

PROTECTING TOMATOES FROM FROST

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Winter is here and most farmers would not dare plant tomatoes because of fear of frost. However, there are some simple effective ways of protecting your tomato plants from frost.

Bottles filled with water can be used to protect tomato plants even in the cold winter weather. It is one method which is inexpensive and effective.

Fill 750ml one (1) litre or two (2) litre bottles with water up to $\frac{3}{4}$ full. Place the bottles upright on the ground every third plant along the row when the plants are still young. Always make sure the bottle neck is 10 cm above the plant top. Raise the bottle as the plant grows to always keep the bottle 10 cm above the plant top by either putting a brick under bottle or by tying the bottles on trellising sticks.

When the temperature drops below freezing, the water in the bottle freezes but the plants stay frost free. Water in the plants has a lot of dissolved minerals in it and will therefore freeze at lower temperatures than water in the bottle which though not pure has less dissolved minerals. When water in the bottles freezes it releases a lot of heat which keeps the air around the tomato plants warmer than the general surrounding area.

Other ways to protect against frost are:-

- High areas away from valleys and slopes that face the sun are better than slopes facing away from the sun.
- Soil type influences frost incidence, eg. growers within the same general climatic and topographical conditions often experience differences in frost damage that seem unexplainable. Possible explanations include differences in soil type, ground cover, soil water content and ice-nucleating bacteria concentrations. Soil type is clearly one aspect of site selection to consider. For example, recently drained swamps are highly prone to sub-zero temperatures. Dry highly organic soils near the surface reduce thermal conductivity and heat capacity, which was purported to cause the colder minimum temperatures. In another example, minimum temperature increases of 1 °C to 3 °C are experienced when mineral soil is mixed with organic soil. Clearly, the soil type affects frost incidences.
- Sprinkler irrigation can be used to control and protect against frost by irrigating lightly very early in the morning to increase humidity in and around the crop field.
- Cover plants with plastic or grass during the night and remove to allow sun heat during the day.
- Keep the ground free from weeds and mulch to allow absorption of heat during the day and release of heat during the night.
- Erecting a 1.5 - 2.0m high grass or plastic fence around or on the upslope and sides of the crop, leaving the downside open, is very effective in preventing frost.
- A diversion dam can be made by mounding up soil or even simply stacking hay bales.

- Burn crop residue, old tyres or oil very early in the morning around the field as smoke will trap warm air inside it thus keeping cooler air away from the crop. However, this method has to be used with care as this can lead to uncontrolled fires

Points to note

- a) Due to cold air drainage to low spots, night-time minimum temperatures tend to follow topographical contours.
- b) Large water bodies upwind tend to diminish frequency of frost events.
- c) Rocky masses (cliffs) and canopy covers (i.e. taller nearby plants) can increase downward night-time radiation and increase minimum temperatures. However, in some locations, they can block cold air drainage and favour cold air ponding. Every location is unique and the advantages and disadvantages of proximity to rocky masses and canopy covers must be considered separately at each location.
- d) Soil type affects energy storage and release and hence night-time temperature.
- e) Local topography and landscape obstacles affect cold air drainage.
- f) Obstacles should be removed that inhibit down-slope drainage of cold air from a crop.
- g) Land levelling can improve cold air drainage and eliminate low spots that accumulate cold air.
- h) Row lines should be oriented to favour natural cold air drainage. However, the advantages from orienting crop rows to enhance cold air drainage must be evaluated against the disadvantages due to more erosion and other inconveniences.
- i) Minimize upslope areas where cold air can accumulate and drain into a crop. For example, grass and plant stubble in areas upslope from a crop can make air colder and enhance cold air drainage into a crop.

For all questions and comments: email gilbertmhazo@gmail.com. Responses will be provided within the shortest possible time.

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