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Department of Horticulture

TOMATO CULTURE

By F. A. HUNTLEY.

TIMES-DEMOCRAT JOB ROOM
MOSCOW, IDAHO.

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BULLETINS

The regular bulletins of the Station are sent free to all citizens of Idaho who request them.

Late Bulletins are:

30. The Service of Soils.
31. Some Spraying Experiments for 1901.
32. Feeding Steers and Lambs and Analysis of Stock Foods.
33. Some Grasses and Clovers and How to Grow Them in Idaho.

TOMATO CULTURE.

By F. A. HUNTLEY.

The tomato is one of the most generally useful of garden products. It is utilized both as a fruit and a vegetable, and is healthful and nutritious. There are but few localities where it cannot be grown with profit. As the season of development from the planting of the seed to the ripening of the fruit covers a period of about five months, it is generally necessary to plant as early as March, and use artificial heat to rear the young plants. Ultimate results are largely determined by the system of planting the seed, and the development of the young plants during the first two months through the nursery period. It is in the neglect of this that so many poor results and often failures occur. The hotbed is, therefore, a very necessary adjunct in tomato culture.

HOW TO RAISE THE PLANTS.

Good plants can be raised in limited quantities by sowing the seed in boxes kept in a warm dwelling room. But as a rule, in such a place, it is not easy to maintain the uniform high temperature and moisture demanded for best results. A well constructed properly managed hotbed will produce plants of the very best quality; and the use of a cold-frame in connection for transplanting and later growth, will furnish plants of strongest vigor. The value of a cold-frame for hardening and invigorating plants previous to setting in the open ground is not usually

well understood. Tomato plants should always be transplanted from the seed bed to another frame and there be grown for a period of a few weeks previous to final planting.

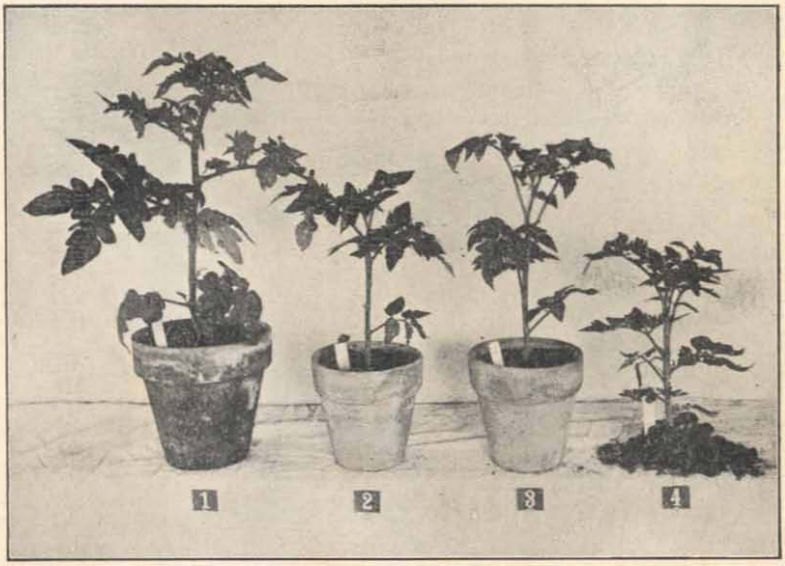
When a cold-frame is used in connection with a hotbed it is possible to raise plants much earlier than by the practice of planting from the hotbed to the open ground without an intermediate shift. Early plants become overcrowded in a hotbed long before outdoor conditions are favorable for transplanting. Plants thus raised are of slender habit, of succulent texture, and weak in vitality. The hotbed method used alone will furnish better plants by the time they are needed for outdoor planting if the seed is sown the last of March, than by planting as early as the first of March. By a proper use of the cold-frame it is not too early to plant the seed on the first of March. This will insure earliness of fruit and a continuous season of ripening. Whether early or late sown the plants should be given liberal room in the hotbed. It is, ordinarially, desirable to use an abundance of seed in planting the hotbed, say a dozen seeds to two inches of row, and the rows three to four inches apart. This is to provide against loss of space if many of the seeds fail to germinate, as often happens. If the seeds prove to be strong in germinating power the plants will be too crowded to do well. The weaker ones should be pulled out and the remaining ones should not be left to stand closer than a half an inch apart. The best time to do this is while the little plants have developed only the two seed leaves, or on the appearance of the true leaves. Plants grown in a tangled mass have weak roots and slender stems, and do not readily adapt themselves to the change to outdoor conditions. They should be so raised that the plants will wilt but little if at all when they are transplanted.

The early hotbed should be prepared with eighteen inches to two feet in depth of fresh strawy manure from the horse stable. It is best to pile it just outside the pit so it can be worked over and repiled two or three times to set up uniform fermentation throughout, before filling the pit. As soon as it is well started to heat it is ready to be thrown in, which should be done syste-

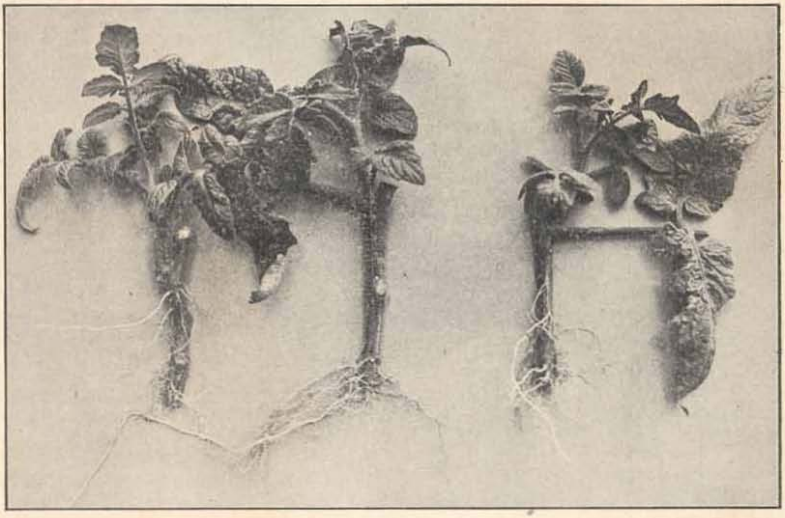
frame. A cold-frame resembles a hotbed without the heating material being supplied. The covering to the frame may be of glass or canvas, but should afford protection in rough weather. An important discovery in these experiments is the use of coal ashes in the filling of cold-frames. After the board frame is in place, a small amount of earth is at first spread over the bottom to facilitate drainage by giving the bed a slight elevation. Then about two inches in depth of sifted coal ashes is spread over the soil, and watered thoroughly. Finally about three inches in depth of very rich mellow soil, composed of about one-third stable manure thoroughly rotted and mixed through the mass, completes the bed. Plants are taken from the hotbed and set in rows, two inches between plants and five inches between rows. The ashes maintain moisture, afford drainage, and admit sufficient air to the roots to promote vigorous growth. A more compact root system near the surface is due to the layer of ashes which the roots will not penetrate, as shown in Fig. Four (4) in the first picture. The base of the root system indicates the beginning of the layer of ashes. This plant was lifted from the cold-frame by its top, and the abundance of short roots held the soil as here illustrated. A deep mellow soil will not produce a campact root system as here shown. Plants grown in deep soil for comparison were strong in root development, but could not be transplanted with equal success owing to the rambling nature of the roots which were longer and less abundant. Very long roots almost invariably become destroyed when the plants are transplanted, thus weakening their vitality. When the roots of a tomato plant become injured, which will nearly always result in transplanting, it is just as important to prune away a portion of the top to preserve a balance in growth as it is to prune a young fruit tree for the same reasons. It is, therefore, best to always cut off the succulent growth at the top.

RAISING PLANTS BY CUTTINGS.

It is not commonly known that the tomato will propagate by cuttings. At the end of the fruiting season a year ago, cuttings were taken from two varieties which had been raised from

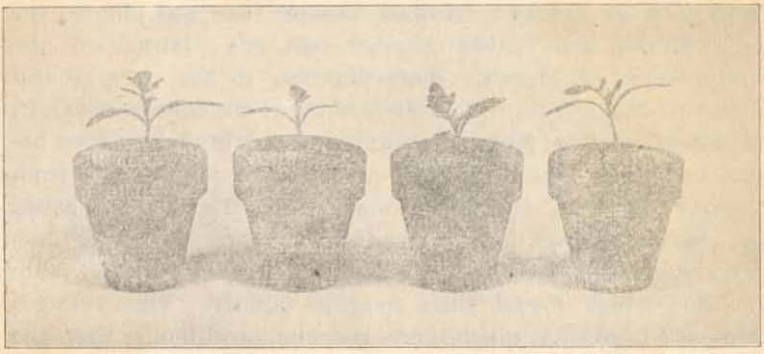


(1) Ready for final transplanting,



(2) Rooted cuttings from the propagating sand.

seed the spring before, and had fruited in the garden. Plants were raised from cuttings of these and fruited in the greenhouse. Again cuttings were taken from the plants which had been raised from cuttings, and these were stuck in wet sand in a warm room on the same date, March 1st, that the hotbeds were planted to these and other varieties. The picture of rooted cuttings shows how they appeared about four weeks after they were placed in sand. Number one in the first picture shows an average plant of one of these cuttings as it appeared on the date of transplanting to the garden, the 27th of May. It is well



No. 3.—Ready to transplant from hotbed to cold-frame.

to say that the spring season this year was an unusually backward one. The plants were ready for the garden at least three weeks before the weather seemed favorable to plant them out, which goes to show that it is not best to raise any but early varieties in this locality.

Sixteen plants of the variety Dwarf Champion raised from cuttings were tested with a like number of plants of the same variety raised from seed. All other conditions were the same. The plants from cuttings were always larger and stronger than the others, though the plants from seed were excellent in

every particular, and the same as number four in the picture. The plants from cuttings held the advantage throughout the test by about ten days in the ripening of the fruit, and the total yield to the end of the season was approximately five per cent greater than from the plants raised from seed.

Tomato plants can be grown along with a collection of house plants in a warm dwelling room through the winter, and are quite as ornamental as geraniums. Whoever so desires can propagate the tomato in this way.

DATES OF SEEDING COMPARED.

Eighteen varieties were included in this test, and three plants of each variety. Hotbed number one was planted the first of March, and hotbed number two was planted on the twenty-second of March. Transplanting to the open ground was done direct from the hotbeds without the cold-frame shift, but attention was given to thinning the plants before they became crowded. Plant number two in the picture was from the early sown bed, and plant number three from the late sown. The younger plants had grown taller by transplanting time, which was due to a higher prevailing temperature and more sunshine, which forced them to grow rapidly. The younger plants were, however, much more succulent and tender than the early ones. The older plants ripened their fruit before the others, from three to ten days, according to the records of the earlier varieties. As the late varieties did not ripen until after a severe frost, an accurate record of ripening could not be made. In amount of yield of both green and ripe fruit there was a difference in favor of the early plants of one to five per cent, but in every case early seeding proved an advantage.

MANURED AND UNMANURED SOIL.

Land that had never been manured was selected for this test. A heavy covering with barnyard manure was applied to a portion of this area. Plants of the same character and varieties were used on the two divisions. The unmanured portion furnished the first ripe fruit from two earliest varieties, but the first

large gatherings of ripe fruit, and large subsequent pickings as well, came from the manured portion. The yield of every one of the eighteen varieties was larger on the manured land, and varied from nine to eighteen and one-half per cent more. If the land had been manured the year before instead of the season the tests were made, we could have expected still better results from fertilizing the soil.

COMPARISON OF VARIETIES.

The varieties used in the experiment were:

1. Dwarf Aristocrat.
2. Atlantic Prize.
3. Crimson Cushion.
4. Dwarf Champion.
5. Spark's Erliana.
6. Trucker's Favorite.
7. Fordhook Fancy.
8. Fordhook First.
9. Ignotum.
10. Matchless.
11. Noble.
12. Peach.
13. Ponderosa.
14. Quarter Century.
15. Early Ruby.
16. Stone.
17. Sutton's Best of All.
18. Turner's Hybrid.

The descriptions following will refer to the varieties by number.

The first in earliness were, 2, 5, and 15.

The second in earliness were, 1, 3, 4, 8, 9, 16, and 17.

The intermediate in ripening were, 6, 7, and 10.

The varieties ripening very late were, 11, 12, 13, 14, and 18.

Varieties bearing small fruits were, 1, 4, 7, and 12.

The fruits of medium size were, 2, 3, 5, 6, 8, 9, 14, 15, and 17.

The large fruiting kinds were, 10, 11, 13, 16, and 18.

The warm sections of this state, where frosts are not liable to occur between the tenth of May and the middle of September, will produce any and all of these varieties with success. However, I will recommend for general culture in favorable localities, numbers 2, 5, 6, 9, 10, 11, 13, and 16.

For northern Idaho and high altitudes, where a late spring

and early frosts are common, I would select numbers 2, 4, 5, 8, and 9.

I want especially to recommend Atlantic Prize for the home garden. Spark's Earliana also proved to be a most desirable early variety. Early Ruby, Sutton's, and Stone were subject to rot, a disease which attacks the blossom end about the time of ripening.

CO-OPERATIVE EXPERIMENTS.

The climatic conditions in the vicinity of Moscow are not especially favorable for the culture of the tomato. Late spring frosts and cool nights prevent early maturity. The valleys of the Snake and Clearwater rivers have a mild climate, and all the conditions there are well suited for raising tomatoes, excepting the very high altitudes well towards the sources of these rivers. Realizing this, and through the generous efforts of Messrs. L. L. Haynes and S. G. Isaman, living near Lewiston, a line of co-operative work was carried on the past season. Each of these gentlemen received plants of twelve varieties for trial, more than a hundred plants altogether, which were duplicates of two-thirds of the varieties used in the trials on the station grounds. They planted and tended by methods adapted to irrigated sections. The observations made were of a general practical nature. The ripening period at Lewiston was found to begin less than two weeks ahead of Moscow, though in the proportion of ripening the Lewiston locality held an advantage of more than five to one in comparison with the Moscow locality. Mr. Haynes reported the Early Ruby the first to ripen, and following about three days apart were Atlantic Prize, Dwarf Champion and Aristocrat. The following are reported as mid-season varieties, Fordhook First, Ignotum, Crimson Cushion, Peach, Fordhook Fancy, and Trucker's Favorite. The late sorts were, Matchless and Quarter Century.

Mr. Haynes adopted a method of planting which, I think, is one of the most valuable features mentioned in these tests. Furrows running east and west were plowed to more than a foot in depth. The plants were then set out within about three inches

of the bottoms of the furrows at appropriate distances, and on the north side of the ridges. These furnished shade from the hot sun at mid-day, and protected the moisture at the roots, thus rendering each irrigation more effective, and the necessity of application less frequent.

"TOMATO BLIGHT."

A disease commonly called "tomato blight" has proved very troublesome the last few years to a greater or less extent, according to varying conditions and circumstances not well understood. Microscopic investigations have shown this disease to be caused by a bacterium or germ which develops within the succulent tissues of the plant, and is conducted through the stems by the movement of the sap. When a plant becomes infected the leaves begin to wilt, and finally the stems turn yellow, and the whole plant shrivels and dies. Bordeaux mixture and various other remedies have been tried without apparent benefit, because external applications fail to reach the affected tissues. It is advisable to destroy all affected plants as soon as the disease becomes apparent, to reduce the chances of further infection as will be the case if the dead plants are left to decay on the land. It seems, therefore, that the only available remedy against blight is prevention.

In a former bulletin I said: "Trials on these grounds during the last four years have shown that the use of vigorous plants and well manured soil, with good cultivation, is a reliable preventive against tomato blight. We have had many cases of this disease here, and have been experimenting to find a remedy. Thus far we have found preventive measures the only reliable safeguard against tomato blight. The explanation is this: Plants sustained in vigorous growth with an abundant supply of humus and all the essential fertilizing elements, which are often deficient in ordinary soils, have the power to resist this disease."

The chief aim of the Lewiston co-operative experiments was to investigate the development of this disease, and the results fully justify my previous conclusions in regard to this matter.

Both Mr. Isaman and Mr. Haynes had previously experienced a great deal of trouble with tomato blight. The latter selected ground this year that had been well manured and prepared for an asparagus bed two years ago. The soil was, therefore, well stored with available plant food, and had a good physical texture. Out of about eighty plants only two blighted. Mr. Isaman used unmanured land, excepting the present season he added a little manure to the soil at the time of planting. He also watered very sparingly through the season of early growth, and none towards the last, and had to report a loss of over thirty per cent of his plants.

We have to report the loss of only one plant from blight this season on the Station grounds among over 400 plants. The diseased plant lived and died in a hard and dry piece of ground near a roadway on one corner of the plat.