

# New York Agricultural Experiment Station.

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POPULAR EDITION

OF

BULLETIN No. 125.

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TOMATO FORCING: METHODS OF TRAINING AND  
BENCHING.

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NOVEMBER, 1897.

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GENEVA, N. Y.

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\*Connected with Second Judicial Department Branch Station.

†Connected with Fertilizer Control.

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TOMATO FORCING : METHODS OF TRAINING AND  
BENCHING.

F. H. HALL.

**Success difficult.** Difficulties are to be met with in tomato forcing which do not confront the winter grower of lettuce, radishes and other plants which come to perfection in spring and early summer. The tomato loves light and heat and to compel it to ripen fruit during the short, dark days of midwinter, when its beautiful, red globes are most attractive and command the highest prices, requires the gardener's most careful attention.

**Principal problem.** He must have vigorous, healthy plants to withstand the artificial conditions of forcing-house life ; but he must not feed his charges too richly or too heavily lest his harvest prove "nothing but leaves" until the oncoming of Florida grown tomatoes makes his ripening crop a profitless one. The problem he must solve is to check growth sufficiently to cause early setting and ripening of fruit, without lessening the vigor necessary for a full crop.

**Methods.** Various plans are used by growers to accomplish these purposes : some set the plants in limited amounts of soil to retard their growth until fruit is set, then stimulate with commercial fertilizers or liquid

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\* This is a brief review of Bulletin No. 125 of this Station on Forcing Tomatoes ; Comparison of Methods of Training and Benching ; Note on a Tomato Disease, by S. A. Beach. Anyone specially interested in the detailed account of the investigations will be furnished, upon application, with a copy of the complete Bulletin.

manure ; others limit root development by growing the plants in pots or small boxes ; and others check the growth of the main stem by leading out the first shoot upon each side.

To compare this last method of training, the **Station test** three-stem system, with the single-stem system **of methods.** and to gain accurate information concerning their effects upon early maturity and productiveness, the station carried on forcing-house experiments during the winters of 1895-6 and 1896-7. At the same time a comparison was made, under each system, between plants set on the benches and others whose roots were restricted in small pots buried in the bench soil. The latter plan causes roots to put forth from the stem above the pot, and the checking of root growth hastens fruit setting.

**Plants.** Two crops of plants were used during the first winter and one during the second, thus making three sets each of single-stem plants and three-stem plants in pots and not in pots on the benches. The variety Lorrillard was used in all the tests as this is conceded to be one of the best sorts for early winter forcing. Plants for each test were grown from the same lot of seed, were selected for uniformity of health and vigor, were placed in similar soil, were fertilized alike and were kept under conditions as uniform as possible.

**Soil.** The soil used in the first winter's experiments was composed of three measures of potting soil, two and one-half measures of sand, two of good leaf mold and two of well-rotted, mixed stable manure ; and in the second winter, of equal measures of leaf mold, sand, well-rotted horse manure and loam, with an amount equivalent to 500 pounds per acre of a fertilizer mixture containing 8.4 per cent available phosphoric acid and 20 per cent actual potash.

**Arrange-** In each test about one-half of the plants were **ment of the** knocked out of the small pots, to which they had been transplanted from the germinating flats, and **plants.** set in the soil of the benches ; the remaining plants were set, still in the pots, upon the layer of manure or sphagnum moss covering the bottom of the benches,



PLATE I—*Tomato plant showing method of training to three stems in forcing house.*



PLATE II—*Tomato plant showing first stages of three-stem training, also manner of pruning off part of foliage to prevent too vigorous growth.*

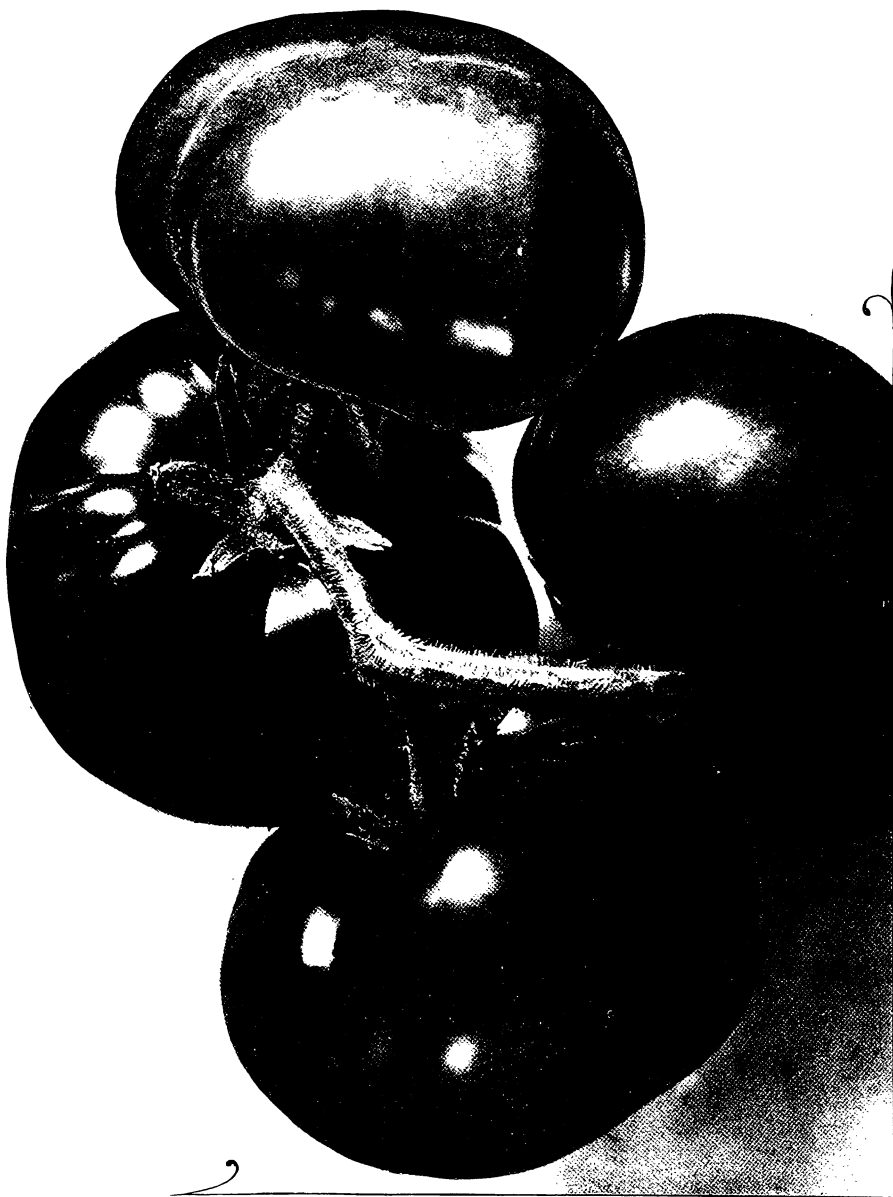


PLATE III—Lorrillard. *From life size photograph of fruit forced in winter.*

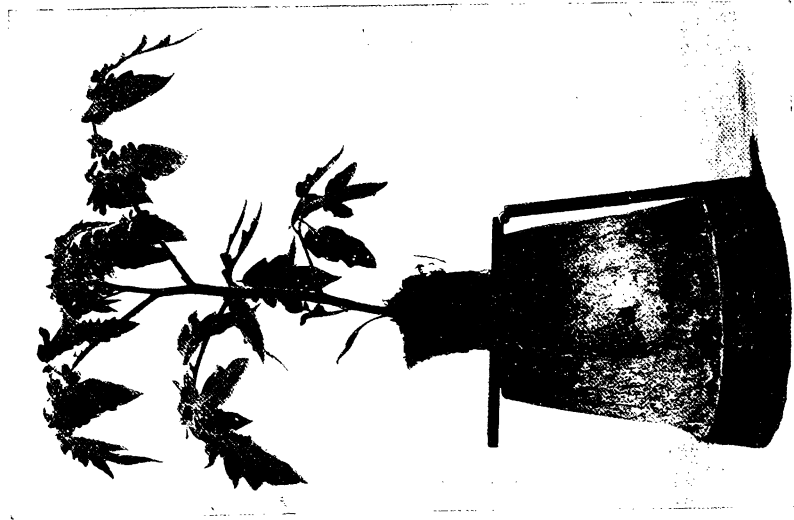


FIG. 1—Tomato plant ready for transplanting to bench of forcing house.

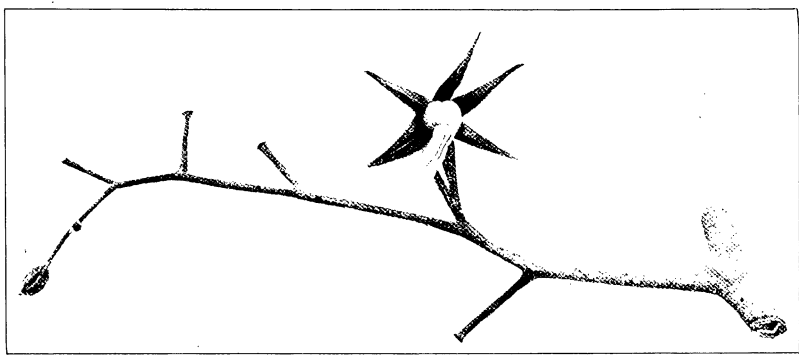


FIG. 2—The fruit fails to set when the stigma is not properly pollinated.



and the soil mounded up above the pots to the seed leaves of the plants. About one-third of the plants in each test, both of those in the pots and those in the bench soil, were trained to three stems and two-thirds trained to single stems. In setting, each plant of the single stem system was allowed only half as much bench surface as those trained to three stems, the areas in the different tests being  $2\frac{1}{8}$ ,  $2\frac{3}{8}$  and  $2\frac{5}{8}$  square feet for the former and  $4\frac{1}{4}$ ,  $4\frac{3}{4}$  and  $5\frac{2}{3}$  square feet for the latter.

Owing to the absence of insects and winds, artificial pollination is necessary in forcing house culture of tomatoes. During light, warm days pollen forms abundantly and is easily distributed by jarring the blossoms as may be done by rapping the plants with a padded stick. When the weather is not favorable for setting of fruit, as during late December and early January, the blossoms should be pollinated by hand during the driest part of every second or third day. The open flowers should be jarred over a camel's hair brush or small spoon and the pollen thus collected touched to the stigmas of other flowers. By passing from flower to flower in this way the blossoms become satisfactorily fertilized and small one-sided fruit, due to an insufficient supply of pollen or to close fertilization, is avoided.

In the first test it was found that peculiarities in the location and construction of the forcing house favored plants located in certain portions of the benches more than others, so the experiment was not considered entirely satisfactory, although its results were confirmed by the later trials. Both in the pots and in the bench the single-stem plants of this test made more rapid growth than did those trained to three stems and gave a greater yield per square foot of bench surface, but did not show very much difference in early maturity or size of fruit.

In the subsequent tests the plants were so arranged as to secure great uniformity in the distribution of light and heat and in the size of the plants at benching time; and sufficient numbers were used to make the results conclusive so far as this climate and the variety Lorrillard are concerned.

**Results.** The average number of fruits per plant, average weight of fruits, and average early and total yield per square foot of bench surface are shown in the table below.

YIELD OF TOMATOES DIFFERENTLY TRAINED AND BENCHED.

SYSTEM.	No. of Plants.	Average number of fruits per plant.	Average weight per fruit.	Average early yield per square foot of bench.*	Average total yield per square foot of bench.
			<i>Ounces.</i>	<i>Ounces.</i>	<i>Ounces.</i>
Single-stem . . . . .	54	22.17	2.79	9.74	21.86
Three-stem . . . . .	32	35.22	2.59	7.54	16.72
<b>Difference . . . . .</b>		<b>4.56 †</b>	<b>0.20</b>	<b>2.20</b>	<b>5.14</b>
Not in pots, single-stem .	29	22.55	2.80	11.46	22.41
In pots, single-stem . . .	25	21.68	2.77	9.02	21.31
<b>Difference . . . . .</b>		<b>0.87</b>	<b>0.03</b>	<b>2.44</b>	<b>1.10</b>
Not in pots, three-stem .	17	37.29	2.61	7.54	17.75
In pots, three-stem . . . .	15	32.87	2.56	7.38	15.69
<b>Difference . . . . .</b>		<b>4.42</b>	<b>.05</b>	<b>.16</b>	<b>2.06</b>

\* Yield for six weeks from first ripe fruit.

† For same area; twice as much space allowed three-stem plants.

The table thus shows that the single-stem training is clearly superior to three-stem training for winter forcing of tomatoes.

The fruits on the single-stem plants are heavier and greater in number for equal areas so that the total yield per square foot of bench surface is decidedly larger. It was found also that the amount of fruit ripened during the first six weeks of fruiting is much greater for the single-stem plants; although in many instances the first fruits ripened were upon the three-stem plants.

In comparing the plants grown in pots and in the benches very slight differences were found when the plants were trained to single-stem; but with the three-stem system retaining the pots seems to be a decided disadvantage, as shown by the less number of fruits and smaller total yield of plants thus checked in growth.