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THOMAS P. COOPER, Dean.

Extension Division

FRED MUTCHLER, Director

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GROWING THE TOMATO

By

A. J. OLNEY

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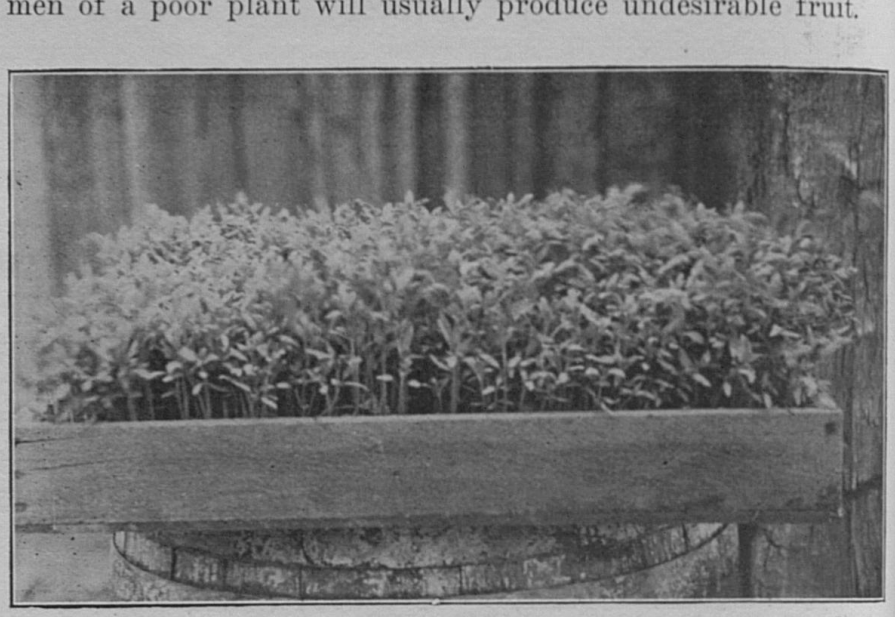
Tomatoes have been grown commercially in Kentucky for some time but the acreage has been greatly increased in the past few years. In 1915, 2,675 acres of tomatoes were grown in the state for canning factories. In 1916, there were 4,240 acres, or nearly double the acreage of the preceding year. The records are not complete for the 1918 crop. However, over 1,800 acres of tomatoes were grown for canning factories at Owensboro. There were four or more concerns canning tomatoes in Louisville. Tomatoes were grown for canning factories at Paducah, Henderson, Bowling Green, Waco, Science Hill, Berea, Eubank, Lawrenceburg and Marion. A few small or private canneries are not mentioned above.

The prices in 1918 range from $14 to $18 per ton and many of the best growers were able to secure ten tons or over per acre. Many of the small farmers who grow no other truck crops are finding tomato growing very profitable. This is often true on soils not well suited to other crops. It is a well known fact that some of the poorer lands of Southern Indiana have been developed into big tomato sections. The tomato industry has many features to recommend it. The crop requires a relatively small outlay of money and the returns are realized in a comparatively short period of time.

The crop is usually contracted to canning companies at a fixed price. When tomatoes are grown for market the very early varieties are the most profitable, since the prices drop as soon as the bulk of the crop comes on the market.

Select Good Seed

Good seed is very important. C. E. Myers (1) in his work at Pennsylvania State College found a difference of more than thirteen tons per acre of marketable fruit from seed selected from high-producing plants over unselected seed of the same variety. It will probably be profitable for many growers to select and save their own seed. Seeds from the finest specimen of a poor plant will usually produce undesirable fruit.



Flat of tomato plants ready for transplanting to other flats or pots.

The cleaning and drying of seed is very simple. Scrape the pulp and seeds from the selected specimens into a pail and pour enough water over them to cover them. Leave in a warm room for 24 to 36 hours. Fermentation will have taken place and the seeds will separate easily from the pulp. Wash a few times over a fine sieve and spread on a paper to dry. After they are thoroly dried, they should be placed in an envelope and carefully labelled. For best results the seed from each vine should be kept separate, with complete description of the parent plant. The plants grown from the seeds of one vine should be planted in a block by themselves. Some blocks will show up better than others and seed should be saved as in the

previous year from the best blocks. This is the method by which improved strains are obtained. Store the seed in a dry, well-ventilated place having an even temperature and free from mice.

Seedlings Need Care

The methods used for handling seedlings differ somewhat according to the purpose of the crop. If an early crop is desired the seed must be sown late in February or early March. For this purpose they may be very satisfactorily cared for in hotbeds,* altho a small greenhouse is more convenient. Tomatoes for canning or late production are usually grown in cold frames* or sometimes in the open ground. The seed for the later crops are usually sown the latter part of March or the first week in April. The seed may be sown in the open ground as late as May 15th. Plantings at this date will give a much lower total yield than the earlier plants. For the early plants it will be most convenient to sow the seed in shallow boxes or flats. Flats should be made about 3 inches deep, 12 inches wide and 20 inches long. The bottom of the flats should not be tight,

Transplanting tomato plants into paper pots.

*Ky. Agri. Experiment Sta. Circular No. 11—"Hotbeds and Cold Frames."

so that good drainage may be provided. Seeds may be sown either broadcast or in rows about 2½ inches apart. When the second leaves appear, the seedlings should be transplanted into flats or pots. Paper pots and dirt bands are sometimes used in place of ordinary clay pots. A dirt band is a strip of heavy paper which, when folded together, makes a band that will hold the soil. The band has no bottom. The paper pots are satisfactory and cheaper than clay pots, but last for only one season.

Tomato plants ready for potting; plant just potted; plant two weeks after potting.

Well-grown potted plants have always given much better results than those planted to flats, in the work at the Kentucky Agricultural Experiment Station. Boyle (2), in his experiments at Purdue, found an increase of four and one-tenth tons per acre by the use of plants grown in dirt bands over those transplanted into flats. Pot-grown plants may be taken to the field for planting during hot weather and, if carefully handled, will scarcely wilt in the process. The yield of tomatoes is probably influenced as much by the health and vigor of the

plants set as by any other factor. When one sees the large number of poor, small and spindling plants which are set every spring, he is not surprised that the average yield is considerably lower than it should be. A stunted plant never recovers entirely and is usually unprofitable.

Plants in Frames Require Special Care

Tomatoes grow best in a rather warm temperature or at about 70 degrees F. during the day and preferably not lower than 60 degrees during the night.

The watering and ventilation of the young plants require even more exacting attention than the temperature. Overwatering is the most frequent offense and causes weak or diseased plants. If allowed to become too dry the plants soon become stunted. While the plants are small they should be watered only in the morning of bright, sunshiny days, so that the foliage will become perfectly dry before night. If the plants are wet in the cool of the night, the conditions for damping off are very favorable and may result in considerable loss. Never water during cloudy weather unless absolutely necessary. Whenever water is applied it should be used liberally and then withheld until it is needed again. After watering, it is always desirable to ventilate as much as possible without chilling the plants or causing a direct draft upon them. Tender seedlings started early in the spring will not stand much ventilation at first, but this should be increased a little each day, if possible, and the frames finally removed entirely, so that the plants will be properly "hardened off" by the time they are to be planted in the field. Flat-grown plants, in particular, should be thoroly watered a few hours before planting, so that more soil will cling to the roots.

Field Culture

Tomatoes succeed on many types of soil. A loamy soil is considered preferable, by some, but land that will produce good potatoes will usually raise a good crop of tomatoes. Experiments have shown that tomatoes respond to applications of fer-

tilizers. Fertilizer experiments with tomatoes by the West Virginia Experiment Station (3), showed a profitable use of both commercial fertilizers and barnyard manures on the soils of West Virginia. An application of 400 lbs. to the acre of a commercial fertilizer analyzing 3% nitrogen, 8% available phosphoric acid and 10% potash is recommended by that experiment station. Soils deficient in phosphorus gave a much increased yield when this element was supplied. Moderate applications of stable manure gave very satisfactory results. The kind and amount of fertilizers that may be applied with profit will depend entirely on the soils in question. A tomato soil should contain considerable nitrogen, but if too rich in nitrogen there will be a vigorous vine growth and a small set of fruit. In fact, this is one of the commonest causes of failure of fruit to set.

Planting in the Field

Before the plants are set, the soil should be in the best possible condition and marked out ready for the planting. The distances for planting depend on the soil, the variety, and whether the vines are to be staked or not. The following distances have been used at the Kentucky Station during the past three years: 4 ft. x 6 ft.; 5 ft. x 5 ft.; and 4½ ft. x 5 ft. Plants set 4 ft. x 6 ft. have been very satisfactory and this gives more room for picking, besides allowing 73 more plants to the acre than when planted 5 ft. x 5 ft. The smaller-growing varieties such as Earliana or I. X. L. did very well planted 4½ ft. x 5 ft. For staking and pruning, 2 ft. x 4 ft. has been found very satisfactory.

The Number of Plants Required to Set an Acre

2	ft. x	4 ft.,	5,445 plants
4½	ft. x	5 ft.,	1,936 plants
5	ft. x	5 ft.,	1,742 plants
4	ft. x	6 ft.,	1,815 plants
5	ft. x	6 ft.,	1,452 plants
6	ft. x	6 ft.,	1,210 plants

Does It Pay To Stake and Prune?

Experiments by the Kentucky Agricultural Experiment Station show that the yield per acre is increased by staking and

pruning, but the yield per plant is reduced considerably. The increase in yield by staking and pruning is due to the fact that a much larger number of plants may be used per acre. Staking and pruning may be profitable for the home garden or intensive trucking area; however, the price of stakes, additional labor involved and the greater number of plants required may bring the cost too high even for truck gardening. For canning, staking and pruning are entirely out of the question. A 5-ft. stake is a good length for average conditions. Tobacco stakes are often used satisfactorily and particularly so with the smaller-growing varieties like Earliana.

Harvesting and Marketing

The proper time to pick tomatoes depends upon the purpose for which they are to be used. If for table use or nearby market they should be picked as soon as they are well colored, but for shipping they should be picked when they are about half colored. Tomato picking, at best, is unpleasant because of the stains on the clothes and hands of the pickers. The stains on the hands may be removed quite readily by applying a rotten or soft tomato before washing.

All soft or diseased specimens should be removed at every picking. Care should be taken to remove all stems from the fruit to prevent bruising.

All fruit for the market should be carefully graded because one leaking tomato may ruin the sale of an entire package. A few over-size, irregular, poorly colored or small tomatoes may spoil the appearance of a whole basket of good ones. The work of grading them is very important.

The standard package for shipping tomatoes is the four-basket crate.

Insects and Diseases

Tomatoes are not seriously troubled by insects, as a general rule. If cutworms are troublesome when the plants are small, they may be controlled by using a poisoned bran-mash bait made by mixing 12 pounds of bran with a pound of Paris

green or half a pound of white arsenic. This is moistened by stirring in some water containing a small amount of molasses. Stir thoroly. It is a good practis to scatter some of this on the ground a couple of days before the plants are set out and also at setting time. *Caution.* This mash will kill chickens.

Flea beetles may be controlled by spraying with Bordeaux mixture. This does not kill the beetle but acts as a repellant.

Leaf spot and leaf blight may be controlled by frequent applications of Bordeaux mixture applied as soon as these diseases are manifest.

The tomato wilts are serious fungous or bacterial diseases. The whole plant yellows and finally wilts and dies. The germs which cause these diseases live in the soil as well as on the plant. The only remedy is rotation of crops.

Varieties Are Numerous

Seedsmen list such a large number of varieties that their selection is often somewhat bewildering. The following notes on varieties are taken from the trial plots on the Experiment Station grounds. Varieties sometimes succeed in one locality and not so well in another.

These notes were taken over a period of three years.

Acme. An old, well-known variety. Fruit pink, smooth, attractive, medium sized, ripening in mid-season. Productive. Popular with many. A standard variety.

Beauty. A very popular pink variety, very similar to Acme in size and appearance. Rather productive, some prefer it to Acme.

Bountiful. A bright-red tomato of the Stone type. Very productive. Grown but one season in tests on Station grounds.

Blue Ribbon Pioneer. Resembles June Pink. Lacking uniformity in size, shape and color.

Buckeye State. A very old, pink variety, ripening in mid-season, smooth, medium in size, moderately productive. Similar to Acme.

Burbank. A rather early, bright-red tomato, medium in size. Has a tendency to crack; too soft for shipping. Vine

medium or below, in size, moderately vigorous. Resembles Early June.

Chalk's Jewel. An early, bright-red tomato, medium in size, very productive. One of the best second-early varieties for home or market.

Comet. Surpassed by many for field culture.

Coreless. A bright-red, globe-shaped tomato of high quality, vigorous and productive. Highly prized for eating sliced or canning. Late mid-season.

Crimson Cushion. A large, pink tomato similar to Ponderosa, but more regular in shape, vigorous and very productive; mid-season.

Dwarf Giant. One of the best of the upright or bush tomatoes. Fruit large, deep-pink, solid flesh of high quality for table use. Moderately productive.

Earliana, Langdon's. A very early, bright-red tomato somewhat irregular in size and shape. Vine medium or below in size. Productive. One of the best extra early varieties.

Earliana, Sunnybrook's. A very early, bright-red tomato, having some of the characteristics of Spark's Earliana, but resembling Early June in character of vine. Grown but one season on the Station grounds.

Early Detroit. A medium-early, pink tomato of globe shape. Flesh solid and of good quality. Very productive. Has a tendency to crack. Resembles Globe.

Early Freedom. A dull-red tomato, ripening in mid-season, surpassed by many as grown on the Station grounds.

Early June. An early, bright-red tomato of medium size and good quality. Very productive. A desirable extra-early variety.

Fordhook First. A very smooth, pink tomato of medium size, handsome in appearance and good in quality. Resembles Beauty. Moderately productive.

Globe. An old, globe-shaped pink tomato that is still holding its own against newer ones; flesh solid and high in quality. Very productive; an excellent variety for home or market.

Golden Ponderosa. Large, yellow tomatoes of the Ponderosa type. One of the best of the yellow varieties. Very productive.

Greater Baltimore. A very popular canning tomato of the Stone type. Above medium in size; bright red; very productive.

June Pink. A very early, pink tomato; said to be a pink Earliana. One of the best extra-early, pink varieties. Very productive.

John Baer. Resembles Chalk's Jewel in fruit and vine. The production and size of fruit also correspond very closely with that variety.

Hummer. A bright-red tomato closely resembling Stone in fruit and vine. Fruit smaller than Stone.

Holmes Supreme. Fruit too small for market but smooth and regular. Productive.

My Maryland. A very fine tomato of the Stone type. Very popular in some sections. Productive.

Mack's Prolific. A cross between Ponderosa and Dwarf Giant; fruited here for the first time last season. Did not show special merit.

Magnus. A pink tomato of medium size and high quality. Moderately productive. Vine large and coarse with potato-like leaves.

Mississippi Girl. A very fine variety, closely resembling Stone.

Manyfold. A very productive, bright-red tomato. Smooth and regular but below medium in size. Fruited but one season at the Station.

Ponderosa, or Beef Steak. Too well known to require comment. Popular among home gardeners.

Perfection. Rather early, red tomato, productive but irregular in size and shape.

Puritan Hill. A very promising tomato of the Stone type. Very productive. Should be tried for canning.

Prolific I. X. L. A very early tomato resembling Earliana. Of merit as an extra-early, bright-red tomato. This variety seems to produce well early in the season but falls off rapidly as the season advances.

Prosperity. A very prolific sort. Fruit smooth and regular, below medium in size; too small for many purposes.

Red Head. A very fine, bright-red tomato, smooth and regular in shape, medium in size; very productive.

Santa Rosa. A large tomato resembling Ponderosa but somewhat more regular in shape. Flesh solid and of high quality. Grown here but one season.

Stone. A standard, well-known, late red variety. Very largely grown for canning. Productive.

Stirling Castle. A rather early, dark-red tomato of small size; vigorous and productive.

Superb Salad. A very productive, bright-red tomato of small size. A good variety to serve whole or for pickling.

Sunrise. A very promising, extra-early, bright-red tomato; quality good, very productive. Recommended for trial.

Shenandoah. A strain of Ponderosa, grown but one year on the Station grounds.

Sugar and Cream—A cross between Ponderosa and Dwarf Giant. Fruited here for the first time last season. This variety seemed to be very susceptible to leaf blight. Not particularly promising, altho fine in quality. It has a bush habit similar to that of Dwarf Giant.

Tenderloin. Very similar to Ponderosa, large and irregular.

Trophy. An old variety. Too irregular in size and shape. Not recommended.

Trucker's Favorite. A purple-tinted variety of good quality but has been lacking in productiveness, as grown on the Station grounds.

Victoria Whole Salad. A very prolific sort. Fine for pickling. Too small for most purposes.

A careful study of the several varieties seems to indicate a very close relationship between many of them; in fact, it is

practically impossible to tell some of them apart. Some of the similar varieties have been grouped for the convenience of tomato growers as follows:

A. Red Varieties

1. Stone Group. Fruits large, smooth, roundish-oblate to oblate, bright scarlet-red; season moderately late. Bountiful, Greater Baltimore, Mississippi Girl, My Maryland, New Glory, Puritan Hill, Stone.

2. Bonny Best Group. Fruits medium to large, roundish to roundish-oblate, bright scarlet; ripening rather early: Bonny Best, Burbank, Chalk's Jewel, Early June, Earliana (Sunnybrook's), Earliana (Langdon's), John Baer, Manyfold, Perfection, Prolific I. X. L., Prosperity, Red Head.

B. Pink Varieties

1. Ponderosa Group. Fruits very large, irregular in size and shape; flesh solid and of high quality: Mack's Prolific, Ponderosa, Santa Rosa, Shenandoah, Tenderloin, Crimson Cushion.

2. Acme Group. Fruits medium to large, rather smooth and regular in size and shape; mid-season: Acme, Beauty, Buckeye State, Fordhook First, Magnus.

3. Globe Group. Fruits globe-shaped, medium to large; flesh solid and of high quality: Globe, Early Detroit.

The results of the variety tests at the Kentucky Experiment Station for the three-year period, show that there is no "Best Variety" of tomatoes. Some do better than others one year and not so well the next, but on the whole the character of productiveness has been fairly constant. The following varieties have been very productive and satisfactory.

Early Varieties. Bonny Best, Chalk's Jewel, Earliana, Early Detroit, Early June, John Baer, June Pink, Red Head, Sunrise.

Mid-season and Late Varieties. Beauty, Crimson Cushion, Coreless, Greater Baltimore, Globe, Mississippi Girl, My Maryland, New Glory, Puritan Hill, Stone.

Summary

The tomato industry in Kentucky is growing rapidly.

Poor seed and poor plants give poor returns. Hundreds of poor plants are set every year.

Staking and pruning reduce the yield of marketable fruit per plant but increase the yield per acre because of the greater number of plants that may be set.

It will not pay to stake and prune tomatoes grown for the canning factory.

Bordeaux mixture will control the leaf blight.

References to Literature

1. Myers, C. E. Pennsylvania Agricultural Experiment Station, Bulletin 129, P. 150.
2. Boyle, J. G. Indiana Agricultural Experiment Station Bulletin 165, P. 809.
3. Dacy, A. L. West Virginia Agricultural Experiment Station Bulletin 142.