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THE ONION IN COLORADO

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THE ONION IN COLORADO

E. R. Bennett*

Onions may be grown in nearly all parts of Colorado but, so far, they have been grown commercially in only a few districts. These are, in order of their importance,—the Uncompaghre Valley with Olathe as the center, Greeley, Denver, Pueblo, Rocky Ford, Canon City, and, to a less extent, near the other towns of the irrigated districts. The requirements for commercial onion growing are, first, a fairly long growing season; second, a soil that can be made fine and that will work easily, a great quantity of available plant food, and a sufficient water supply.

SOILS

Quite a variety of soils are used for onion growing. In the east the most common soil is that known as muck, or peet, bottom lands. These soils are rich in nitrogen, hold moisture readily and when fertilized with ashes or other commercial fertilizers containing phosphoric acid and potash, grow good crops of onions, providing they are not handicapped by either too much or too little rainfall. Practically no soils of Colorado are of this class. The next most common soil for the culture of the onion is the loose soil of the river bottoms. These range from light sandy loam with considerable humus to the heavier adobes. In the east few onions are grown in the uplands, but this is largely a matter of availability of moisture. In Colorado, this makes comparatively little difference where irrigation is given and onions are grown successfully on the heavy clay mesa soils. Ordinarily, the onion is not well adapted to light, dry gravelly soils, as it is difficult to get a sufficient yield to make the growing of onions a paying proposition.

PREPARATION OF THE LAND

Too much attention cannot be given to the preparation of the land. Probably the best method of preparing land for onions is to plow up clover or alfalfa soil and grow some hoed crop that requires a great amount of cultivation, as the potato or sugar beet. Soils which have been planted to potatoes following alfalfa or clover are in excellent condition for onion growing. They always need, however, a heavy coat of well decomposed stable compost. For this reason, onion growing is largely confined to close proximity to the small towns or cities where stable compost can be hauled to the land without great expense. The most successful growers use from ten to twenty tons of this compost each year on their onion lands. If this can be distributed in fall and plowed in, so much the better. In fact, fall plowing for onions is to be desired, particularly on soils that are inclined to be somewhat lumpy. In many cases, the manure is hauled onto the land during winter and plowing is done in February or March as soon as the frost is sufficiently out of the soil to permit the working of the land. In our districts of little rainfall, as in the Uncompaghre Valley, this may be depended on in the majority of years. The important thing in the preparation of the land is to have it so thoroughly levelled that water may be distributed over the whole field in shallow ditches or by flooding without getting too much in any one place or leaving spots with insufficient water. Thorough preparation of the land by harrowing and flooding is necessary. This should be done until a perfect seed bed is made.

So far, no particular rotation of crop has been practiced. The probabilities are that in time some rotation will need to be adopted to prevent the ravages of fungous diseases and insect pests, as the mildew, thrip, etc. The trouble with rotation in onion growing is the same as that for other intensive crops, that good onion lands are usually high in price and the grower feels that he cannot afford to give the land up for a year or two to such crops as clover or peas, as those crops will not, during those years, bring a good interest on the value of the land.

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PLOWING

Plowing may be done in either fall or spring. If plowed in fall, it may be done to a depth of eight inches. Where it is left till spring it is possibly better not to plow quite so deeply, or if deep plowing is done, packing the soil should be accomplished in some way so as to make a firm seed bed. It seems to be the concensus of opinion among our most successful growers that six inches is about the right depth for plowing. The plow should be followed by a harrow. Most growers alternate between the harrow and a float made from plank, using these tools until a perfect, smooth seed bed results.

The system of planting used will depend on whether the onions are to be irrigated by flooding or by ditches. Where flooding is done, the onions are sown in rows about twelve inches apart. The more common practice is to first make shallow ditches with a hand plow about 26 inches apart. These furrows are sometimes made, then followed by a light floating of the land to level the surface, leaving sufficient depressions in which to run water across the field. This leaves the land so that the spaces between the furrows are slightly raised. The seed are then sown, making two rows between the ditches. These rows are 12 to 14 inches apart respectively, the wider space being the ditched row. Considerable care is necessary in marking out the land and in sowing to keep both ditches and rows straight and even. The usual practice is to run a marker where the fissues are to be made. These markers are simply home-made, wooden frames with three or four legs that will make marks 26 inches apart when hauled across the field by one man. Several types of seeders are used, as the Iron Age, Planet Junior, etc. There seems to be considerable difference of opinion as to the relative merits of the different seeders, but as each kind is championed by different growers, it is evident that they all have their advantages and are probably nearly equal in efficiency. Where the rows of onions are made to conform with the ditches previously made, there is less danger of getting the rows out of line, as each ditch aids as a correction on the seeder. Seed are sown from one-half to five-eighths inches deep. From three to four or four and a half pounds of seed are used per acre.

THE IMPORTANCE OF GOOD SEED

The importance of good seed cannot be over-estimated. Our experiments and observations in the field have demonstrated quite conclusively that no one factor will make for the success or failure to so great an extent as that of quality of seed and varieties adapted to conditions. In both the Olathe and Greeley districts the majority of growers are producing their own seed. There is probably a great deal in the acclimatization of seed for Colorado conditions as to its real value to the grower. At Olathe we found the most successful growers had been producing their own seed for from ten to sixteen years. These strains were the results of careful selection of bulbs for seed stock so that for these series of years nothing but the very best types of the variety had been saved. The results of this selection for acclimatization were shown when last year in making a test of these seed at the Experiment Station gardens at Fort Collins, in comparison with the best strain of seed obtainable from eastern seedmen. These seed, which were what is known at Olathe as the Yellow Globe Danvers, but what is probably a cross between Yellow Globe Danvers and Brown Australian, were sown at the same time as varieties of Red Globe, Yellow Globe, Danvers Red Weathersfield, White Globe and Prizetaker. The season of 1912 was rather unfavorable in the Fort Collins district, as the temperature averaged lower than usual with rather heavy precipitation, which made the onion crop late and produced a large percentage of so-called thick-necks. In the fall we found a difference of more than three weeks in time of maturity in favor of Colorado grown and selected seed. Another factor in favor of home grown seed is that the grower may be absolutely sure, not only of the purity of his seed, but of the variety, where if the seed are purchased from any of the seedmen,

there is a chance for a mistake in variety, which may make a serious difference in the yield or the value of the crop. It is without a doubt cheaper, so far as cost of seed is concerned to buy seed from seedmen than to produce it on a small scale for home use, but when all things are considered, it is doubtful if any grower of onions can afford to take chances in buying seed unless he is able to buy from some neighbor who is doing good work in that line.

GETTING A STAND

In the northern Colorado districts there is seldom any trouble in getting the onions to germinate and make a good stand from the moisture already in the soil. Because of this, most of the growers have used the flooding system rather than the furrow irrigation system, and in this case it would be difficult to irrigate the onions up. In the west slope districts and in the Arkansas Valley districts there is more danger of drying weather in early spring; consequently it is not safe to depend on getting a stand from the moisture in the soil. Most growers plan to irrigate shortly after the seed are sown. By running a small quantity of water in each of the furrows and leaving it in a sufficient length of time, the ground may be sufficiently moistened to bring up the seed without flooding or packing the surface. This brings a very even percentage of germination and stand.

CULTIVATION

As soon as the young plants are large enough to be seen in the rows, cultivation is begun. This is begun almost entirely with the hand wheel hoes. Shallow, frequent cultivation is essential to success. The oftener this is done the better. Three or four times is probably the minimum number for hoeing. Weeding is one of the expensive operations, but must be attended to, as it is impossible with tools to keep the weeds entirely out of the rows. If the hoeing is done early and thoroughly done, it will very materially decrease the labor of weeding. The ditch system of irrigation also tends to cut down the labor of weeding, as there is less tendency for the weed seed to germinate in the row than when flooding is done.

IRRIGATION

The number of irrigations must depend entirely on the type of soil, location, and the season. At Greeley, irrigation in the early part of the season is usually avoided. One of the most successful growers there begins in the latter part of June or early July and irrigates by flooding about once a week, probably making seven or eight applications. In the west slope districts, the irrigation is begun soon after the seed are sown and continued whenever necessary until early in August, when no more water is applied, so as to allow the onions to mature. There is undoubtedly a tendency among growers to over-irrigate. The aim should be to keep the ground in such a condition as to promote the most rapid growth during the early part of the season. Too much water tends to produce a heavy top and ultimately to make what is known as a thick-neck or a scullion. These thick neck onions are always present to a greater or less extent and any factor that tends to produce them should be avoided, as they are absolute waste.

After the onion is two-thirds grown, it is rooted sufficiently so that even if the top soil is quite dry it will still come to full maturity and produce an onion of better shape and keeping quality than if more water is given. The great difficulty in all Colorado onion growing districts is to secure the required size and still have the onion mature early. Late maturing onions are in more or less danger from freezing, and are more difficult to handle in harvesting and marketing.

We have had many inquiries as to the feasibility of rolling or breaking over the tops of the onions in the latter part of the season to cause them to ripen off. Experiments have not shown that this practice is necessary or particularly beneficial. If the weather is such as to allow the onion to mature normally, the top should stop growth early in August and

soon tip over and be well shriveled in time for harvesting. It is possible in some cases that breaking down the tops by hauling a pole or light roller over the field may aid this process of ripening off, but our experiments so far have not demonstrated the efficacy of the practice.

THINNING

It is quite possible that thinning of onions might be practiced with profit, but so far our growers in Colorado have not made a practice of thinning. Where good, reliable home grown seed is used and conditions permit the control of germination, it is not essential to sow much more seed than can be brought to maturity; consequently, thinning has never become a general practice.

A NEW SYSTEM OF ONION CULTURE

Up to the present time the so-called new system of onion culture has never been practiced to any extent in Colorado. Our experiments for two years here at the experiment gardens have led us to believe that this system could be practiced in Colorado with considerable profit. The system consists of growing planted seed in flats or hot beds in February so as to have plants four or five inches high to set in the field as soon as the weather will permit in spring. These plants are thinned in drills an inch and a half or two inches apart in the hot bed and the plants grow rapidly, but with plenty of ventilation, till time of setting in the field. About 150,000 plants are required to set an acre, setting the plants 3 in. apart in the row with rows 1 ft. apart. The so-called Spanish onions, as the Prize-taker or Giant Gibralter, are most commonly used for this purpose. The other varieties, as Yellow Globe Danvers and Red Globe, may be used but will not produce the immense size that is desired. In our trials we found that it was not difficult to grow onions that would average from eight to twelve ounces and many specimens were produced that weighed from sixteen to twenty-one ounces. Even larger bulbs than these have been produced. This system insures a heavy yield of large onions and gets them ready for market early in the season. For special markets these onions will bring an average of from one-half or more to double the price of the ordinary onion crop. The cost of transplanting will probably not be less than $10 per acre and may amount to $20 and the work of producing the plants in the hot beds must be a considerable item. Much labor will be saved, however, in the weeding and hoeing, as the plants will have the advantage of good size before the weeds can possibly start. The yield in this case, also, will be much greater than onions sown in the field; consequently, for the man who has a small area of land we believe that this system has great possibilities. In setting the plants the ground must be marked out in somewhat different manner from that for sowing the seed. Either one or two methods may be adopted. A small shallow furrow may be made for each row with the plants set in the edge of the furrow, or a broader furrow may be made and a row of onions set each side of this furrow. In this case, it is well to make the ditch so that the two rows of onions may be about eight inches apart with a wider space between the double rows. This space may be used later for the ditches for irrigation.

HARVESTING

In harvesting, the onions are first lifted by an implement known as an onion lifter. This is simply an implement shoe or bar of iron about two feet wide, drawn by a horse, that will run under the onions, cutting the roots and loosening them from the soil. This tool is sufficiently wide to raise two rows of onions at a time. After they are lifted, the onions are topped. This work must be done by hand. The toppers follow the rows, cutting off the tops with a knife and discarding those bulbs which are not marketable. The good onions are drawn in crates, and in cases where the onions are thoroughly ripe are emptied into sacks which are left

in the fields from ten days to two weeks to cure. Where sufficient crates are available these are left in crates rather than sacks for the curing. The roots are not usually cut from the onion as the roots soon shrivel and are broken off from the bulbs in handling. The sacks used are practically the same as those used for potato growing, 115 pound Liverpool returns, or centrals. When the market is such as to make it possible, the larger part of the crop is shipped direct from the field. Our growers are coming more and more to storing a part of the crop, for in average years the price is considerably better some time during the winter than at harvesting time. This does not always prove true, however, and sometimes growers find that while the market is fair in the fall there is practically no market in winter or spring and the crop is sometimes lost. The market for onions is practically the same as that for potatoes. Sometimes they are shipped to Chicago or Kansas City but more often to Texas and other southern points. The great drawback to the onion growing is the variability of the market price. There are several reasons for this variability. The consumption of onions is somwhat limited as compared with our other staple crops. Production is probably rather more variable than any of the other crops; consequently, the price is controlled largely by the production in the east, which always depends on whether the season is normal or abnormally wet or dry. Owing to the climatic conditions of Colorado, it is probable that our production is more uniform from year to year than that of the eastern states, but as the bulk of the crop is grown in the east, the yield here has little influence over the market price. As nearly as can be estimated, the price at selling time in the fall has been in the neighborhood of $1.00.

COST OF PRODUCTION AND YIELDS

It is a noteworthy fact that comparatively few of our growers seem to know the cost of production of their crop. As a business proposition, onion growing as well as other crops must be carefully considered from the standpoint of cost as well as that of production and market values if we are to make a successful business. Various growers with whom we have talked have made various estimates of this cost. One of the most successful growers and one who has been in the work for fifteen years has given the cost of production as follows: (This cost is based on a five-acre unit, or that which is considered to be what one man can handle during the season.)

One man, six months	$360.00
Manure for the land	75.00
Plowing and harrowing	15.00
Sacks for harvesting	225.00
Seed	60.00
Lifting	5.00
Hauling to market	35.00
Total	$775.00

The weeding, irrigating, and other labor is considered in the wages of the one man for six months. This gives us a total cost of $805, or $161 per acre. This is based upon a production of 350 sacks of 115 pounds each per acre. While this may be a little high for the average cost over the state, it is probable that it is not far from correct and does not include taxes, interest on investment, or depreciation of tools, although the latter item is of comparatively small importance, as one of the factors in favor of onion growing is that comparatively little machinery or horse power is required for onion culture. This leaves the grower $241.50 per acre from which must be deducted the taxes, interest, and depreciation. While this looks like a big income per acre, one must remember that the limit of the acreage per man is decidedly low. Some growers estimate that a man can take care of six or seven or even eight acres. It is doubtful in most cases if it will pay one man to attempt handling over five acres without extra help. The real factor in the business that must be considered by anyone contemplating

onion production on the market, is as to whether all conditions are favorable to get a maximum crop at a maximum price and at a minimum cost of production. It must be remembered that the cost of production will not vary to any considerable extent. If the land is situated a long distance from railroad, the item of hauling will very materially increase, or if bad roads are to be contended with. All the factors as to adaptability of soil and availability of stable compost, length of season, seed, and variety must be considered and, while we believe that for the man with all conditions favorable the onion crop has great possibilities, we would not recommend anyone to attempt the culture of this crop without carefully considering all sides of the question.

SEED PRODUCTION

The production of seed for home use and for market is becoming more and more of a business each year. The first essential is to decide as to the variety most in demand. In the western slope districts the Yellow Globe Danvers, or a type of that veriety, is grown more than any other, although Red Globe, White Globe and Prize Taker are grown to some extent. In the Greeley district, the varieties are divided about equally between Yellow Globe Danvers, Red Globe Danvers, with White Globe, Prize Taker, and Red Weathersfield grown to some extent. In the fall when the onions are harvested, the best bulbs are carefully selected from the field. In making this selection, the first essential is to have in mind the most desirable type of that variety; then the selecting must be done by someone who will discard everything which does not conform to the desired type. These bulbs are usually placed in the crates and stored in a cool onion cellar. These should be kept as cool and dry as possible till the following spring. Early in the spring the ground is prepared and these bulbs set in the field a few inches apart in the row with rows from 2½ to 3 feet apart. About 90 sacks of medium sized bulbs are required to set an acre. In setting the trenches are made four or five inches deep and the bulbs placed by hand with the stem ends up, then the soil is replaced over the bulbs. These bulbs send up a stem 2½ to 3 feet high and will blossom in July. As the seed matures the seed stalk is cut by hand and placed on canvas to dry. After the seed head is sufficiently dry to thresh, the seed are separated from the fiber either by threshing or with the flail and the seed passed through a fanning mill to remove the chaff and light, worthless seed. The onion seed industry in Colorado gives promise of becoming of considerable importance. Up to the present time the seed growers of Colorado have received considerably more for their produce than the price obtained by the seedmen of the cast and our growers have learned that even while the seed costs twice as much, it is more profitable than that procured elsewhere. A rigid selection is necessary if we are to keep up the type and yield of our bulbs. Dishonest seed growers who plant culls will produce as good looking seed as those from selected bulbs, but the inherence is necessarily bad and cannot result other than in an un-uniform type of onion and many scullions. After the seed are taken from the field, the plants will produce seed stems the second year. Growers tell us that these second year seed are not as desirable as those produced from the plants the first year.

STORAGE ONIONS

The onion is rather difficult to store satisfactorily. There is always a tendency for the bulbs to start growth, which spoils them for market purposes. The storage house must be frost proof and as nearly dry as possible. To accomplish this end, it is usually necessary to build more nearly above ground than for the ordinary potato cellar. Great care must be exercised in providing for ventilation. Onions are better stored in crates or in racks in the storage house. If the onion can be kept dry and at near a freezing point, it may be carried till February or March when the market is in good condition.