



GROWING

tomatoes

FOR EARLY MARKET

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Growing
TOMATOES
for

E**ARLY MARKET**

OPPORTUNITIES: are excellent for the production of early stake tomatoes in Missouri. This publication can help you grow good crops for early market.

WHAT TO CONSIDER: FIND YOUR MARKET—Before growing tomatoes, have your market outlet established. It may be a central wholesale market, a local wholesaler, a supermarket buyer, restaurants, hotels, a roadside market or possibly others. You are sure to get into trouble if you wait until the tomatoes are ready for harvest before looking for a market . . . **KNOW WHAT YOUR MARKET WANTS**—Establish with your buyer the type of tomato he prefers, how it should be packaged, and when it should be delivered . . . **MEET YOUR MARKET NEEDS**—In general, all markets want a tomato that is early, firm, smooth, and crack-free. Markets differ in their wants as to size, color, and shape of fruit and type of package. Find out what your market wants. You as a producer must have an early, productive tomato.

CHOOSE THE BEST VARIETY: This isn't an easy job. But the choice of the right variety may be the most important decision you can make. There is no one best variety. Soils differ, locations differ, and market preferences vary. You must find the varieties that do best in your location, and on your soil type and will meet your market demands.

The perfect tomato hasn't been developed yet—and probably never will. We do know a lot about the desirable characteristics a tomato should have, so you won't have to resort to the "trial and error" method of selection entirely. Here are some of the qualities to look for in selecting a good market tomato:

Hybrid Vigor: Generally the best hybrid tomatoes are *more productive* and show *greater uniformity* than standard tomatoes.

Wilt Resistance: Fusarium wilt is fairly widespread throughout Missouri soils. Wilt-resistant tomatoes should be used except on soils *definitely* known to be free of wilt. Most commercial hybrid tomatoes do not have wilt resistance.

Earliness: An early variety is one that will mature first fruits 65 to 70 days after transplanting. An early planting of an early variety will set more fruits before blossoms drop because of high temperatures, and for many Missouri markets early production commands a much higher price.

EARLY MARKET TOMATOES

NOTE: This is a list of the present and promising tomatoes grown for early market in Missouri. They are not necessarily recommended. Study the good and bad points of each before making your decision. The tomatoes are listed alphabetically.

Maturity, midseason; productivity, average plus; foliage cover, good; fruit uniform, very smooth, average firmness; size, large; cracking, fairly susceptible; not resistant to fusarium wilt.

Burpee Big Boy

Maturity, very early; productivity, good; foliage cover, good; fruit uniformity variable, fairly smooth, above average firmness; size, large—particularly early fruits; cracking, very susceptible; not resistant to fusarium wilt.

Burpee Big Early

Maturity, early; productivity, good; foliage cover, good; fruit uniform, fairly smooth, firm; size, medium plus; cracking, fairly susceptible; not resistant to fusarium wilt.

Burpee Hybrid (6113)

Maturity, midseason; productivity, good; foliage cover, fair to good; fruit uniform, smooth, firm, no green shoulders; size, medium plus; cracking, resistant to radial cracking (crowfoot); not resistant to fusarium wilt.

Glamour

Maturity, early; productivity, good; foliage cover, good; fruit uniform, smooth, firm; size, medium plus; cracking, fairly susceptible; resistant to fusarium wilt.

Mocross Supreme No. 4

Maturity, very early; productivity, good; foliage cover, fair to good; fruit uniform, smooth, firm, no green shoulders; size, medium plus; cracking, shows some resistance; resistant to fusarium wilt.

Mocross Surprise

Maturity, very early; productivity, good; foliage cover, fair; fruit uniform, globe shaped, fairly smooth, firm; size, medium plus; cracking, very susceptible; not resistant to fusarium wilt.

Moreton Hybrid

Select a Good Location

- Frost** Cold air drains to low lying areas. Early market tomatoes should be planted on sites where cold air can drain away. Second bottoms, broad river valleys and gently sloping hillsides make good sites.
- Irrigation** Early market tomatoes are a high cost crop. It will be a very risky investment to grow them without irrigation. In addition, adequate application of water will provide a more uniform soil moisture level resulting in *higher yields* and *improved quality*.
- Windbreaks** Cold spring winds are hard on newly transplanted tomatoes. A windbreak, whether it be from a protective hillside, a planting of trees, or strips of rye left in the field, will offer much protection and speed maturity.
- Soils** Lighter soils warm up more rapidly and offer an advantage in earliness. A *sandy loam* soil is ideally suited to tomatoes. Avoid sandy soils and heavy clay or gumbo. Soil drainage is important. Tomatoes do not like wet feet! Provide for adequate surface drainage and avoid soils with poor internal drainage or claypans.

Use the Right Fertilizer

- Feed Your Soil** The tomato plant is a large consumer of nutrient elements found in the soil. Many Missouri soils are naturally low in one or more of the essential elements. Previous cropping may have depleted one or more of the soil elements to a low level. *A soil test is the only reliable method of determining what the nutrient levels in your soil actually are at the present time.* Your county extension agent will test your soil and make fertilizer recommendations to bring it to the desired nutrient levels as given in the chart on page 5.

Remember, it is very important that you start out with the proper nutrient levels! So see your county extension agent for information on taking a soil sample.

In applying fertilizers to “feed your soil”, it is desirable to distribute the fertilizer throughout the plow depth. This may mean broadcasting the fertilizer before plowing or broadcasting after plowing and disking deeply. Where *heavy* applications are used, broadcast half and plow deeply, broadcast remaining half and disc in deeply. If you need to make heavy applications of fertilizers to “feed your soil”, have your soil tested *each year* until you reach the nutrient levels shown in the table on page 6, for your soil. Once your soil has reached the desired nutrient level it should be re-tested every three or four years.

THREE GOOD LOCATIONS



Broad river valley—alluvial soil; facilities for irrigation.



Second bottom; alluvial soil—windbreak protection; good facilities for irrigation.



Sloping hillside—good air drainage; facilities for irrigation

DESIRABLE SOIL NUTRIENT LEVELS FOR TOMATOES

	Phosphorus (P ₂ O ₅)	Pounds per Acre by Missouri Test		Exchangeable Calcium
		Exchangeable Potash	Exchangeable Magnesium	
Light sandy or gravelly loam	280-300	325-400	200-225	2000-3000
Medium Silt Loam	300-350	425-550	275-400	3000-4500
Heavy loam & clays	375-425	500-650	475-650	5000-7500

Feed the Plant

When you have the soil fed, you need to feed the plant. Here is what the plant needs:

Starter Solution

Use *water soluble* fertilizers containing analyses 10-52-17, 12-24-12, 15-30-15, and 13-26-13. Dissolve in water at rate of 3 pounds per 50 gallons. Apply between $\frac{1}{2}$ and 1 pint of the diluted solution per plant. Liquid formulations containing trace elements, vitamins, etc., are not necessarily superior and are much more expensive.

Banded Fertilizer

Placement

Use 400 pounds per acre of 4-12-12 or 5-10-10 or equivalent. For *ridged rows*, apply in furrow about six inches deep when throwing up the ridge. For *level plantings* side band at time of first cultivation. Place fertilizer band six inches from stem and about four inches deep.

Nitrogen

Top Dressings

For maximum production tomatoes must have extra nitrogen during the fruiting period. Topdress your tomatoes using 30 to 35 pounds of nitrogen per acre. This would be equivalent to 100 pounds of ammonium nitrate per acre. Make *three* top dressing applications at three week intervals beginning when the first fruits are the size of a golf ball.

Apply in a ribbon just outside the foliage spread or through the irrigation water. Keep the dry fertilizer off the foliage!

Organic Matter

Organic matter feeds *both* the soil and the plant. It serves as a storehouse of nutrients and is vitally important in providing good soil tilth. *Some form of organic matter should be incorporated into the soil every year!*

Common forms of organic matter are animal manure and green manure. A crop of rye makes a good organic matter addition to your soil and generally does not interfere with your cropping systems. The rye is sown in early to late fall (Aug. to Oct.) and turned under in December or early the next spring. In any case, the rye should be turned under not later than the jointing stage. This allows for sufficient rye growth to provide organic matter, but avoids "choking" the soil with too much. You should have no difficulty in preparing the soil or planting.

At the jointing stage broadcast 30 to 35 pounds of nitrogen per acre before turning under the rye. This aids in decomposing the rye. Allow three weeks for the rye to break down before planting.



Side-banding fertilizer at time of first cultivation.

Rye makes a good green manure crop.





Lift tomato seedlings for transplanting to beds.



Transplant tomato plants to beds.

Shall I Grow Plants or Buy Them?

The best bet is to grow your own tomato plants. However, if you haven't had some experience in growing plants it might be advisable to purchase them from some *local* source.

Reasons for Growing Your Own

- Assurance of the varieties you want to plant.
- Can transplant when the weather is favorable.
- Greater possibility of growing disease-free, nematode-free plants.
- Plants will be in better condition for transplanting.
- Problems: Higher plant cost (usually well justified); lack of experience.

Reasons for Buying Plants

- Lack the time or experience necessary to grow them.
- Do not want to invest in necessary equipment.

Plant-growing beds.





Prepare tomato ground thoroughly before planting.



Ground should be ridged on level soils.

Where to Buy Plants

Make arrangements with a local commercial tomato grower or greenhouse operator to grow plants for you. Make arrangements early. Decide on varieties, who will purchase seed, number of plants needed, approximate ready rate, whether potted or bare root, and of course, cost.

Plants shipped in from southern areas are generally unsatisfactory for early market tomatoes because of poor condition on arrival, uncertain weather on arrival date, likelihood of disease and nematode problems, and poor choice of early market varieties.

Growers who desire to grow their plants can obtain valuable information by requesting a copy of Bulletin 617, "Vegetable Plants for Home and Commercial Growers," from their county extension office or by writing to the Mailing Room, College of Agriculture, University of Missouri, Columbia, Mo.

CONDITION SOIL BEFORE PLANTING

Every effort should be made to put the soil in good condition before setting out the plants. Plow the land several weeks in advance of transplanting to insure a firm, compact seedbed. The soil should be thoroughly disked and dragged so that clods are broken up and all weeds destroyed. Ridging may be advisable on level soils in lowland areas.

Use Care in Transplanting!

The tomato plant suffers a severe shock during the transplanting operation. All precautions should be taken to reduce this shock to a minimum. Here are some suggestions:

- Wet plant bed thoroughly the day previous to transplanting.
- Plant on cloudy, windless days or during late afternoon and early evening hours.
- *Lift* plants from bed with as much soil remaining on roots as possible.
- Plant as soon as possible after lifting and protect roots from direct sun and wind exposure prior to setting.
- Apply ½ to 1 pint of water to the root area when setting the plant. Use a starter fertilizer in the water. (See section on Fertilizers for amounts of starter to use.)
- Lay “leggy” plants in 4 to 6 inch furrow. Cover stem except for top 6 to 8 inches of the plant.
- Be sure to firm the soil around the roots to eliminate air pockets.

When to Transplant Tomatoes

The date when tomato plants can be set out in the field depends upon:

1. The likelihood of frost damage.
2. The prevailing minimum night temperatures.

For example: Tomatoes will not be injured unless frost occurs, but will make slow growth and set on few fruit unless the minimum night temperature remains *above* 50° F. The early harvest date for a particular variety is more dependent upon the temperatures which prevail during the months of May and June than upon the date of field setting.

The price differential in favor of early tomatoes is generally such that most tomato growers are willing to take *some* risk of injury or loss from frosts. Decide beforehand the risk you are willing to take and begin spring operations accordingly.

The likelihood of light freezes on various dates is given in the table on page 11. These are long-term averages; dates from year to year will vary a few days.



Transplanting tomatoes to the field.

DATES AFTER WHICH THERE IS THE GIVEN LIKELIHOOD OF A LIGHT FREEZE* OCCURRING

Station	Likelihoods				
	40%	30%	20%	10%	5%
	(4 yrs. in 10)	(3 yrs. in 10)	(2 yrs. in 10)	(1 yr. in 10)	(1 yr. in 20)
St. Joseph	Apr. 20	Apr. 23	Apr. 26	May 1	May 5
Kansas City	Apr. 15	Apr. 18	Apr. 22	Apr. 27	May 1
Columbia	Apr. 22	Apr. 25	Apr. 29	May 4	May 9
St. Louis	Apr. 11	Apr. 15	Apr. 19	Apr. 26	May 1
Rolla	Apr. 19	Apr. 22	Apr. 26	May 2	May 6
Lebanon	Apr. 26	Apr. 29	May 3	May 9	May 14
Mountain Grove	Apr. 21	Apr. 25	Apr. 29	May 4	May 8
Birch Tree	Apr. 17	Apr. 20	Apr. 24	Apr. 29	May 4
Springfield	Apr. 20	Apr. 23	Apr. 27	May 3	May 7
Neosho	Apr. 21	Apr. 24	Apr. 27	May 2	May 6
Nevada	--	--	Apr. 22	Apr. 27	May 1
Lamar	--	--	Apr. 22	Apr. 27	May 4
Koshkonong	--	--	Apr. 16	Apr. 22	Apr. 27

*Light Freeze: 28° to 32°F. Little or no damage to most plants. Heavy damage to tender plants, and to semi-hardy plants in low lands.

*Information adapted from Mo. Agr. Expt. Station Bulletin 649 .



Single stem system of pruning. Note the small “suckers” growing where the leaf attaches to the main stem. These suckers are removed.



Two-stem system of pruning. Note the sucker just below the first flower cluster has been allowed to grow and form the second stem.

Spacing Early Market Tomatoes

Tomato plants should be spaced 18 to 24 inches apart in the row. Where plants are trained to the two-stem system, allow the maximum distance. Single-stem plants do well on 18-inch spacings.

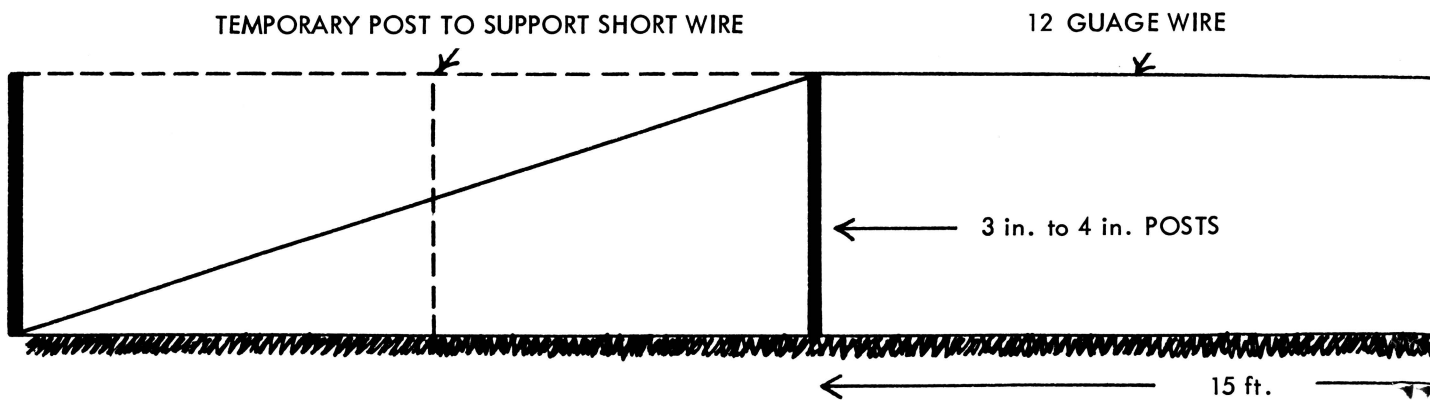
The distance between rows will depend upon the type of cultivating equipment you intend to use. The usual planting distance between rows is 4 to 6 feet. Roadways should be left between every 6 to 12 rows. This facilitates harvesting, spraying, and irrigation.

Pruning Methods

Tomatoes are usually pruned to a single stem or two stem system. In pruning to a single stem, remove all shoots or “suckers” when they are two to four inches long. A “sucker” is a shoot that grows where a leaf attaches to the main stem.

In pruning tomatoes to two stems, follow the single stem system, but allow the “sucker” just below the first flower cluster to grow and form the second stem. Then remove all “suckers” from both stems.

Usually tomato plants are pruned once every week or 10 days. Where there is no advantage to holding production late in the season, the top of the plant may be pinched out after 5 or 6 hands of fruit have set. Where good fertility, disease control and irrigation are followed, a good crop of tomatoes can be produced when vines are left to grow unpruned after the 5th or 6th hand has set tomatoes. This unpruned growth tends to shade the tomatoes.





Field of staked tomatoes.



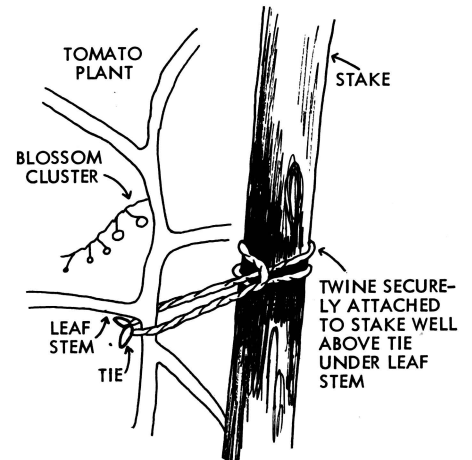
Field of trellis tomatoes.

Ways to Train Plants

Early market tomatoes are trained to one of two systems: the wood or steel stake, or the wire trellis. For staking, 1 x 1 or 1 x 2-inch wood stakes or $\frac{3}{8}$ steel stakes about 5 feet long are most commonly used. The stake is driven 6 to 10 inches into the ground, about 4 inches to the side of the plant in the row. Staking is done within two or three weeks after transplanting.

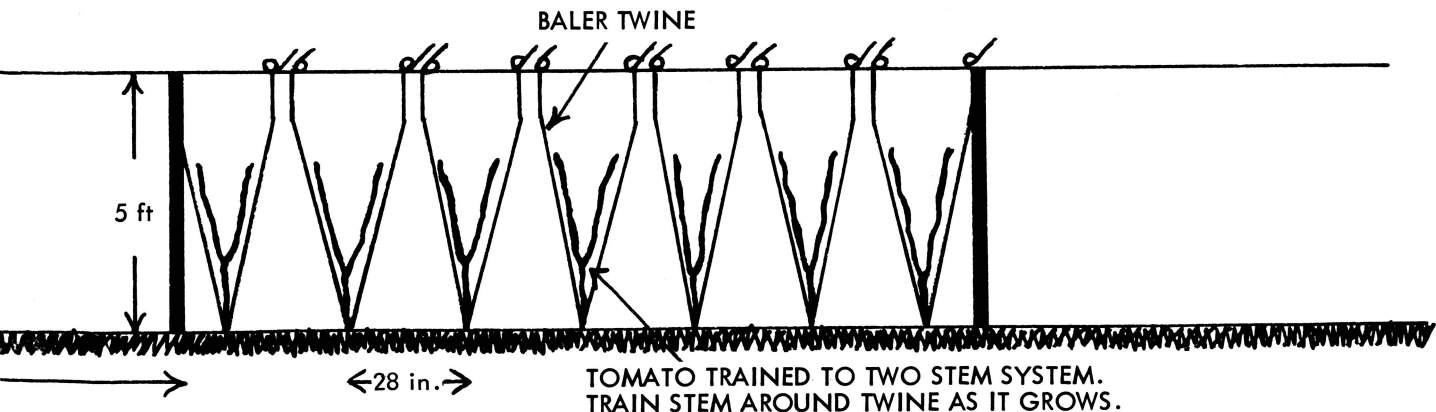
Tie vines to stakes, with Jute tomato twine (available at most large vegetable supply houses) or any soft cord or twine. The twine should be securely attached to the stake and tied under a leaf stem on the side of the plant opposite the stake. Be sure to arrange the stem of the tomato so the blossom clusters face away from the stake. Allow at least an inch of play between the stake and the vine to allow for stem growth.

Training to a wire trellis is a bit more complicated. See photo, upper right, and diagram below.

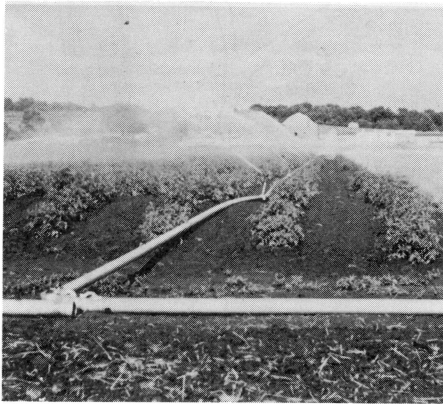
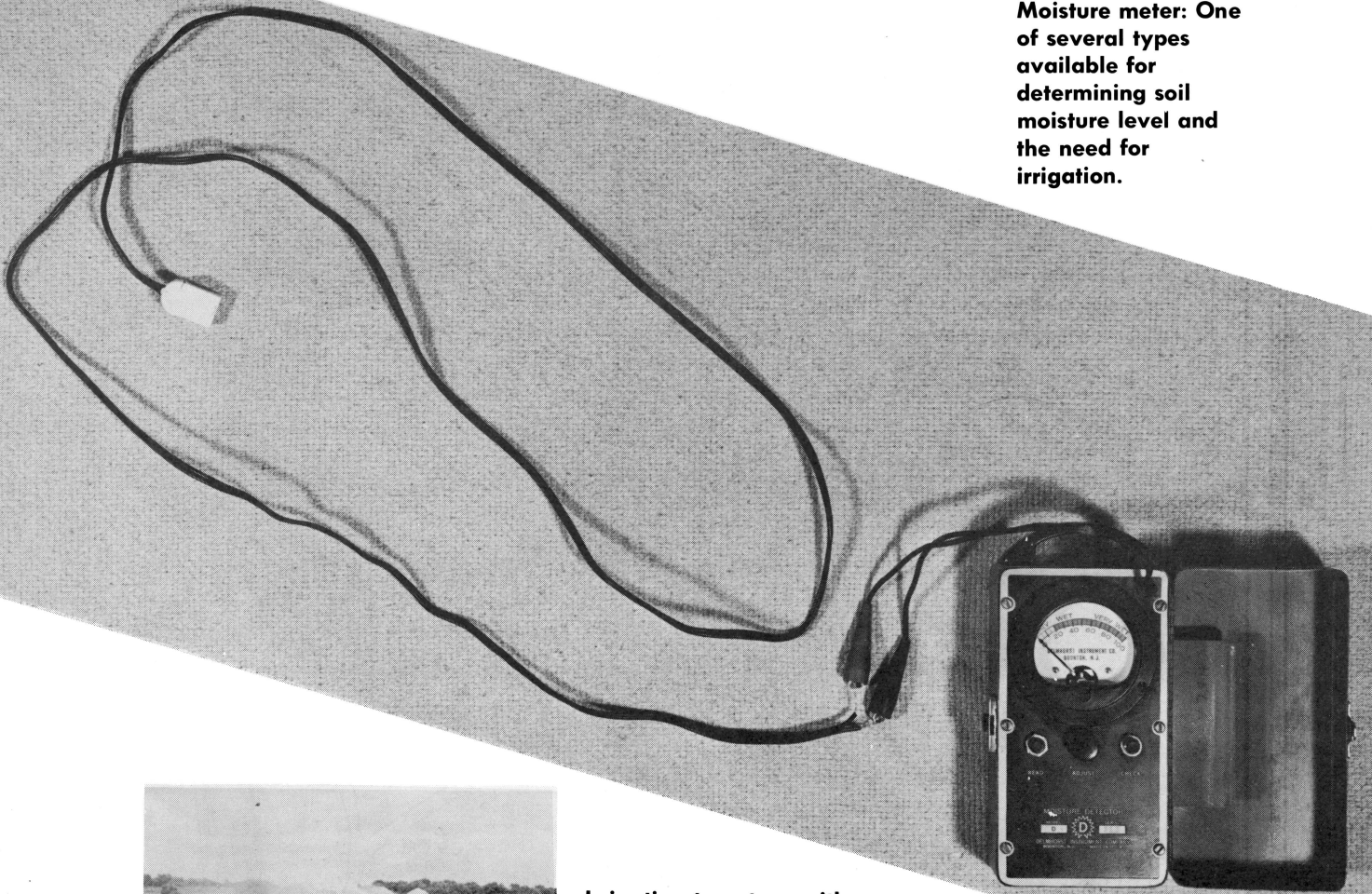


Cultivation

Cultivate deeply about two weeks after transplanting to loosen the soil and kill the first crop of germinating weeds. *Thereafter, cultivate shallow—no more than 1 to 2 inches deep!* Cultivate frequently enough to control weeds and loosen soil after heavy rains or irrigation. Stay out of the field when the foliage is wet.



Moisture meter: One of several types available for determining soil moisture level and the need for irrigation.



Irrigating tomatoes with portable aluminum pipe and overhead sprinklers.

Irrigation

The tomato plant should *never* be allowed to suffer from a shortage of water. Good yields and quality fruit come from steady, even growth of the plant.

To maintain a soil moisture level of not less than 40 percent, your soil will need to receive about 1 inch of water per week during May, 1½ per week during June, and 2 inches per week during July and August. Where rainfall does not meet these requirements *irrigate to make up the difference*.

A common mistake many growers make is waiting too long to irrigate. Begin irrigation as soon as it is needed.

Your irrigation schedule can be timed by using one of the electrical methods of measuring soil moisture. There are several types available (see photo).



Air blast sprayer gives excellent control of insects and disease.

Control of Insects and Diseases

Satisfactory control of all the common insects and diseases of the tomato can be obtained by using the proper insecticides and fungicides. The most common insects you will encounter are: cutworms, aphids, flea beetles, hornworm, fruitworm, stink bugs and spider mites. The most prevalent foliage diseases are: early blight and Septoria leaf spot.

Your insect control program should be enacted when a problem arises. Close daily inspection is necessary to determine the insect situation. Insecticide recommendations, including dosage rates, intervals between application and harvest, and tolerances, are subject to rapid change. Therefore it becomes necessary to issue annual current recommendations. Such information can be obtained in the current year's "Insect Control Recommendations for Missouri" (Commercial Vegetable Section), which is obtainable at your county Agricultural Extension office.

Your disease control program should begin early and continue at least until harvest. Follow a 10 day spray schedule using Zineb or Maneb fungicides, beginning shortly after transplanting to the field. For more specific information on disease control consult Extension Circular 661, "Tomato Disease Control." You can obtain a copy from your county Agricultural Extension office.

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