions before any of the other varieties did. The Prize Taker yielded about a fourth more than the New Queen, but ripened a month later. The old standard varieties, Yellow Danvers and Red Weathersfield do fairly well, but those having their origin in a climate similar to ours do best.

PARSNIPS

Culture As this vegetable requires a long period for growth, and does not endure much heat, it must be sown at the beginning of the cool weather of the fall, in order to be grown most successfully. Parsnips prefer a rich loamy soil, and should be sown in rows about two feet apart. After being once started they require only a moderate amount of water and cultivation. The more rapidly they are kept growing the more tender and sweet they will be

Varieties. Two varieties are grown—the Hollow Crown, a long smooth variety, and the Turnip-rooted.

PEAS.

Culture. The pea is a vegetable that often causes the grower considerable anxiety in our region. It is not an especially difficult vegetable to grow, but is an uncertain one. With proper treatment it produces well during favorable seasons. Being a plant of which we eat the seed, the desired part cannot be produced during frosty weather, and the vegetative part cannot endure dry heat. Hence the plan resorted to here is to grow the vegetative part during the cool weather of winter, for producing pods during the temperate weather of spring; or to try to get the plant to go through all its stages during the temperate weather of fall. In doing the latter, growers are not always successful. The danger during the winter is that the early bloom and pods will be killed by frost. The danger during the fall is that the pods will not mature quickly enough to escape the November frosts, since it is difficult to get them to germinate early enough to reach maturity before that time. The pea is such an excellent vegetable when grown, that it is worthy of a gardener's best efforts. Peas enjoy a rich mellow soil. The seed is sown in drills about two feet apart, and irrigation furrows run along the sides, except when sown in moist soil in cool weather. Sometimes they are covered by plowing a light furrow upon the seed in the drill. This leaves a furrow for irrigation. If sown during the cool part of the winter in moist soil, they will come up without irrigation, but irrigation is always essential when sown

during the early fall. They do not need a large amount of water, but should be given plenty of cultivation. Baking of the soil about the plants is very injurious.

Varieties. Green peas may be secured during April by either of two methods: Early dwarf varieties may be sown during midwinter, or larger later varieties may be sown during the previous fall. Some growers prefer one method and some the other, while still others pursue both. The best dwarf varieties for sowing from the latter part of December to the middle of February are the American Wonder, Little Gem, Nott's Excelsior, and Gradus. For sowing during late October, November, and early December, the most popular varieties are the Yorkshire Hero, Champion of England, Horsford's Market Garden, Stratagem and Telephone. For August and September sowing, to produce green peas during November, only the dwarf, early varieties, like the American Wonder and Little Gem, are suitable.

POTATOES.

Culture. The season between the frosts of early spring and the heat of early summer being short, the growing of potatoes during spring is attended with difficulties; and greater difficulty still is encountered in attempting to grow them between the heat of summer and the frosts of late autumn. But proper attention to the requirements of this important vegetable results in a fair yield during May and June, and a usually lighter one in November. The potato requires a mellow, loamy soil kept moderately moist—neither too wet nor too dry. A good percentage of humus in the soil is also highly desirable. This condition may be secured by turning under alfalfa, or by applying plenty of stable manure, followed by deep plowing and thorough harrowing.

For spring growth the best time to plant, according to our experiments at the Station farm, is from the middle of January to the middle of February, in the Salt River Valley. The later they are planted here after the middle of February, the less growth they will make before the hot weather of June, which in the vicinity of Phoenix, is sure to level all potato tops to the ground. The seed pieces are commonly dropped 12 to 18 inches apart in furrows 2 1-2 to 3 feet apart, and covered by throwing a furrow over

them. If the soil is moist and the field is harrowed or rolled after the furrows are made, irrigation will not be necessary until after they are up, but in some cases it is well to have furrows left for use, in case the soil becomes too dry before they are up. It should be remembered that, unlike seeds, the early stages of germination proceed as well in dry as in moist soil. Not until the stem puts out roots is much moisture needed. The less the soil is irrigated and the more it is cultivated, the mellower it will

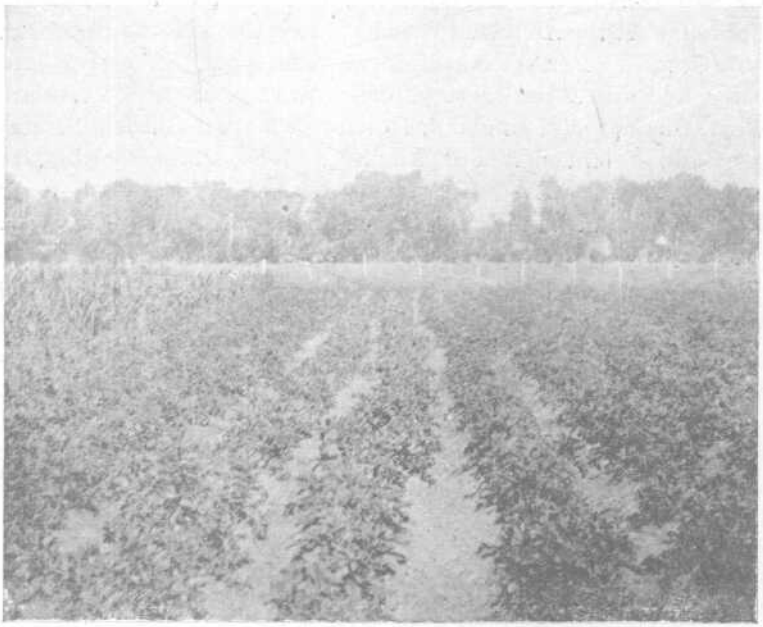

FIG. 4. View in experimental potato plat.

remain. If the soil becomes too dry at any time, irrigation is apt to start a new growth that will be detrimental to the crop. It is very important that the soil be prevented from baking about the roots and tubers. To this end, the irrigation stream should, by keeping the furrow midway between the rows, be kept as far away as possible. Thorough cultivation should follow each irrigation. By following these methods, the yields have been from 60 to 175 bushels per acre at the Station farm during the past two years.

For fall growth potatoes are planted during August. In some parts of southern Arizona they must be planted whole, or they rot instead of sending up stems. For this purpose small ones are used. When they are cut, the seed pieces are placed with the eye upwards, by some growers, and covered lightly that they may come up before decaying. The growth of tops is commonly slender at this time of year, instead of stocky as during spring. At best, the yield is usually light, especially in the warmer valleys.

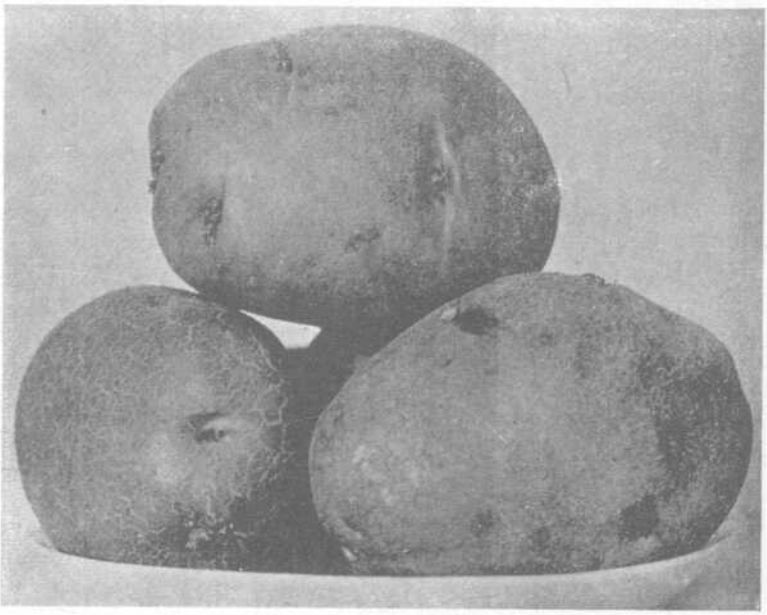

FIG. 5. Burpee's Extra Early potato; planted January 17; mature May 15; two weeks earlier than Early Rose, and equally productive; two thirds natural size.

Varieties. None but early varieties have time to make their growth during the short season that exists. The Early Rose is the one commonly planted, and at present is in the Salt River valley the only one that it is practicable to grow successfully. Burpee's Extra Early, Triumph, and Early Andes yield equally well, and are some earlier, but at present there is no suitable source of a seed supply. Early Ohio is early, but does not yield so well.

The Bovee yields well, and is as early as the Early Rose.

RADISHES.

Culture. Radishes may be had for the table six weeks from sowing at any time from October to May The seed germinates promptly in all temperatures in our region from August to May, and the plants endure all low temperatures that ever occur here. Their cultivation is very easy, and the results quick in moderately warm weather As tenderness and crispness are the chief qualities desired, they should be kept growing as rapidly as possible.

Varieties. All varieties grow successfully. The French Breakfast and Scarlet Turnip are early varieties. The Chartier and the Chinese varieties are popular.

SPINACH.

Culture. This vegetable is easily grown in our region during the cool part of the year, but does not endure our dry summer heat It requires plenty of moisture, and prefers a rich soil. It is sown in rows 18 to 24 inches apart; and when an inch or two high may be thinned to 4 to 8 inches, or it may be left to be thinned by using the small plants. It may be sown along permanent furrows, or it will sometimes do best in the bottom of furrows It should be given sufficient water to keep it growing thriftily.

Varieties. The varieties most commonly grown are the Prickly, the Long-Standing and the Round or Summer.

The New Zealand Spinach is distinct from any of the above, it being a summer variety that should be treated about as tomato plants are.

SQUASHES.

Culture. If the proper varieties are planted the squash is an easily grown vegetable in our climate It is sensitive to frost, but endures heat. It needs a rich soil and a moderately generous supply of water. It grows most rapidly if planted after the soil has become well warmed, but may be planted, especially the bush varieties, as early as February In the case of the large varieties, ordinarily nothing is gained by planting during cool weather.

The bush varieties should be planted 3 to 6 feet apart, and the running varieties 6 to 8 feet apart. They are planted as melons and cucumbers are, along furrows previously wet by a stream of water.

Varieties. Among early summer varieties the scalloped ones are the most popular, the Mammoth White Bush and the Mammoth Yellow Bush giving the heaviest yields at the Station farm. None of the northern winter sorts thrive here, the Cashaw Crooked Neck Pumpkin taking its place. For fall and winter use it should be planted during June or early July.

SWEET POTATOES.

Culture. The sweet potato is grown quite successfully in southern Arizona. It may be grown in quite a variety of soils, but prefers a fairly rich sandy loam. It is very sensitive to frost, but thrives during hot weather. Planting out should not begin until danger of frost is past, and in making summer plantings, the fact that they will be killed by the first frosts of autumn should be kept in mind. The sweet potato is grown from sprouts from tubers that are kept in a suitable condition for their development. The young plants may be started in a hotbed, or in the open air. In either case, heat from beneath is important. If grown in the open air, a trench may be dug four or five feet wide and about two feet deep and filled to within about six inches of the top with firmly packed fresh horse manure. After adding a few inches of soil and wetting the whole thoroughly, the potatoes may be placed upon the soil as close as possible and prevent them coming in contact with one another. Enough sand should be thrown in to fill in between the potatoes and two or three inches of sandy loam or sand thrown over the whole. The bed should be kept moist, and in six to eight weeks the plants will be ready for setting out. They may be removed from the tubers as they lie in the bed, or the potatoes may be uncovered, the shoots removed, and the cover replaced. Splitting the potatoes before placing them in the bed facilitates the removal of the young plants, as they will then all grow from the upper side.

The plants are commonly set about eighteen inches apart on the sides of ridges made three to five feet apart. Care should be

taken to keep the plants wet from the time they are removed until set out. They should be kept moderately moist and should be given shallow cultivation until the length of the vines interferes.

Varieties. The Californian, or Shanghai, is very generally grown throughout the Southwest. The Southern Queen and the red and yellow Nansemond are also grown.

TOMATOES.

Culture. The tomato is not grown here with the ease that it is produced in many regions. In most of the valleys the winters are too cold and the summers somewhat too warm for the successful fruiting of this vegetable. In the cooler valleys they fruit through the summer, but in the warmer ones, the vines cease bearing during August and early September. At Yuma, by giving the plants a slight protection during the heat of summer and the cool part of winter, fruit may be gathered throughout the year. The tomato prefers a rich mellow soil. They may be planted in such a soil where they are to remain, or may be transplanted to it when warm weather arrives. In either case, the seed should be planted during January or February.

In sowing the seed in boxes, care should be taken not to get them too thick. The object to be kept in mind is to produce stocky vigorous plants. As soon as they begin to crowd one another in the seed box, they should be transplanted to boxes or beds two to four inches apart each way. Giving them plenty of light and exposing them to the outdoor atmosphere will contribute to their hardiness and vigor. During April they may be transplanted to the garden, setting them three to four feet apart each way. They will do better to be closer together than in a less dry, sunny region, as it is an advantage to have the plants shade one another. They require a moderate supply of water, and should be cultivated until well grown.

At the Station farm we have found that tomatoes planted in hills where they are to remain give good results, and require less care than when propagated in the usual way. In our dry atmosphere, some time is required for a tomato plant to recover from the shock caused by transplanting. If they are planted where

they are to remain, this drawback is obviated. Plants grown from seed planted out will endure a surprising amount of frost. The seed may be planted during January, and, while the young plants grow slowly for a month or two, they eventually will be fully up with and often ahead of plants forced inside in boxes. Several seed should be dropped in a hill, and when the plants are established, all removed except the most vigorous one. In 1899 ripe tomatoes were gathered from those planted where they were to remain ten days before those planted in boxes inside a greenhouse, at the same time, produced any ripe ones. In 1900, seed was planted in hills only, and the results have been quite satisfactory.

Varieties. Of the many varieties of tomatoes extant, the Dwarf Champion is the favorite in this region. The sun is so trying, that a stocky plant with heavy foliage matures its fruit in the best condition. Other varieties having these characteristics are the Dwarf Aristocrat and the Fordhook Fancy. Of the older varieties the Trophy, the Acme, the Stone, the Favorite, the Ponderosa, the Beauty, and the Perfection are grown more or less successfully in southern Arizona.

TURNIPS.

Culture. This vegetable is grown quite successfully in our region, and during early winter is the principal one seen on vegetable wagons. Their culture is quite simple. They may be sown in drills and irrigated through furrows, or they may be sown broadcast and flooded. Plantings may be made from September to February. They require plenty of water, in order to grow rapidly and produce tender roots.

Varieties. All varieties succeed. Those commonly grown are the Purple Top, Strap-leaved, the Early White Flat Dutch, and the Early Purple-top Milan,

IMPORTANCE OF PLANTING GOOD SEED.

There is no region where it is more important that none but the best seed authentically named be planted. At best, difficulties attend the germination of seed in our climate. Hence it is a waste of time and money to plant seed of doubtful germinating power. Then, too, it is imperative, in the case of many vege-

tables that certain varieties be planted; and it is consequently important that correctly named seed be secured At the Station farm, we have found seeds from the long-established seed-houses of W Atlee Burpee & Co , Philadelphia, and Peter Henderson & Co , New York, to be always reliable A few varieties can sometimes be procured to better advantage from one of the southern seed firms, J Steckler Seed Co , New Orleans, N L Willet, Atlanta, or the Germain Seed and Plant Co , Los Angeles Beware of buying seed kept in bulk by a local dealer, unless you have full confidence in his reliability Such a course would be likely to result in disappointment, instead of vegetables for the table It pays to plant the very best, and none but the very best of seed