Using Greenhouse Plant Beds for Demonstrating Plastic Mulch, Trickle Irrigation, and Row Covers

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Demonstrations and evaluations of plastic mulch, trickle irrigation, and row cover effects on vegetable crops are primarily conducted in the field (1, 2). However, field evaluations of these procedures during the summer months are often not available for observation by grower groups that traditionally meet during the winter and spring months, or by students in plant production courses taught during the spring or fall semester. This report describes a plant bed system in a greenhouse that could be used for demonstrating plastic mulch, trickle irrigation, and row cover effects on selected vegetable crops regardless of season.

Several plant beds (3.4 m long, 1.0 m wide, and 0.25 m deep) were built and placed in a glass greenhouse at the Pee Dee Research and Education Center in Florence, S.C. Pine boards (50 mm × 155 mm; thickness × width) were used for the sides and plywood (25 mm thickness) for the bottom.

Screws and brackets were used to secure the joints and a wood preservative was applied to all wood surfaces at completion. Small holes (19 mm diameter) were drilled 0.3 m apart into the bottom for drainage. The costs for materials per plant bed was <$70.

The plant beds were filled with a sterilized local field soil (Norfolk loamy sand) that was limed and fertilized according to soil test recommendations. Trickle irrigation tubing was placed on the surface of the soil (one tape per bed) and connected to a tap water source. The soil surface was covered with black polyethylene.

To evaluate the usefulness of the proposed system with watermelon [Citrus lanatus (Thunb.) Matsum. and Nakai cv. Oasis], row covers were established in plant beds in the greenhouse and in the field on 26 Mar. 1987. Plastic mulch and trickle irrigation were used in all treatments. Row covers evaluated included clear polyethylene that was supported with wire hoops, a nonsupported spunbonded polyester fabric (Reemay; duPont de Nemours, Wilmington, Del.), and a nonsupported extruded polypropylene fabric (Agronet; CDK International, Marietta, Ga.). Plots without row covers served as controls. Treatments were arranged in a randomized block with three replications. Temperatures in the greenhouse were not allowed to drop below 20°C or to exceed 35°C. Row covers were removed on 12 May 1987 and runner lengths, a measure of plant vigor, were determined on plants from the greenhouse and field plant beds.

Watermelon plants in the greenhouse beds produced longer runners than those grown in the field (Table 1). Reduced growth in the field likely is attributable to lower day and night temperatures (data not presented) and plant injury from a freeze (-2°C) on 1 Apr. While identical results would not be expected from the greenhouse and the field due to the differences in temperatures, similar trends existed among the treatments in both environments. Plants grown under clear polyethylene had the longest runners and plants without row covers the shortest.

The results permit the conclusion that greenhouse plant beds can be successfully included in a research program and for field day demonstrations to illustrate the principles of plastic mulch, trickle irrigation, and row cover production practices. The system described was relatively inexpensive to build and permits demonstrations to be conducted at any time of the year. In addition, greenhouse evaluations provided security for monitoring equipment. While similar growth trends were observed among the treatments in both greenhouse plant beds and the field, evaluations in plant beds should be considered as a supplement to field trials, not as replacements for them. I successfully have grown watermelons, tomatoes, and peppers under the system described.

<table>
<thead>
<tr>
<th>Row cover treatment</th>
<th>Greenhouse</th>
<th>Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear polyethylene</td>
<td>1.9 a</td>
<td>0.74 a</td>
</tr>
<tr>
<td>Spunbonded polyester</td>
<td>1.4 b</td>
<td>0.31 b</td>
</tr>
<tr>
<td>Extruded polypropylene</td>
<td>1.3 b</td>
<td>0.29 b</td>
</tr>
<tr>
<td>No row cover</td>
<td>0.8 c</td>
<td>0.13 c</td>
</tr>
</tbody>
</table>

Runner lengths were measured on 12 May 1987, 41 days after initiation of row cover treatments.

Mean separation within columns by LSD, 5% level.

Literature Cited