UNIVERSITY OF FLORIDA

Institute of Food and Agricultural Sciences
North Florida Research and Education Center – Suwannee Valley

Greenhouse Cut Flower Zinnia Production 99-11

Robert C. Hochmuth[1], Lei Lani Leon[2], David Dinkins[3]

Introduction

Florida greenhouse vegetable acreage in 1999 was estimated at 80 acres. Primary greenhouse vegetable crops included: pepper, cucumber, and tomato. Greenhouse growers also have smaller acreages of specialized crops such as lettuce, herbs, edible flowers, etc. Greenhouse growers in North Florida have been seeking alternatives to tomato production in the past 5 years as marketing, labor, pest management, and fruit quality challenges have limited profits for some.

Cut flower research experts and florists indicated high quality zinnia and other fresh cut flowers may have potential as an alternative greenhouse crop. Cut flowers

[1] Robert C. Hochmuth, Multi-County Extension Agent, Suwannee Valley Research and Education Center, Live Oak, FL 32060
[2] Lei Lani Leon, Lab Technician, Suwannee Valley Research and Education Center, Live Oak, FL 32060
[3] David Dinkins, Bradford County Extension Director, 2266 N. Temple Ave., Starke, FL 32091-1028

grown in the "off season" were among the alternative crops evaluated at the NFREC-SV near Live Oak beginning in 1997. Trials of cut flowers have included zinnia, sunflowers, delphinium, and snapdragon in a greenhouse hydroponic system. Emphasis after the first year has been with several varieties of zinnia. The hydroponic production system used in these trials has been lay flat perlite bag culture as currently used by most Florida greenhouse vegetable growers (Hochmuth & Hochmuth, 1996). This would help the transition from tomato to zinnia for area growers.

Cultural Practices

The trials were conducted at the NFREC-SV, University of Florida, near Live Oak, Florida in a single 22' x 60' stand-alone greenhouse with 8' high sidewalls. The structure was covered with two layers of 6-mil polyethylene and the area between the two layers was inflated with air. The greenhouse was equipped with an evaporative cooling pad on one endwall and ventilation fans on the opposite endwall. Propane gas was used to heat the greenhouse and provide a minimum temperature of 60°F. Warm air was conveyed by 12-inch ventilation tubes along the floor between the double rows of lay flat bags. The same ventilation tubes were used to recirculate greenhouse air in the crop canopy to minimize free water from forming on the plants. In addition, horizontal airflow fans were located above the crop and also used as recommended, primarily to reduce moisture and disease on the plants (Bartok, 1994).

Zinnia seeds were sown into Speedling planting flats with 1½-inch square cavities. Scotts Metro Mix 200 media was used for plug plant production. The transplants were grown in the flats using water and nutrient solution as needed until transplanting. The four-week-old transplants were planted into lay-flat bags of perlite. The lay-flat bags used were 12.5 inches in diameter. The length of the bags used has varied from 3 to 12 feet, depending on convenience. The lay-flat bags are arranged in pairs of rows every 5 feet as is typical in greenhouse tomato production (Hochmuth, 1991; Hochmuth and Hochmuth, 1996). Several planting arrangements and spacings have been used. The suggested method is 4 plants every 12 inches, clustered around a single irrigation emitter. Irrigation emitters used in these trials were Chapins Trickle Stik®. Irrigation volume at peak crop demands was approximately 1.5 quarts per emitter per day.

Nutrient management followed the same program used for nutrient solutions for hydroponic tomatoes as outlined by UF Cooperative Extension Service (Hochmuth, 1990). The nitrogen level was maintained at 150 ppm for the season. As the cut flowers increase in height, a flower support system is utilized. A plastic mesh (6 in x 6 in mesh) netting is raised as the crop grows to support the flower stems.

Lighting Requirements

During the first two years of this study problems occurred during low light

periods from November to March. Low light levels resulted in small spindly plants and small flowers of poor quality. During late spring and early fall, zinnia crops were excellent with no additional light. Trials were conducted in 1998 and 1999 to determine the effect of supplemental light on the zinnia crop. It appeared in initial tests, the addition of light using standard grow light bulbs (120 watt) made a significant positive impact. Current light practices for the period of November through February is as follows: a grow light is placed over the young transplants at germination and is used during the entire transplant stage. An additional five hours of light daily has been successful, from 5 pm to 10 pm. The same lighting schedule was then used over the crop after being planted into the bags. One light for every 100 square feet of space has been adequate in initial trials. The lights hang at 7 to 8 feet above the floor.

Zinnia crops grown in late spring to early fall in the greenhouse were provided shade using a 30% shade cover over the crop. This is needed to reduce temperature in the crop canopy.

Variety Selection

Several zinnia varieties have been evaluated over the period of 1997 – 2000 (Table 1). Zinnia varieties are available in various sizes and colors. The florists and buyers indicate the importance of color at various times of the year. For instance, yellow or bronze are popular for fall seasons but are of limited use after that season. Red and white are popular for many months December through June, which included Christmas, Valentine's Day, and Mother's Day. Multi-colored varieties may be popular for the Easter market. The choice of color and size is very important and the decision should be made in collaboration with the buyer.

Stem length is also important. Buyers indicated a preference for long stems of 18 to 24 inches or greater, but the market demand and flower quality have some effect on the length accepted.

Table 1 NFREC-SV trials of zinnia varieties including seed source, color and size.

Variety	Seed Source	Color
Big Red	Parks Seeds	Red
Ruffles Mixed	Stokes Seeds	Mixed
Benary's Giant White	Benary's Seeds	White
Benary's Giant Dahlia Mix	Benary's Seeds	Mixed
Oriole	Stokes Seeds	Orange

Marketing

A pilot test-marketing project was conducted with two wholesale florists in North Florida in the fall of 1998. At the time of the project, the florists were purchasing cut zinnias from California. Zinnias do not ship as well as many other cut flowers, and as a result, the quality of the California zinnias was average, at best. The quality of the local zinnias in this project was superior according to the buyers. During a two-month period, samples were supplied to retail florists for their assessment. Retail florists also indicated the quality was excellent and indicated the product would be accepted in the marketplace.

Cut flower yields vary with variety. Large flower varieties, such as "Big Red" or "Benary's Giant" will not produce as many cuts as a small flower variety such as "Ruffles Mix". Time of year and lighting also have a significant impact on number of cuts. However, the large flower varieties have consistently produced 2 marketable stems per week per square foot of greenhouse floor space. The small flower varieties, such as "Ruffles Mix", have produced 4 to 5 marketable stems per week per square foot.

The wholesale price for high quality zinnia ranges from 25 to 50 cents per stem depending on color, size, quality, demand, etc. Using a yield figure of 2 stems per square foot per week for the large varieties and a price of 30 cents per stem, the gross income for a greenhouse cut flower zinnia crop would be $0.60 per square foot per week. It should be noted, the production season is not continuous for each planting. A part of the greenhouse would be dedicated to sequential plantings to assure a constant supply. From our trials, a typical harvest season, on the same plants, would be 6 to 10 weeks with adequate light. The transplant growing period is 4 weeks and from transplanting to the first flower harvest is typically 4 more weeks. This needs to be considered in planning a cropping sequence.

Pest Management

Insect and disease problems have been manageable in the three years of work. The most common problems have been thrips, aphids, whitefly, armyworms, and powdery mildew. Greenhouse flower crops have many more pest control materials available than greenhouse vegetable crops. Scouting programs and monitoring methods (yellow sticky cards) have been important in timely control. Thrips are perhaps the most important pest to monitor because of the scarring damage they cause by feeding on the open flower petals.

Summary

Zinnia as a greenhouse grown cut flower in North Florida appears to be a viable

and profitable alternative crop. The market demand is relatively small for a single cut flower crop such as zinnia. Therefore, this alternative is most likely to fit a small greenhouse grower with a single bay greenhouse (4000 sq. ft). It appears the zinnia, as one crop in a greenhouse cut flower mix, would be most feasible. Small cut flower producers typically have several flower species due to the limited demand for any single cut flower. Arranging this market and production with area wholesale florists will be important.

Work will continue in this project to refine recommendations on light, pests, varieties, post harvest handling, and cost of production. Contact the NFREC-SV for the updated research on this project.

References

Bartok, J.L. 1994. Don't Overlook Benefits Of Horizontal Air Flow Fans. Greenhouse Manager. Feb, 1994. p90-92

Hochmuth, G. 1990. Nutrient Solution Formulation For Hydroponic (Rockwool And NFT) Tomatoes In Florida. Fla. Coop. Ext. Serv. SSVEC-44 17pp

Hochmuth, G. 1991. Florida Greenhouse Vegetable Production Handbook, Vol 3. Fla. Coop. Ext. Serv., Circular SP48. 98pp

Hochmuth, G. and R. Hochmuth. 1996a. Keys to Successful Tomato and Cucumber Production in Perlite Media. Fla. Coop. Ext. Serv., Misc Report. 9pp