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# Cinnamon Hill Farm

71 Traugers Crossing  
Kintnersville, PA 18930

## SUSTAINABLE AGRICULTURE RESEARCH AND EDUCATION PROGRAM PRODUCER GRANT FINAL REPORT

Project Number: FNE94-76

### Goals of the Project

The primary objective of this project was to evaluate the economic feasibility of greenhouse production of strawberries locally on a commercial basis during the period of October through December.

### Vita Update

Beginning in May, 1995, we marketed our produce at the new Farmers' Market at the Allentown Service Plaza on the Pennsylvania Turnpike in addition to our stand at the Quakertown Growers' Market. Mr. Zimmerman acted as Market Master for the Allentown market during 1995.

Due to an accident in April, 1995, Mr. Zimmerman suffered a fracture of the right hip. This, in addition to the drought during the summer of 1995, forced us to reconsider our product line. As a consequence, Cinnamon Hill Farm now markets an ever increasing line of baked goods, and jams and jellies which Mr. Zimmerman produces in the family kitchen. The market for these products has proved strong enough for us to consider constructing a dedicated production area elsewhere on the premises, as well as the hire of a new employee to help with the kitchen work. Jams and jellies are also sold at Crafters' Cottage in Montgomeryville, PA. We plan to continue with both fruits and vegetables, and baked and canned goods in 1996.

### Cooperators and Their Roles

We consulted with Dr. Marvin Pritts of Cornell University regarding some of the more serious problems which we encountered through the course of the project.

In addition, Mr. Scott Guiser and Mr. Thomas Contrisciano of the Pennsylvania Cooperative Extension Service were consulted regarding cultural practices.

Representatives of Indiana Plant and Berry Company were helpful in diagnosing a problem which we were having with plant survival. Indiana Plant and Berry Company also replaced the original plant shipment at no additional cost other than a shipping charge.

The Pennsylvania Department of Agriculture provided support in the form of a loan for the construction of the greenhouse granted through the Agricultural Technology Loan Program.

With the help of my father, construction of the greenhouse was completed by the end of June, 1994.

### Protocol

After consultation with a representative of Indiana Plant and Berry Company, a decision was made to plant Tribute strawberries exclusively. This decision was made on the basis of varietal productivity and tolerance to conditions expected in the experiment.

Bagged, dry, composted chicken manure was obtained from Agri-Cycle, Inc. of Victor, NY. Preliminary studies had shown this material to be an inexpensive, compatible medium. The bags of media were arranged on benches, prepared for planting by burning holes in the bags, and, after the drip irrigation system was installed, moistened in preparation for planting. In early July, dormant crowns of Tribute strawberries were set manually with the aid of a dibble. Completion of planting took 10 days by which time the crowns set first had begun to grow. Within several days, the plants began to wither and die. After the fact, it was determined that the planting medium was too strong nutrient-wise. The entire planting was discarded. The media was replaced with 3 cubic foot bags of Fafard #2 mix (40% of the planting), or Baccto high porosity mix in 2 cubic foot bags. Both were obtained from E. C. Geiger, Inc. of Harleysville, PA. The bags were prepared and planted as before with eighteen plants in the 3 cubic foot bags and fifteen plants in the 2 cubic foot bags. Planting was completed by mid-August. The plants grow rapidly under these conditions; flowers were present in some plants two weeks after setting.

The plants were fertigated as needed with water soluble 20-20-20 at 200 ppm. The fifth fertigation was supplemented with 100 ppm  $MgSO_4$ . After five irrigations with nutrient solution, the planting was irrigated with clear water. The following treatment was with  $Ca(NO_3)_2$  at 100 ppm N. All fertilizer concentrates were adjusted to pH = 7 with  $K_2CO_3$ , if necessary. This routine was followed throughout the experiment. The plants were treated with fungicides every fourteen days on a rotating regimen. Pollination was augmented by daily treatment with an airblast from an electric leafblower. The leafblower was also fitted with a knapsack sprayer for pesticide application.

### Results

Berries were ready for harvest beginning in late October. Although the plants flowered rapidly after setting, the berries were slow to develop. In spite of the assistance with pollination, catfacing was a persistent problem, as was fruit rot.

Initially, the harvest was quite exciting; however, as the daylength grew shorter, the amount and quality of fruit diminished. The marketable fruit was sold for \$1.75 per pint; the demand was much higher than expected, but the harvest was considerably below expectations. As the days grew shorter, we noted

that, although flowering was still profuse, the fruit withered while still small and green. No explanation for this phenomenon could be obtained; supplemental lighting was suggested; however, Professor Pritts has reported it to be unnecessary. By mid-December, the harvest had diminished to near nil, although the plants still appeared to be healthy and flowered vigorously. At this point, night temperature was reduced to 45°.

Plants in the 3 cubic foot bags were noticeably more vigorous than those in the smaller bags.

### Economic Conclusions

Economically, the project was a serious disappointment. Only \$57.25 worth of berries were sold; about the same amount of berries of lower quality were harvested and made into jam. This was sold for about \$50.00 over costs.

### Suggestions for Further Investigation

Supplemental lighting may help to alleviate the problem with withered fruit.

Several ways of reducing the capital expenditures come to mind, for example, a more cost effective greenhouse, i. e., a hoophouse, planting the crowns earlier than mid-July, and a less expensive growing medium. A hoophouse would be both less expensive to construct and less expensive to heat because of the lower roof. Also, the long, low profile of a hoophouse of comparable size would lend itself to be more efficient overall. By planting the crowns earlier, maybe as early as early June, the crop would be expected to begin fruiting about mid-August. From our results, harvest would be expected to continue into November. We have no information as to what would happen if heat were cut off at that point; it may be possible to elicit a harvest as early as mid-April of the following year with none of the fuel expenses which we incurred in our attempt to maintain the planting through the winter. Pruning of the crowns, which would be required under this scenario, has to be done periodically anyway. Derunning of the plants was the most labor-intensive aspect of the project. The production method which we had proposed, i. e., growing in bags on benches, was meant to reduce labor input into the project. If the plants were set into open benches filled with soil, a considerable cost advantage could be taken; further expense reduction is possible if the crowns were to be set into beds on the greenhouse floor. We have found, as a result of another research project, that a mixture of concrete sand and composted mushroom soil provides an excellent growth medium at considerable savings over commercially available potting soils. As can be surmised, a combination of these suggestions would minimize overhead costs while providing some additional advantage over the original proposal.

In brief, what we would suggest, in retrospect, would be to use a hoophouse with its contingent heating and cooling advantages and set the strawberries no less than nine inches apart in narrow, raised beds of sand/ mushroom soil mix right on the greenhouse floor. This procedure is amenable to

irrigation with drip tape, a much less expensive method than we employed in the bag culture method. Planting in mid-May would provide for a harvest beginning in mid-August and continuing into November, well after frost has killed comparable outdoor plantings. Probably no more than minimal heating (40 - 45° night temperature) would be necessary to maintain the crop. After harvest is complete, the plants would be topped and mulched to protect against freezing. By early March, sufficient supplemental heat is supplied to ward off frost with a crop expected in mid-April.

### Recommence

We feel that, if only from the standpoint of the potential economic gain, the proposed project warrants further investigation. We will continue to study the proposal during 1995.

### Outreach

As of the Spring of 1995, we were discouraging other producers with whom we spoke of investing in a similar project unless they had the available facilities to justify the expenses.

Mr. Scott Guiser of The Bucks County Office of the Pennsylvania State University Cooperative Extension Service has been made aware of the results of the experiment, and has been asked to mention them to those who would be interested.

No further efforts were made because of the negative results.



Harry K. Zimmerman

10. January, 1996

Illustrations

Three photographs are attached which show the plants in various stages of growth.



