Cropping Systems for Greenhouse Tomatoes

Richard J. McAvoy
Extension Specialist
Greenhouse Crops

Greenhouse tomatoes can be produced in ground beds or aboveground using any of a number of inert or non-inert growing media. In Connecticut, tomatoes are produced in ground beds as well as in peat-lite bags (noninert medium) and in rockwool slabs (an inert medium). In the following review, several production systems, some of the requirements of these systems and some of the benefits and liabilities of each system will be discussed.

Tomatoes in Soil Beds

Tomato seedlings are transplanted directly in the soil floor. Parallel trenches four inches deep and six inches wide are prepared in the soil prior to transplant. When repeated crops are produced in the same house, the beds are tilled and the pH and nutrients (primarily phosphorus and micronutrients) are adjusted between crops. Sometimes peat or compost is added to improve organic matter content. Soils should be fumigated between crops using a chemical agent (see article on soil fumigation). Plastic can be used to cover the entire floor of the greenhouse. A white on black material can be used to suppress weeds and reflect light (white side up). Plants are transplanted through the plastic and nutrients and water are supplied by drip irrigation. Tile drainage may be required to ensure uniform drainage throughout the house.

The soil bed is the simplest method of cropping in that it requires low cost setup (i.e no beds to build, etc). In addition, there is less of a disposal problem than with artificial media. Soil beds are well buffered in terms of nutrients and water,

therefore, control of irrigation and feeding need not be as precise as in other systems.

On the negative side, soil fumigation can be a problem as weeds, insects and disease organisms tend build over time. Cool soil temperatures early in the season will slow growth. Several weeks of heating may be required to sufficiently warm the soil prior to transplanting. In the well-buffered soil beds, nutritional and pH imbalances are difficult to correct while cropping, and growers may find they have less control over the crop.

Tomato Cropping in Peat Bags

Peat-lite media filled bags are set out in parallel rows in the greenhouse. Bags are usually placed on top of a plastic mulch. Bags are irrigated with drip or spray nozzles. Bags are generally reused and the mix is discarded or shredded, fumigated and used to grow bedding plants in flats or baskets. Peat-lite media can also be used in troughs built aboveground, but bag culture offers more flexible use of the greenhouse and is more commonly used. Peat-lite media are well-drained, cheap, abundant and lightweight. These media dry quickly and have less buffering capacity than soil beds. The frequent need for irrigation gives the grower more opportunities to adjust nutritional regimes and control plant growth.

The relatively low water holding capacity and limited cation exchange capacity necessitate frequent irrigation and precise control of water distribution and nutrient levels. Soil testing should be done frequently, i.e. on a weekly basis.

Tomato Cropping in Rockwool

Rockwool is an inert substance which comes in preformed slabs usually three to four inches square in cross section and about three feet in length. The material is sterile and is used in the greenhouse much like lay-flat peat bags. Rockwool slabs are very compact and lightweight, making them easy to work with. Slabs are irrigated with drip or spray stakes located at the base of each tomato plant. Nutrients can be recycled if the slabs are deployed in troughs, or simply drained to waste.

Rockwool has little or no cation exchange capacity and, because of the limited slab volume, only limited water holding capacity. Water must be supplied frequently, six or more times

per day, and nutrition must be closely monitored. Electrical conductivity and pH must be monitored daily.

Rockwool slabs can be steam sterilized or chemically fumigated between crops and reused a second time. Disposal of spent slabs has become a significant problem in Europe.

More detailed information on greenhouse tomato culture can be obtained from the following reference materials and information sources:

Growing Greenhouse Tomatoes in Soil and Soilless Media (Publication 1865/E) and *Tomato Diseases* (Publication 1479/E); available from Communications Branch, Agriculture Canada, Ottawa, Ontario Canada K1A OC7.

Bag Culture Production of Greenhouse Tomatoes, Special circular 108, available from the Ohio State University, Ohio Agricultural Research and Development Center, Wooster, Ohio.

Growing Greenhouse Tomatoes in Trough Culture Using a Peat-Vermiculite Growing Medium, Vegetable crops offset series #33, Rutgers–The State University of New Jersey, Cooperative Extension Service, Cook College, New Brunswick, N.J.

Two rockwool suppliers are: (1) Agro-Dynamics, Inc., 12 Eikens Rd, East Brunswick, N.J. 08816 (1-800-USA-AGRO), (2) Pargro, Inc., 185 Circular Street, Saratoga Springs, N.Y. 12866 (518-583-7209).

The Hydroponics Society of America has an extensive listing of books on greenhouse vegetable culture in different soilless media, this information is available for sale from HSA, P.O. Box 6067, Concord, California 94524.

One additional source of information may be the Canadian Hydroponic Information Service, 1648 Avenue Rd., Toronto, Ontario Canada M5M 3Y1 (416-256-0966).