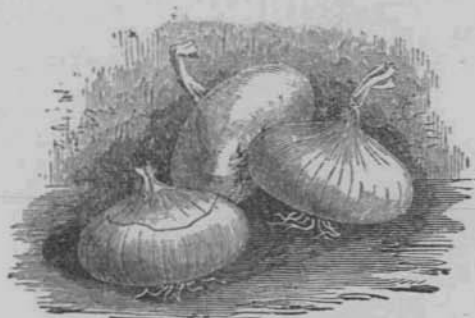


Bulletin No. 22.

1900.

University of Idaho
Agricultural Experiment Station.

DEPARTMENT OF HORTICULTURE.



ONION GROWING.

By F. A. HUNTLEY.

DEMOCRATIC-TIMES' JOB ROOM,
Moscow, Idaho.
1900.

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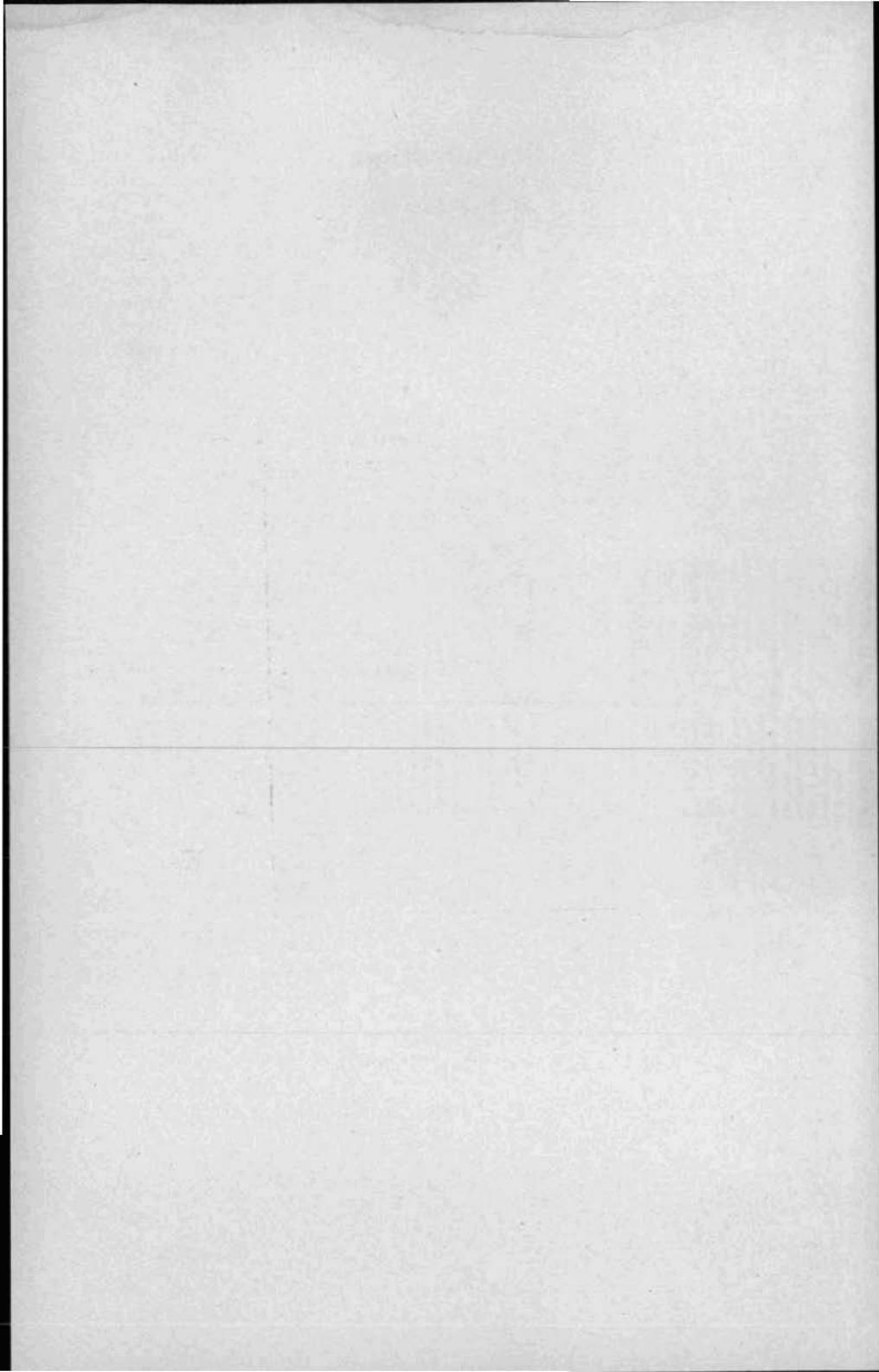
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Bulletins.

The regular bulletins of the Station are sent free to all who request them.
Bulletins issued since the close of the fiscal year June 30, 1-98:

16. The San Jose Scale in Idaho.
17. Construction and Management of Hotbeds.
18. Sugar Beet Investigations in 1898.
19. Miscellaneous Analyses.
20. Apple Scab in the Potlatch.
21. The Codlin Moth.

*Absent on leave.





Prizotaker

ONION GROWING.

By F. A. HUNTLEY.

GENERAL REMARKS.

The experiments and observations recorded herein are based mainly upon an experience of three years in onion growing at this station. Where reference is made to irrigation methods the knowledge was gained by an experience in this line of work under similar conditions to those found existing in this state. It is the aim of this bulletin to explain the modern practices employed in onion culture, with such modifications as have been found appropriate to Idaho soils and climate.

As a food product the onion has no substitute among vegetables. It is a staple article of commerce and trade. The markets are seldom oversupplied, and often a scarcity exists. The Year Book of the United States Department of Agriculture for 1898 shows that in 1897 the importation of onions from other countries to the United States amounted to 560,138 bushels, and in 1898 to 488,853 bushels. In 1897 the wholesale price averaged 81 cents per bushel, and in 1898 it was 90 cents. The importations were, largely, from Cuba, Bermuda, Spain and France. The imported onions are milder and of better quality than the varieties commonly raised in this country, but since the introduction of the hotbed method of raising onions and transplanting, it has been found possible to compete successfully with the foreign grown product in qualities not the least inferior. In view of the fact that no state west of the Rocky Mountains, excepting California, produces a liberal home supply of choice bulbs, it is evident that onion culture could be made an important and profitable industry among our own people.

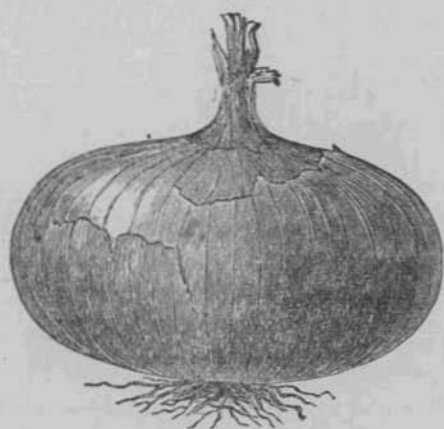
CLIMATE.

The onion is adapted to a wide range of climatic conditions. It is made to thrive in every state from the Atlantic to the Pacific, and from the Northern boundary to the coast at the South. Certain varieties are best adapted to warm conditions and a prolonged season, while others mature in a briefer period and with lower prevailing temperatures. Longseasons and warm climatic influences favor large growth. The large growing varieties can, as a rule, be selected for such localities. The varieties commonly grown in southern countries are of milder flavor than those best adapted to early maturity where the summer season is short. Yet it is known that some of the large mild varieties can be raised with gratifying success in all the horticultural sections of this state by adopting proper methods. It is also important to say that such varieties retain their natural good qualities when they are especially well developed.

SOIL AND FERTILITY.

The success of an onion crop depends more on the characteristics of the soil producing them than it does on anything else. Heavy clay or "adobe" soil should be avoided. A sandy loam or decomposed volcanic formations, such as are abundant in this state, furnish good natural conditions. Though our natural soils are generally rich in the elements of plant food it is always advisable to further prepare them by providing an additional supply of the most essential elements demanded by the crop. The essential elements are, mainly, nitrogen, phosphoric acid, and potash. Barnyard manure contains all of them in good proportion. Sheep manure is an excellent substitute, and poultry manure is the best of any that is likely to be found available for the use of the farmers and gardeners of this state. Forty to fifty tons of barnyard manure to the acre is recommended for liberal fertilizing when used alone, though a less amount is required for best results under certain favorable conditions. Sheep manure being generally free from coarse litter is much less bulky for the same quantity of fertilizing elements furnished. The two compared are very nearly

equal in value if saved without bedding material or the coarse refuse of a feed-lot. Since poultry manure can usually be had in only limited quantities, a ton or two to the acre used as a top dressing will be found the best method of application, following the use of other manures, and after the land has been plowed. A soil once prepared well for raising onions is very durable, and with good methods of tillage and clean cultivation it is advisable to use the same land for this crop several years in succession. When this is practiced there should be some fertilizing done for each crop, though it will not be found necessary to manure heavily as in the first preparation.



Wethersfield.

Concentrated commercial fertilizers are largely used in older states where intensive cropping has long been practiced and it is quite possible that their application for certain special purposes here would result profitably. Our limited knowledge of the natural soil constituents in various sections of the state leads to the belief that nitrogen is the only fertilizing element not existing in sufficient abundance to meet the demands for growing onions very profitably. If this is true it is quite probable that some concen-

trated commercial product furnishing available nitrogen would be found sufficient to at least answer a temporary demand. Nitrate of soda can be depended on for this purpose. Its cost which should not be over \$3.50 per 100 pounds at the nearest commercial center might seem a considerable outlay to those unused to purchasing fertilizers, yet the great benefits resulting would likely prove a profitable investment. Gardeners sometimes use as much as 500 pounds to the acre for onions, though excellent results are obtained by the application of 200 to 300 pounds on such an area. It is considered most economical to apply it broadcast in the manner wheat is sown by hand, using about 75 pounds for each application at intervals of two or three weeks. The first application should be made when the onions have attained the average diameter of a lead pencil.

Phosphoric acid is the form in which a phosphate is most available as a fertilizer. This can be had by the use of dissolved bone black or by the application of a product known as superphosphate. It is not possible to tell how much of either one of these products should be used without a determination of how much the soil naturally contains. This could be learned from a chemical analysis of the soil or by the application of various amounts in small growing tests a season previous to its general adoption. From 100 to 200 pounds per acre is recommended.

Potash is obtained by the use of hard-wood ashes, muriate of potash and sulphate of potash and kainit. The three latter are the easiest obtainable and should prove to be the cheapest in the West owing to the great bulk and cost of shipping ashes from localities where it is produced. About the same quantity of muriate or sulphate of potash would be required as of the phosphates and about twice the amount of kainit by weight. The cost of the second and third should not exceed \$3.00 per 100 pounds, and of the kainit not more than \$1.00 per 100 pounds, exclusive of freight charges.

The use of nitrate of soda is sure of profitable returns, but it is advisable to determine the results by small trials before employing commercial fertilizers extensively, as before stated.

Green manuring is likely to prove most advantageous in preparing onion soils. The plowing under of a well established crop of alfalfa, or a heavy crop of red clover, will prove the cheapest source of plant food for the onion grower of any means that could be found. Even with this practice the use of natural manures or commercial fertilizers should not always be dispensed with.

PREPARATION OF THE SOIL.

All the operations in onion culture require a well cultivated soil. There should be no clods, no tufts of grass nor litter of any kind to obstruct the use of the seed drill and the other small implements used in cultivation. The land should be plowed to a good depth in the fall to allow the soil to become disintegrated and settled through the winter and to establish capillary action with the subsoil. Shallow cultivation in the spring by thoroughly harrowing the surface when the land is not too wet will usually put the soil in good condition. Sometimes the roller or clod crusher can be used to good advantage at this season. The disc and acme harrows are good implements for pulverizing, and especially is the latter useful for finishing the surface before planting.

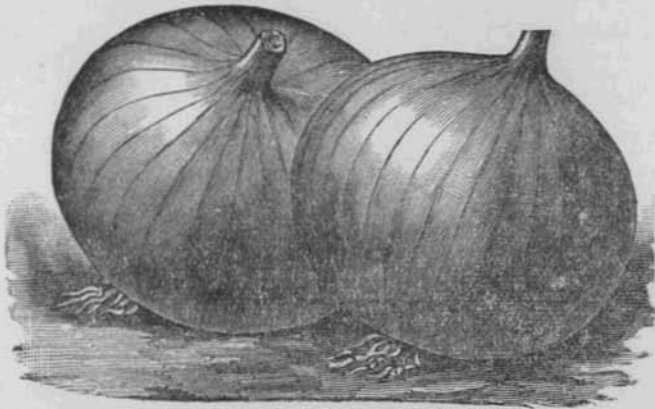
TWO METHODS.

Two methods of raising onions are practiced extensively by specialists. They are known as "The old onion culture" and "The new onion culture." The latter does not displace the old method, but the two are often combined, or some preferring one to the other. The two methods differ chiefly in seeding in the open ground, which is the old method, and sowing the seed earlier in hotbeds and transplanting being the new practice. Both have their points of advantage which will be more fully explained under appropriate headings. Some varieties are best adapted to the old methods of culture while others will not succeed well only by the new method, owing chiefly to their adaptability to warm seasons and a prolonged growing period. All varieties, however, succeed well by planting early in hotbeds and transplanting.

DESCRIPTION OF VARIETIES.

The proper selection of a variety or varieties for whatever purpose intended is an important matter. The descriptions generally given in extensive catalogue lists, which are usually reliable in a general way, do not always meet every requirement, nor apply to the conditions of every locality. The following brief descriptions have been carefully arranged to conform to the requirements of this state:

PRIZETAKER—Very large, nearly globe shape, light yellow, mild flavor, slow to mature, the best variety for transplanting, excellent for extensive marketing, not recommended for out door seeding.



Yellow Globe Danvers.

WETHERSFIELD—Medium large, thick and flattened, dark red, strong flavor, certain to mature, excellent both for open ground seeding and transplanting, good for extensive marketing considering its color. Yellow varieties usually command best prices.

YELLOW GLOBE DANVERS—Medium large, nearly globe shape, light yellow, fairly mild flavor, matures well if planted early, the very best variety for the grower who

practices seeding in the open ground, excellent for extensive marketing.

AUSTRALIAN BROWN—Under medium size, thick and slightly flattened, medium brown, very symmetrical, strong flavor, matures remarkably early, recommended for localities where the summer season is short. This is probably the firmest and heaviest onion grown in proportion to size. A remarkably good keeper.

SILVER KING—Very large, flat, white, mild flavor, matures if planted early, good for transplanting, excellent for fancy marketing. The Silver Skin is not so large but resembles the Silver King in many respects.

NEW QUEEN—Very small, white, medium flat, medium mild, early, a pickling variety. (See cover for illustration.)

A descriptive list of varieties could be extended in this manner very considerably but would tend to confuse rather than instruct. Most of the varieties catalogued by seedsmen have been on trial here, and the above selections have been made in view of meeting the greatest variety of demands, and the selections given best conform to the descriptions and conditions named.

RESULTS OF CULTURE TESTS.

Last season's carefully planned tests were carried out in this department to determine the comparative advantages of transplanting and open ground seeding. The results in almost every particular were very satisfactory. Four of the best varieties representing average types of onions are here reported. The Silver Skin was taken to represent the best average type of a white, flat onion, but owing to a shortage of hotbed plants of this variety the transplanting figures are not reported. The tabulated results are as follows:

BY TRANSPLANTING.

Variety.	Measured row —feet.	Pounds.	Number of bulbs.	Computed bushels per acre.
Prizetaker.....	100	180	200	1393
Wethersfield.....	100	120	206	928
Yellow Globe Danvers....	100	104	203	805
Australian Brown.....	100	80	200	619

SOWN IN OPEN GROUND.

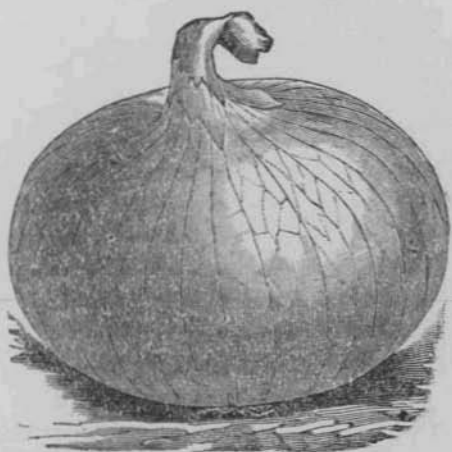
Variety.	Measured row —feet.	Pounds.	Number of bulbs.	Computed bushels per acre.
Prizetaker.....	100	170	530	1316
Wethersfield.....	100	90	480	696
Yellow Globe Danvers ..	100	120	486	928
Australian Brown.	100	74	432	571
Silver Skin.....	160	100	320	756

NOTE—A bushel of onions contains 54 pounds.

About one-fourth of an acre was devoted to these tests. It might be argued that so small an area could not be taken to fairly represent field conditions but every effort was made to render the experiment thoroughly practical. No fertilizers whatever were used. It is doubtful if the land had ever been manured, as other crops for the two years previous had failed to indicate better than average soil conditions.

The transplanted plants were raised in a hotbed to a size averaging about three-sixteenths of an inch in diameter when they were transplanted to the open ground. On the date of transplanting, seeding was done in the open ground duplicating the varieties transplanted. Plats were all adjacent on the same kind of soil. All rows were twelve inches apart. All the rows were given the same kind of care and cultivation excepting it was necessary to thin the plants grown by seeding in the open ground.

The transplanted plants were placed about six inches apart in the row, but it was afterwards found that four or five inches would have been a better distance. It was intended to thin the open-ground seeding to the same distances, but there being plenty of room for the bulbs without crowding, they were left much closer. This is shown by the count of more than double the number of bulbs shown in the second table as compared with the count in the first. It can be seen that a corresponding distance to the first would have reduced the yield in the second table very considerably. These conclusions show wonderful advantages in favor of transplanting.



Silver Skin.

In regard to the matured product, every transplanted portion furnished superior bulbs both in size and condition of maturity. Both methods gave well matured bulbs of Wethersfield and Australian Brown. The Yellow Globe Danvers matured a fairly even product by both methods, though it became necessary to throw out of the second lot a few "thick necks" and some small bulbs in sorting for market. On the whole the Danvers gave excellent returns which would have resulted better if the season

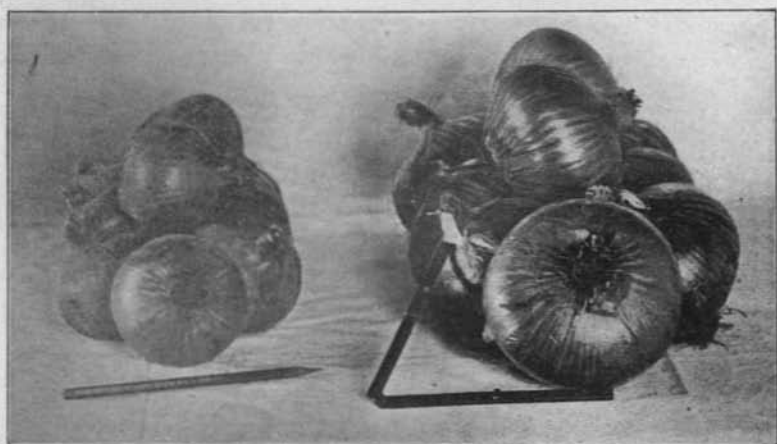
had not been unusually cold and unfavorable for outdoor seeding. The Prizetaker yielded heaviest by both methods, but the superiority of the transplanted as compared with the immature condition of the open ground seeding, indicated that this variety should be used only for transplanting and is a most remarkable onion for the "new culture."

A comparison of each of the four varieties is shown in the cuts. The pile on the right in each picture shows the best of nine selected samples by transplanting, and the one on the left shows the same number of the same variety of the best bulbs by open ground seeding.

SEEDING IN THE OPEN GROUND.

The seed bed for onions should be mellow and the soil well pulverized. There should be sufficient moisture to insure germination. A cold, heavy, wet soil destroys the vitality of seeds and is not congenial to onions. With all conditions favorable about five pounds of seed will plant an acre. Twelve inches between rows is the most favorable distance to plant. After preparing the seed bed the land should be marked for the rows. Some prefer to plant and mark for the next row at the same time. This manner of working will usually prove unsatisfactory as it is extremely difficult to secure straight rows and even distances with a marker attachment to a seeder. The sled-runner construction after the fashion of the old corn marker is a good tool. The runners should be made about eighteen inches in length and spaced 12 inches from center to center, and the marking edges beveled to a V shape. These runners will mark two rows at a time by letting the third runner track with the last completed mark. The use of a garden line for a guide will start the first row straight. By walking backwards and pulling the marker by hand will secure perfect results.

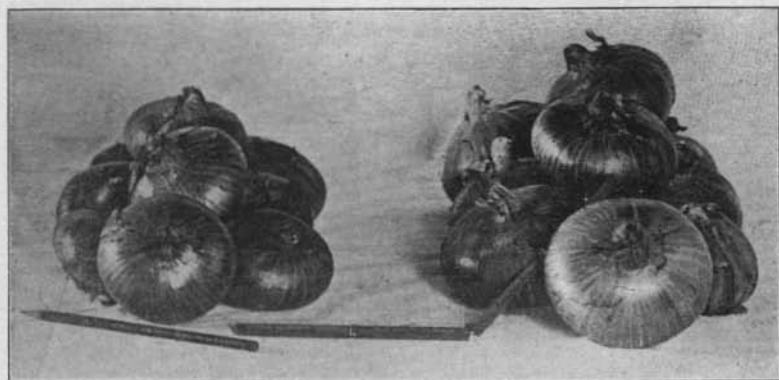
The seed drill should be a reliable dropper, and must be run with a steady hand to secure even seeding. The best depth to plant will be determined by the character of the soil. Usually a half an inch is about right.



Open Ground Seeding.

PRIZETAKER.

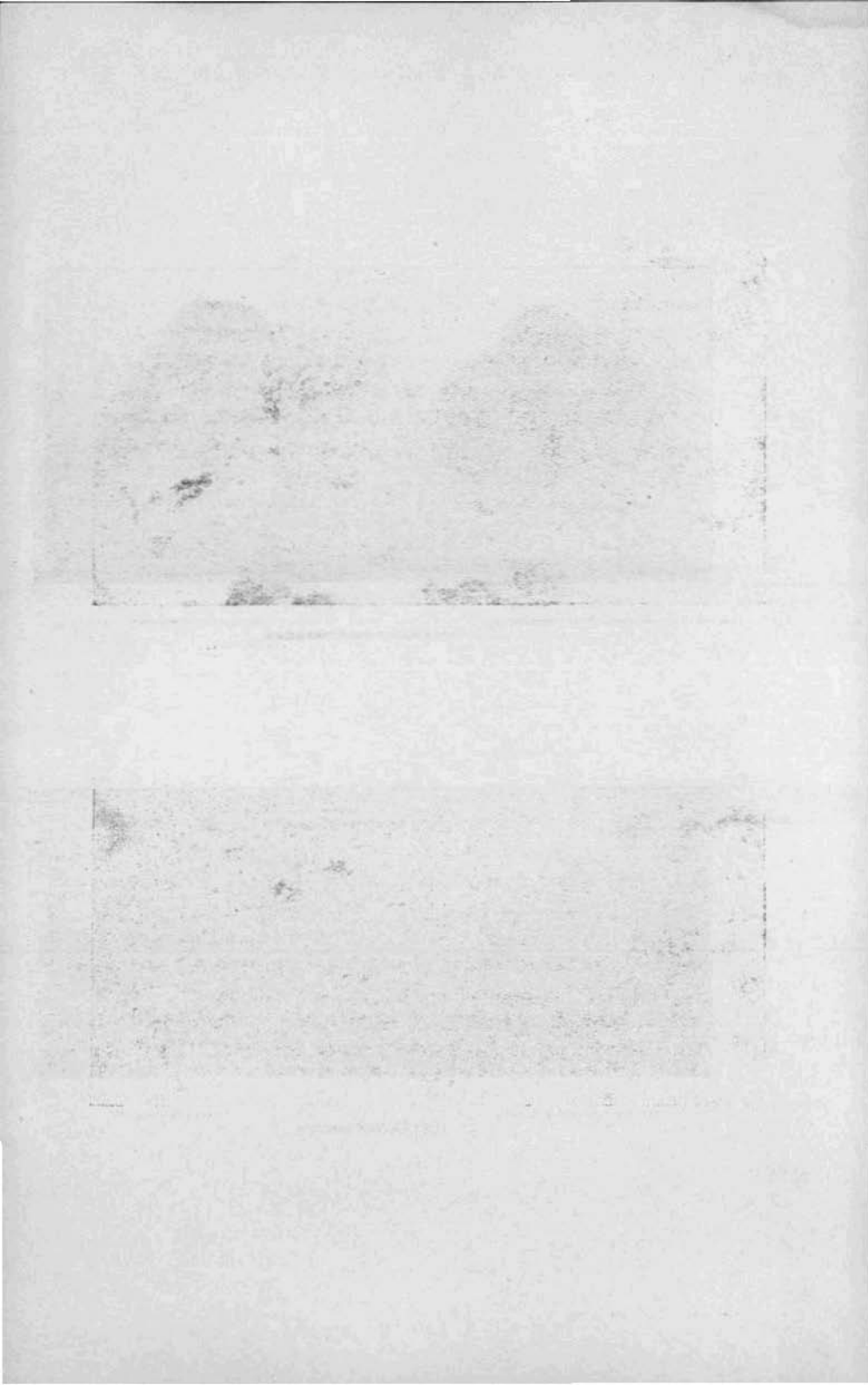
Transplanted.

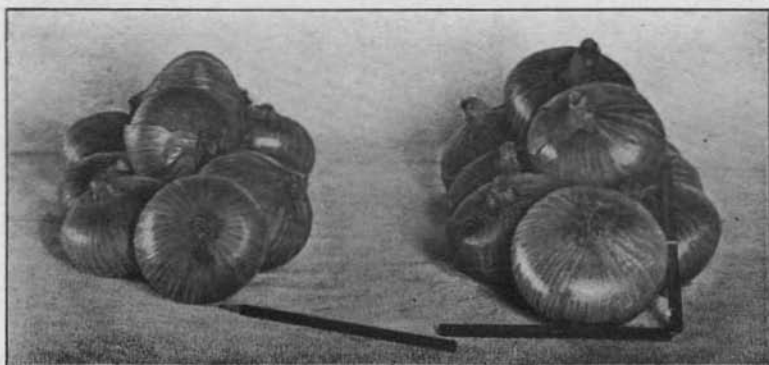


Open Ground Seeding.

WETHERSFIELD.

Transplanted.

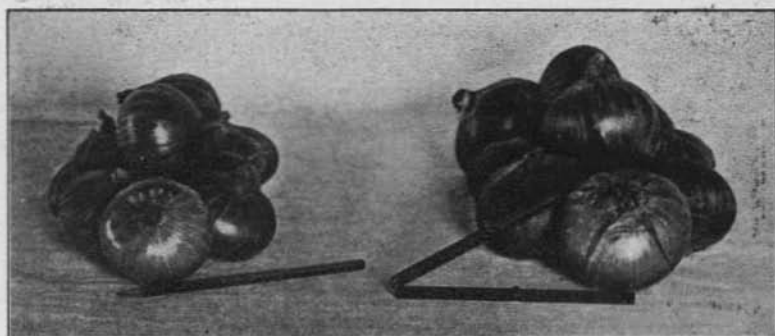




Open Ground Seeding.

YELLOW GLOBE DANVERS.

Transplanted.



Open Ground Seeding.

AUSTRALIAN BROWN.

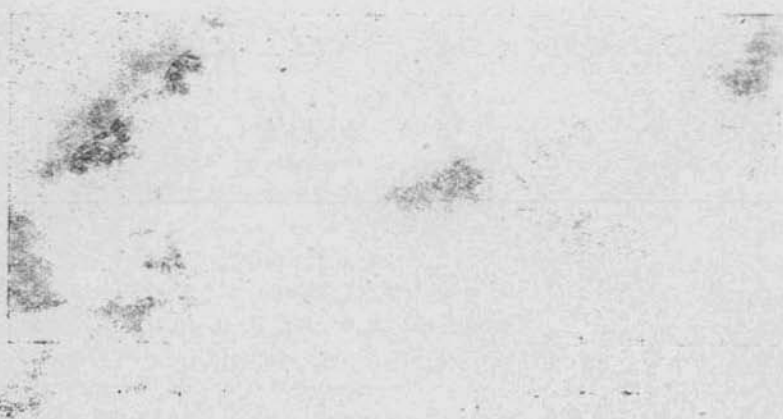
Transplanted.



Photograph

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Photograph



THINNING AND CULTIVATING.

As soon as the plants are well up they should be thinned. Regard all plants not wanted in the permanent stand as so many weeds. If left to attain considerable size they use the fertility and moisture needed by the other plants. From three to four and one-half inches apart according to the average size the variety usually attains will give correct spacing.

Early and persistent cultivation should be attended to; for a little neglect during the first few weeks will cause more harm than it will be possible to correct by later care. Hand weeding requires much labor which can be, to a great extent, avoided by early attention to thinning and hoeing. A good wheel hoe will accomplish most that is to be desired in weeding and cultivation if carefully managed.

IRRIGATION.

Where the necessity for irrigation arises a system should be established for thoroughness. This will apply to all manner of crops. To occasionally wet the surface soil and leave a dry layer of soil beneath is bad practice. Water must be left on the land long enough to reach the moist subsoil and set to work capillary action to a great depth. Then by systematic surface cultivation to prevent rapid evaporation, plants will receive sufficient moisture, and the right degree of soil temperature will be maintained to favor continuous and rapid growth. A dry subsoil forces moisture from the surface, and while moisture covers the surface heat increases excessively below and in contact with the tender roots. By irrigating thoroughly and only when necessary the best results are secured.

Onion plants should not be flooded. Run furrows between the rows with the small plow attachment to the wheel hoe and confine the water to the furrows. It is a fine piece of work to irrigate onion rows only 12 inches apart, but it can be done with perfect success and rapidity by providing small laterals through the plat at close intervals crossing the rows. On nearly level land the laterals may run parallel with each other as close as 20

feet apart, though the slope will determine the best distance. The low ridges for laterals should be provided before marking and planting. It is best to work the laterals with a light flow to avoid flooding. Cultivating should be resumed as soon as the soil dries enough to become mellow. During late summer and early autumn it is best to use water on the land sparingly if at all. Over stimulated bulbs will not mature uniformly and comparatively dry conditions will hasten ripening.

TRANSPLANTING.

In the South where the winters are mild, onion seed is often sown in the open ground in the fall and the plants are transplanted early in the spring. This method is not practicable where the winters are severe, and would not do in this state. The seed should be sown in hotbeds six or seven weeks before the time for transplanting, and it is best to transplant as soon as the ground becomes in a good settled condition. Hotbeds are expensive where many of them are wanted if glazed sash is used. Glass is almost necessary for protection to very early planting, but since onions do not require the high degrees of temperature necessary for some other plants, muslin or canvas will answer the purpose, by furnishing additional protection during cold spells and on the occurrence of frosty nights. Straw mats, burlap sacking, board shutters, or old pieces of carpet may answer the purpose of temporary protection.

The seed should be sown in drills in the hotbed, making the rows three or four inches apart. It is a waste of space to broadcast seeds in such narrow limits.

The ground should be prepared and marked for transplanting, the same as directed for open ground seeding. Have a small box for carrying the plants. Wet the soil thoroughly before lifting the plants from the seed bed. This will save breaking the roots. Shorten the roots to about two inches in length and the tops to about three inches, using a knife or a large pair of shears. It will not be necessary to use water when transplanting, but it is an advantage to keep the plants as moist and cool as possible

during the operation. A kneeling position over the row is most convenient for speedy work. Some transplanters use a stick for opening the soil to receive the plants, while others prefer the hands only. Some pressure is brought to bear over the roots, and the plants are left in an upright position. It is important to use care to secure even distances between plants.

Many growers who have practiced both seeding in the open ground and transplanting claim that about the same amount of labor necessary to thin plants to their proper distance by the first method will be required for transplanting.

Some of the advantages claimed for transplanting are, certainty of a full stand, earliness of maturing, uniformity of size, more perfect shapes, and the ability to raise and mature the large foreign varieties which always bring best prices in the markets.

Onions should be harvested early and cured while the weather is dry. In wet seasons sheds are provided with drying racks. Cool dry storage is necessary to favor the keeping qualities of bulbs. Unless the grower is well provided with storage capacity he will find early marketing most advantageous.

