

## Combating Summer Heat in Greenhouse

The severe heat of summer has a tremendous long lasting impact on plant growth, especially in greenhouses, if not managed technically. To counter the detrimental effects of the severe heat, it is imperative to maintain a proper balance, of the Greenhouse operational activities and crop management practices. The crucial crop growth and development parameters include; aeration, humidity, soil moisture and light intensity. The optimization of these factors based on crop needs, with the changing climatic conditions; holds the key to successful production.

### Greenhouse Operations:

**Top shade-net:** Recommended to keep the top shade net closed during noon hours / peak high temperature hours (between 11 am to 4 pm). However, if the sky is overcast with clouds, the shade net should be kept open.

**Side curtains:** Recommended to keep the side curtains open all through the day (7 am to 6 pm), to facilitate ample air circulation. Ideally; it is kept closed during nights to trap the CO<sub>2</sub>, however during warm nights; it is advisable to keep it open. In exceedingly hot areas; air propellers/ exhaust fans can be installed inside the greenhouse for air circulation.

**Application of distemper:** To reduce light intensity and temperature; white distemper can be applied on top, side plastic as well as on bottom apron. The distemper should not be oil based. Do not use any dark colored material like red soil for reducing light intensity.

**Installation of Misters on the side curtains:** 180° Jet Misters can be installed on the side nets from all sides and operated at every half hourly interval for 5 - 10 minutes. This will help in bringing down the greenhouse temperature.

**Installation of overhead sprinklers:** In areas with extremely hot and dry climate; installation of overhead sprinklers can be carried out.

### Crop Management:

**Water application:** Water plays the crucial role during summer to regulate temperature, humidity and moisture level in the beds. Hence, supplying water to plants, during morning or evening hours through drip or showering is mandatory, as per need. The sides of the bed should not be left dry.

Pathway flooding and flooding of the area on inner side of bottom apron, is also adopted, which aids in increasing the humidity. This operation is carried out, only when it is coupled with ample ventilation; if not, the high humidity can cause adverse effects.

Excessive pathway flooding in areas with heavy soil is not recommended, as this will lead to trapping moisture inside the beds and eventually leading to root rot.

Operation of foggers is also recommended at an interval of 30-60 minutes during afternoon hours, especially between 12 pm to 3 pm. The time and duration of fogger operation will vary from region to region.

**Time of fertigation, watering and spray operations:** In summer, all these operations should be carried out early in the morning, when climate is mild and plants are in active stage. Carrying out these operations during afternoon or evening hours should be strictly avoided.

**EC and pH:** During summer, regular monitoring of EC and pH of water and soil is a must. Water and soil EC tends to increase due to high rate of evaporation. However, a drop in the soil EC due to frequent water application may occur. Hence, it is absolutely necessary, to monitor the EC of the beds at frequent intervals.

**Plant Cultural Operations:** To develop microclimate in the plant canopy, it is advisable to remove old, dead, decayed and extra leaves, which in turn, facilitates proper aeration.

**Plant protection:** The summer heat creates an ideal environment inside the greenhouse for the rapid multiplication of a variety of pests. And hence, regular scouting and preventive control measures need to be followed to keep the crop free of pests and diseases.

### **Tips and Guidelines for Prolonged water storage**

Owing to the deficit in rainfall, water scarcity is bound to hit hard in many parts of the country at an alarming rate. Apart for the direct impact posed due to water scarcity, there are a few indirect threats as well, which are mentioned hereunder:

1. In many cases, the water obtained for irrigation purposes would be a mixture of various sources; *viz.* rivers, ponds or other water bodies, tube wells, canals etc. This mixed sample of water has every likelihood of having pathological, nematode and other disease causing organisms coupled with undesirable pH and EC. Hence, before using for irrigation purpose ensure that the pH and EC is tested and brought to acceptable limits. The pH can be adjusted by using acid or alkali. In cases with high EC, detailed analysis needs to be carried out and based on the result, the fertigation can be adjusted to some extent, thereby reducing the ill effects of high EC.
2. The availability of fresh water on daily basis is a rare possibility, hence prolonged storage for upto two weeks or more may be the only option. Under such circumstances, the storage tank should be covered. Before using the water for fertigation, treat the water with bactericide or any other sterilant. This treatment will take care of biotic threats, if any in the water. The Hydrogen peroxide + Silver sterilant can be used at the rate of 0.2 - 0.5 ml / lit. of water.
3. The water should not be left to remain stagnant. A means of letting the water move within the storage tank needs to be worked out.

The above three guidelines will only help in reducing the ill - effects and not eliminate the issues associated with water scarcity and prolonged storage.

