



# Cooperative Extension Service

NORTH DAKOTA STATE UNIVERSITY - FARGO, NORTH DAKOTA 58102  
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HORTICULTURE



## Improved methods for Growing Tomatoes and Muskmelons in North Dakota

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Fresh tomatoes are one of the most desired garden vegetables for home and market. They are grown each year with varying success in North Dakota. Successful muskmelon production, on the other hand, has been generally limited to years when the growing seasons have been lengthy and warm. Cool seasons often result in melons with disagreeable flavors.

Experiments using clear or translucent polyethylene mulch or protective row covers with transplants indicate that warm season vegetables can be grown with reasonable reliability on an annual basis. Records show excellent yields, improved quality, and increased earliness with both tomatoes and melons where plastic mulches were used.

Light radiating through the mulch warms the soil early in the season. In addition, plastic retards cooling by the wind so that the soil retains warmth throughout the night.

### For Tomatoes:

(1) Choose an early (65-73 day), determinate variety such as Sheyenne or Cavalier. Earlier varieties are available but yield less. Later varieties do not generally produce well in our short growing seasons.

Determinate tomato plants grow bush-like, do not require staking or tying, and mature most of their fruit during a period of five to six weeks. In-

determinate tomato varieties may produce a few fruits very early. However, later production is usually scattered over a period too long for our short growing season. Most hybrid tomato varieties are indeterminate in growth habit.

(2) Transplant early (between May 15, and May 25). Most tomato plants are now set out about June 1, at which time soil and night air temperatures are barely high enough for growth. Earlier transplanting can mean earlier maturity with time to ripen a complete crop before chilling temperatures occur in the fall.

(3) Protect the plants from frost with covers, either vented plastic row covers as described below or boxes, cans, baskets, etc. You must remove containers in the daytime if the plants are to receive light and ventilation.

(4) Mulch the soil under the plants with clear plastic film. Such a mulch prevents rapid drying of the soil and inhibits most weed growth. It keeps the plant roots from suddenly becoming too wet, thereby deterring blossom-end rot and fruit cracking. Soil splashing is reduced and the fruits are kept from contacting the ground.

### For Muskmelons:

(1) Choose an early, high quality, disease-resistant variety, such as Gold Star Hybrid (85 days). Characteristically, muskmelons require hot, dry weather during their ripening period. With cool or wet weather muskmelons tend to develop off-flavors and

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will generally lack sweetness. Gold Star Hybrid variety has been suggested because it has consistently yielded sweet, fine-flavored melons even under adverse conditions. Such a varietal trait is especially needed for North Dakota's climatic conditions.

(2) Use transplants. Even early varieties of melons often mature too late in our short season when seeded directly in the garden or field. Therefore, transplants are desirable. The proper use of transplants results in about 10 days earliness with yield increases up to 100 percent.

Since muskmelon transplants are seldom available for sale, the gardener should know how to grow his own. Start by sowing seeds individually in "Polyskin" peat pots or peat pots fitted into similar sized plastic pots. Grow them in a sunny window or greenhouse at high temperature, 75° to 85° F., for no more than 20 days before setting in the field. For example, plants started from seed on May 5, transplant (peat pot included) to the garden on or before the 25th of May. Or May 10 seeding, transplant on or before Memorial Day. Older seedlings are not as desirable as younger plants. Pinch back plants more than 20 days old to two true leaves when planted so that the wind will not whip them before they become established.

Melons do not readily replace damaged roots, so exercise the utmost care to prevent breaking roots when transplanting.

It is necessary to remove the outer plastic film from "Polyskin" pots before planting. However, plant the peat-pot directly in the soil with the contained melon plant. Plants are removed from plastic pots by inverting the pot and tapping its edge against a solid object while holding the soil ball in the pot with two fingers. Be sure to lower your plants in the soil when planting so that the edges of the peat-pots are well covered with soil. Firm soil well around the plant and water after planting.

(3) Mulch melons with clear plastic film to gain time and increase yields. The use of clear mulch results in about seven days earliness with yield increases of about 50 percent for late plantings to 200 percent for early plantings.

#### For Other Vegetables:

Peppers, eggplant, watermelon, squash, cucumbers and sweet corn may be grown on plastic mulch with good effect. Whether there is sufficient earliness or yield increases to compensate for the extra costs of plastic application has not yet been determined for these crops in North Dakota.

#### Application of Plastic Mulch and Setting Out the Plants

Mulch should be clear or "natural" polyethylene sheet, 48 to 50 inches wide of a thickness of 2 or 4 mils (1 mil = 1/1,000 inch). Plastic is usually available from hardware stores or lumberyards. The plastic film is easily cut to the desired width with an ordinary scissors.

In a small garden, the plastic may be applied manually, but machines for this purpose are available and would be advantageous when planting an area as large as 1/10 acre. Plastic that is laid by machine must be purchased as "un-folded" (factory cut to 48 to 50" width) or flat rolls. Un-folded rolls are also desirable for manual application though not imperative.

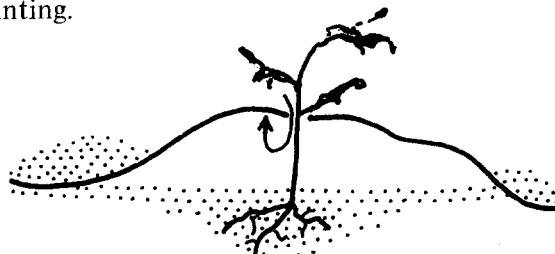
Generally, plastic mulch is laid before the plants are set in the field or garden. Shallow furrows are dug on each side of the row to secure the edges of the plastic film. Back fill the furrows with soil to cover the edges. By using 48-inch wide plastic, 36 inches of clear plastic remain exposed to light.

#### Spacing

Space tomato rows 5 to 6 feet apart, melons 10 to 12 feet. Determinate tomatoes, such as Sheyenne, are planted 2½ to 3 feet apart within the row; muskmelon plants are spaced 18 to 24 inches.

#### Planting

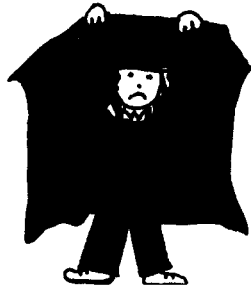
Set transplants through slits or V-shaped cuts made through the plastic mulch. Since these openings in the film must later be sealed, they should not be made larger than necessary for transplanting operation. Use hand trowel for making the openings in the plastic as well as for digging the holes in the soil. Water the plants immediately after transplanting.



Open holes let wind balloon the plastic.



Put soil about the stem to seal the hole.



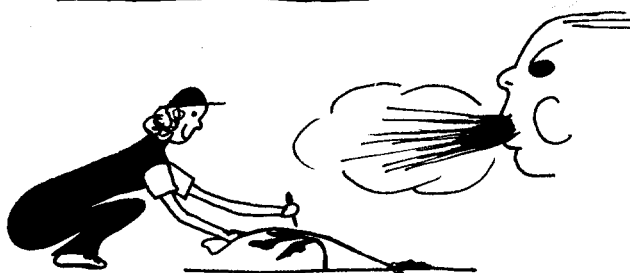
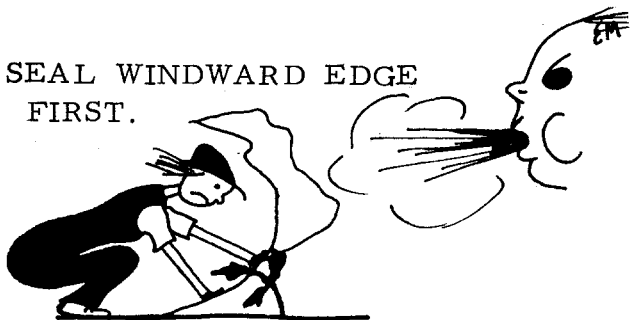
USE CLEAR PLASTIC, NOT BLACK.

### Wind Action

Prevent wind from lifting the film. Use a spadeful of soil around each plant stem to seal the cut edges of the plastic. Wind must not be allowed in under the film. Wind may damage small plants; it may also dry and cool the soil. Most weeds do not thrive under plastic. Those that start cause little harm unless they succeed in lifting the mulch, which can result in wind damage to the plastic film.

In case you transplant before the plastic is laid, proceed with digging grooves as before. Then lay one edge of the plastic in the windward groove and seal with soil. Pull the sheet gently over the tops of the plants and hold it there while making slits for the stems. Carefully thread the stems through the slits. Lay the leeward edge (away from wind) of the plastic in the opposite groove and cover it with soil. Be certain to place soil about the stem and over any accidental punctures to prevent the wind from blowing beneath the mulch.

SEAL WINDWARD EDGE FIRST.



You must control weeds in the walkway space between the plastic mulch rows. Cultivation loosens the soil, thereby allowing rapid penetration of rainfall. You may need to irrigate during prolonged dry

spells. Water cultivated areas between rows. Plant roots will draw moisture from this area. No more than three irrigations per season have been required at Fargo when plastic mulch was used.

Occasionally weeds will grow up through the hole beside a crop plant. These weeds are especially detrimental. Carefully remove them as soon as observed to prevent damage to the crops' root systems.

### Management of Row Covers for Tomatoes

Row covers are long narrow plastic tents covering entire rows of plants. The daylight warms the air under clear or translucent row covers (even on cool overcast days). At night, heat from the soil and radiation from plants is trapped by water which condenses on the inner surface of the plastic and is reflected or carried back to the plants. In this way the covered plants obtain more heat and are protected from cold and freezing. Frost protection of 5 or 6° F. is possible.

Row covers are placed or constructed over tomatoes at planting time, May 15 to May 25. Close covers at night and open them as soon as day air temperatures reach 55° F. or sunlight begins to heat the interior. On warm days or at times when the sun shines, ventilate row covers to supply carbon dioxide to the plants and to prevent overheating. Close supervision is especially important starting about June 10, to prevent foliage burning. Remove the covers permanently sometime between June 15 and June 25.

### Pollination of Tomatoes for Fruit Set

Tomatoes do not need cross pollination; however, the flowers need to be subjected to vibration by wind or mechanical means for pollination to occur. Pollination is poor to nil under row covers. The basic purpose of row covers is to obtain early fruit set. Thus, you must remove them soon enough to allow pollination to occur. Proper timing will depend on date of planting, bloom cover and seasonal temperatures.

### Construction of Row Covers

A sturdy row cover depicted in Figure 1 is a rigid frame made of lumber with plywood ends which can be opened as ventilators. These have the advantage of being quickly and easily ventilated and even removed if necessary. They also hold their position well in high winds without being staked down. There is a limit to the length of such structures because the plants at the leeward end become warmer than those at the windward end during ventilation. These covers are also rather costly and difficult to store when not in use.

The second type of row cover sketched in Figure 2 is used commercially. It can be any length, is relatively inexpensive to construct and ventilation does not pose the problem of a rising temperature gradient down the row. It will not survive strong winds as well as the first type and requires more supervision.

#### Clean-up

Clean up plastic mulch as soon as possible after

harvest in the fall. Do not plow it under. Plastic that remains buried in the soil does not deteriorate and may impede cultivation for years to come. Burn the polyethylene to get rid of it. You'll need a very hot fire. Do not attempt to burn it without additional fuel to start and maintain a high temperature. No other method of disposal is satisfactory. Where burning is not approved, haul refuse plastic to the nearest sanitary land fill.

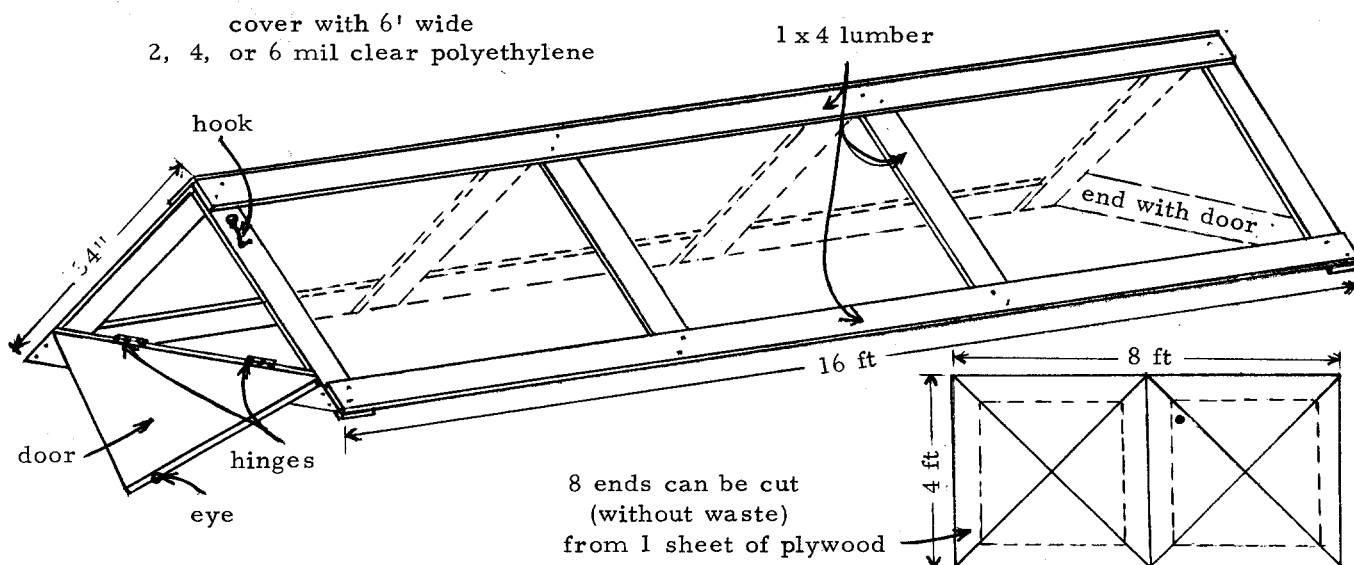


Figure 1. END-VENTED ROW COVER FOR EARLY TOMATOES IN NORTH DAKOTA

Cover each side with 2 or 4 mil clear polyethylene, 3 to 4 ft wide. Clothespin the top edges to wire. Seal lower edges with soil. Tie end to stake.

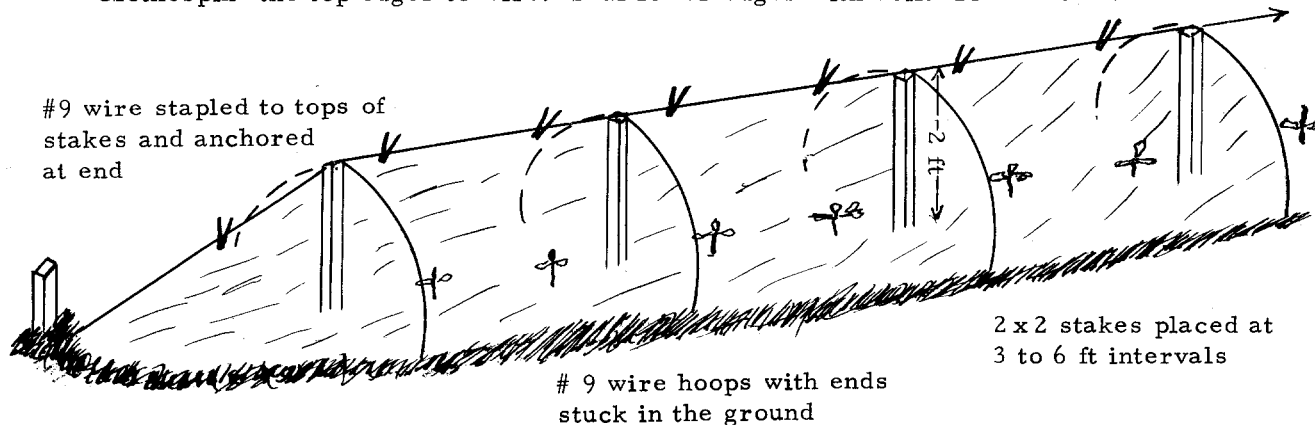


Figure 2. TOP-VENTED ROW COVER FOR WINTER TOMATOES IN CALIFORNIA