Table 2. The effect of growing media on marketable yields and fruit weights of greenhouse grown 'Tuckqueen' tomatoes for a 12-week picking period (Experiment 2).

<table>
<thead>
<tr>
<th>Growing medium</th>
<th>Marketable yield per plant (kg)</th>
<th>Avg wt per marketable fruit (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 fine sand:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 sandwast</td>
<td>4.2 ± 7</td>
<td>102 a</td>
</tr>
<tr>
<td>3 fine sand: 1 peat</td>
<td>4.0 ± 6</td>
<td>99 ab</td>
</tr>
<tr>
<td>Fine sand</td>
<td>3.5 ± 9</td>
<td>102 a</td>
</tr>
<tr>
<td>Loam</td>
<td>3.3 ± 5</td>
<td>91 bc</td>
</tr>
<tr>
<td>Clay loam “problem soil” in 5:3:2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JIP mix</td>
<td>3.0 ± 3</td>
<td>91 bc</td>
</tr>
<tr>
<td>Sawdust</td>
<td>3.0 ± 3</td>
<td>85 cd</td>
</tr>
<tr>
<td>5 clay loam</td>
<td>3.0 ± 3</td>
<td>80 d</td>
</tr>
<tr>
<td>“problem soil” 2</td>
<td>3.0 ± 3</td>
<td>80 d</td>
</tr>
<tr>
<td>Clay loam “problem soil”</td>
<td>2.7 ± 3</td>
<td>80 d</td>
</tr>
</tbody>
</table>

2Within columns, values that do not have letters in common are significantly different at 5% level.

In Experiment 2 the wt per fruit from the plants grown in soil-based media declined after the first 6 weeks, while the wt per fruit from plants grown in soilless media increased for the first 9 weeks (Fig. 1). Except for the first 3-week period, fruits were larger throughout the picking season from the plants in soilless media. The low fruit wt on sawdust-grown plants, particularly during the first 3 weeks, reflects the initial problem of plant establishment in this medium.

Experiments 3 and 4. Yields of 7 tomato cultivars were compared in a 3 sand:1 sawdust mixture and in sawdust alone in 23 cm-deep curved beds. No soil comparisons were included. Across cultivars, yields were 4.11 kg per plant in sawdust and 4.15 kg in the sand-sawdust mixture. Difficulty in establishing plants in fresh sawdust was overcome by wetting the sawdust with nutrient solution before transplanting, more frequent solution application after transplanting, and an improved solution distribution system. Selection of finer grade sawdust or sawdust with a large proportion of fine shavings might have increased lateral movement of moisture and facilitated plant establishment.

Conclusions. The higher yields obtained in Experiment 1 compared to subsequent experiments are attributed to later transplanting and to high N levels after transplanting. Excessive vegetative growth and abortion in the first two weeks was followed by vigorous growth and heavy fruit set. Harvesting was delayed and this crop was produced during longer day length and more sunshine. However, early spring maturation is essential for highest prices and to obtain some these reduction in total yield must be accepted.

While additions of peat moss, sand and straw to poorly aggregated greenhouse soils did little to increase tomato yields, investigations showed the use of soilless growing media such as sawdust or a sand-sawdust mixture to be a practical alternative. By this method it has been possible to raise commercial yield levels from approx. 8.5 kg/sq m of greenhouse space to 13.5 kg/sq m or more for the sprout crop which is normally harvested from late April to mid-July and then removed for a fall crop.

The bottom of the beds are sloped slightly to one side and lined with a plastic sheet to permit free drainage and prevent waterlogging or excessive accumulation of salts. A daily or twice daily application of dilute nutrient solution supply both the water and nutrient requirements. While in the experimental plots feeding was by hand or through a hose proportioner and distribution lines, most growers now use large mixing tanks and pump the nutrient solution through a system of plastic header pipes, with a small bore plastic tube leading to each plant. Although establishment requires more care, growers have expressed preference for sawdust over other soilless media because it is cheaper and easier to handle, and more easily steam sterilized for re-use.

Literature Cited

Ethyl Hydrogen 1-Propylphosphate as a Ripening Inductant of Green Tomato Fruit

A. A. Boe
University of Idaho, Moscow

Ethylene has long been used as an agent in the ripening of green fruits. Ethephon releases ethylene when subjected to pH levels of plant tissue (1). EHPP has a chemical structure similar to ethephon.

Ethephon induces ripening of tomato fruit when applied as a preharvest spray (2) or as a postharvest treatment (3). In the studies reported here EHPP was compared with ethylene and ethephon to determine its activity as a ripening inductant for tomato fruit.

Tomatoes (Lycopersicon esculentum Mill cv. Valiant) were planted in the field on June 1, 1970 and grown under irrigated culture. On August 27 3 treatments were applied by spraying, to plots of 10 plants with 4 replications: 500 ppm EHPP, 500 ppm ethephon, 0.5 ppm ethylene.
and water. On September 8, green fruit were harvested from each replication for observations on ripening and respiration rates.

Green fruit were harvested on August 27 from an untreated plot for laboratory treatment with EHP, ethephon and ethylene for observation of ripening rate and respiration. Treatments were made by placing the fruit in solutions of EHP and ethephon for 30 min. Ethylene was applied at a rate of approx 100 ppm in the air stream of the respirometer. Control fruit and fruit for the ethylene treatment were placed in water for a time equal to that of the chemical treatments.

Respiration rates were determined by use of the colorimetric method of Claypool and Keefer (4). Ripeness level was determined visually as described previously (5).

EHP increased the respiration rate of ripening tomato fruit when applied after harvest at 500 and 1000 ppm (Fig. 1). Respiration did not increase as rapidly in the EHP as in the ethylene treatment, but the curves followed a similar pattern indicating an advancement in the climacteric of the fruit.

**Table 1.** Ripeness level of tomato fruit (cv. Valiant) treated with EHP, ethephon, and ethylene after 14 days of ripening.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Postharvest</th>
<th>Field application</th>
<th>Ripeness level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>3.5</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>EHP (250 ppm)</td>
<td>3.4</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>EHP (500 ppm)</td>
<td>4.0*</td>
<td>4.3*</td>
<td></td>
</tr>
<tr>
<td>EHP (1000 ppm)</td>
<td>5.0*</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Ethephon (250 ppm)</td>
<td>3.5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Ethephon (500 ppm)</td>
<td>4.8</td>
<td>4.5*</td>
<td></td>
</tr>
<tr>
<td>Ethephon (1000 ppm)</td>
<td>4.0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Ethylene (100 ppm)</td>
<td>4.7*</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

1Green *=1, Breaker=2, Pink=3, Red=4, and red ripe=5.
2Significantly different from the control at the 5% level.

**Fig. 1.** Respiration rates of ripening tomato fruit (cv. Valiant) treated after harvest with 0, 250, 500, and 1000 ppm EHP and 100 ppm ethylene.

**Fig. 2.** Respiration rates of ripening tomato fruit (cv. Valiant) treated after harvest with 0, 250, 500 and 1000 ppm ethephon and 100 ppm ethylene.

**Fig. 3.** Respiration rates of detached tomato fruit (cv. Valiant) treated before harvest with 500 ppm EHP and 500 ppm ethephon.

Ethephon did not increase respiration as early as ethylene. Fruit treated with 1,000 ppm ethylene did not respire more than the control, whereas lower conc appeared to increase respiration rates (Fig. 2).

Fruits treated with EHP and ethephon at 500 and 1000 ppm were ripen after 14 days of ripening than were the controls. The most effective conc of EHP was 1000 ppm whereas ethephon at 500 ppm increased the ripeness level the most. Fruit treated with 1000 ppm ethylene did not ripen as rapidly as those treated with 500 ppm of this compound (Table 1).

Preharvest treatments with EHP and ethephon advanced the respiratory climacteric of the ripening tomato fruit but did not increase overall respiration rates. These rates were higher for treated fruit early in the ripening period but did not reach as high a level as did the controls (Fig. 3). Both EHP and ethephon increased the ripeness level of the fruit after 14 days of ripening.

**Literature Cited**


---

**Influence of Physical Conditions on Summer Temperatures in Nursery Containers**

**Thomas A. Fretz**

*University of Georgia, Georgia Station, Experiment*

**Abstract.** Media temperatures surpassed 120°F in 1 gal nursery containers of both steel and high density polyethylene without plants when exposed to direct solar radiation. While, silver, and yellow exterior colors

High soil temperatures may be an impediment to container production of nursery plants (3, 4). Root growth at soil temperatures above 85°F may be retarded, while total cessation in many species occurs above 100°F. Optimum root growth generally occurs at soil temperatures between 78-85°F (1). Soil temperatures in excess of 120°F have been observed in metal containers fully exposed to solar radiation (2, 3).

Preliminary studies were conducted to investigate media temperatures in 1 gal nursery containers without plants in order to find physical methods to reduce high media temperatures previously reported (2, 3). The effect of type and color of nursery container, soil medium, and surface barriers on media temperatures was studied during June, July, and August of 1970.

---

1Received for publication February 9, 1971.

University of Georgia, College of Agricultural Experiment Stations. Journal Series Paper No. 929.

2Assistant Horticulturist. Trade names are used in this publication for the purpose of providing specific information. Mention of trade names does not constitute a guarantee or endorsement of the product by the Experiment Station or the State of Georgia.