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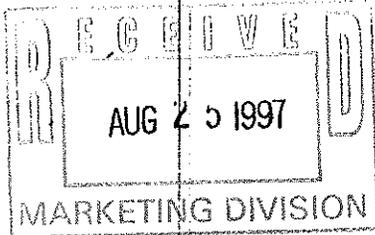
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Early Season Strawberry Production
Utilizing Plastic Covered Tunnel Culture (year 2)

A Final Report

Michael and Ann Finley
Hipp Fruit Farm
August 15, 1997

In 1995 and again in 1996 we were awarded an ADD grant from the State of Wisconsin to research early season strawberry production utilizing plastic covered tunnel culture. It was our plan to combine two developing technologies into an integrated system for strawberry production in Wisconsin.

The blueprint for the strawberry production system is a cultural technique being developed by researchers in North Carolina and New Jersey that involves fall planting of container grown nursery stock into plastic covered, drip irrigated raised beds. This system is being utilized commercially in these areas with great success, however its adaptability in Wisconsin is limited by the colder climate here. To overcome this hurdle we planted three of these beds inside a walk in cold frame or a "high tunnel" as they are sometimes called. This structure is essentially a 15 foot wide greenhouse frame with standing headroom in the center. The frame is covered with a single layer of clear polyethylene. There is no supplemental heat or lighting and no power ventilation. Excess heat is vented by opening the endwalls, and natural air flow through roll up side walls.

It was our assumption that by marrying these two techniques, that we could get strawberry plants grown with the New Jersey / North Carolina system through the Wisconsin winter, and produce fruit about 6 weeks before the first field grown berries were ripe. We also had a sense that there was a good market for this fruit at a substantially higher price than traditionally grown strawberries. The premium price combined with the yield potential of the North Carolina / New Jersey cultural system appeared to make this a commercially viable system for the Wisconsin strawberry grower.

Grant money was used to set up a pilot nursery to produce the container grown "plug plants" used in the fall planting system. ADD Funding also financed the construction of approximately $\frac{1}{4}$ acres of high tunnels.

To this point I would consider this project to be a qualified success. For two consecutive seasons we have produced a strawberry crop inside the tunnel, both years we harvested through a 5 week season that began about 6 weeks ahead of our field grown crop. The quality of this fruit was outstanding throughout the entire harvest period. We were able to market 100% of the berries that were produced, with no losses due to

weather induced spoilage from extreme heat or untimely rain, a nearly impossible goal in Wisconsin Field production.

Although chemical reduction was not one of the original goals of this project, the protected environment of the tunnels allowed us to produce the crop without the use of pesticides both years, a definite marketing plus for some consumers.

The assumption of a high end market has also been dead on target. Virtually all of the fruit was marketed through the Dane County Farmers Market at a price of \$2⁵⁰ / pint and the demand always exceeded the supply. Berries from our main crop sold this year for \$2²⁵ / quart, so the tunnel grown berries commanded nearly double the price. California strawberries sold in the grocery stores at the same time as the tunnel crop, were as low as 89¢ a pint, so clearly price is not the object in the minds of some consumers when a high quality locally grown alternative exists.

Although the Madison market is widely regarded as a high priced market, it is certainly not the only one in the state, and there should be many other opportunities throughout the state

For sales at these levels or even higher.

Total yeild has been the major disappointment of this study. It is our feeling that a yeild of 1 pint per plant is required at these price levels to make this a profitable venture. While 1997's yeilds were much improved over the '98 season, we were only able to realize slightly better than $\frac{1}{2}$ pint per plant this year. Even at the high prices mentioned earlier, this yeild level doesn't cover the capital expenses involved, much less covering labor costs or returning a profit. I don't consider this a Fatal Flaw however, since growers in New Jersey and North Carolina are obtaining yeilds in excess of 1 pint per plant using this Fall planted raised bed system, in the open field. I believe that this yeild problem is simply a matter of fine tuning this cultural technique to Wisconsin conditions and we are continuing work on this project with that goal in mind.

Another downside to this system is its labor demands. The North Carolina/New Jersey system is inherently more labor intensive than the conventional matted row system used in Wisconsin. The production of the "plug plants" is a particularly laborious job. Likewise the actual construction of the high

tunnels is no small task. Once the tunnels are built, the work doesn't stop, in addition to the "grunt labor" involved in the construction and maintenance of the structures, the tunnels are extremely management intensive, and require close monitoring every day during April and May, a time when the Wisconsin strawberry grower already has a full plate.

While there is no getting around the labor demands of this system, the problem has been compounded by the experimental nature of this project. Like any new endeavor, there is a learning curve and the curve has been extremely steep in spots. Compared to the conventional strawberry production system that we're used to, we've had to "re-invent" the wheel" in many ways, and a good deal of money and effort has gone into discovering and solving problems that we hadn't foreseen.

Thanks to ADD Funding, we now have a solid infrastructure in place to continue the development of this technology. We have doubled the number of plug plants produced this year, with the intention of planting outdoors, as well as in the high tunnels this fall. It is our hope to produce plug plants for other interested growers during the '98 season. We also plan to continue

our work with the high tunnel system, since we feel that this technique has great potential not only for our operation, but for many other operations throughout Wisconsin and the upper midwest. As we continue our work on this project, we will be available for consultation to other growers who may be interested in utilizing this system.

Strawberries under glass: a pre-season delicacy

By Jana Melcal
Wisconsin Correspondent

Strawberries under glass: Mike Finley admits the idea has always intrigued him. Is it possible to grow strawberries in a greenhouse environment and bring them to market early enough - thereby warranting a premium selling price - to justify the expense?

Finley is hoping he is on to something that could not only improve the bottom line at his fruit-growing business in Janesville, Wisconsin, but that of other berry growers in Wisconsin and the upper Midwest. Finley and his wife, Ann, sold usciuous, red, vine-ripened strawberries at the twice-weekly Madison Farmers' Market beginning May 22, well ahead of any other growers.

On most days, their 100 pints of strawberries sold within an hour.

"It reinforces that there is a healthy demand for early strawberries at a good price," Finley says.

The secret to the Finleys' early strawberry production is two 16 foot by 200 foot plastic-covered greenhouses or tunnels. Finley believes he and a New Hampshire man are the only ones in the country currently producing strawberries under glass.

The Finleys have owned Hipp's Fruit Farm, 2801 Happy Hollow Road, for 16 years. When they took over the farm from Finley's uncle, Gerald Hipp, the farm had 125 old standard apple trees, only a couple of which remain, and the farm was down to about five acres of strawberries.

Since then, Hipp's Fruit Farm has grown. Offering both u-pick and already picked fruit, they grow 14 acres of strawberries, two acres of raspberries and an acre of blueberries. They also grow five acres of pumpkins and work with the Rock Aqua-Jays, a Janesville-based national-champion water-ski show team, to sponsor haunted hayrides on weekends through October.

Although they typically are too busy during strawberry season to sell berries through farmers' mar-

kets, they are regular, twice-a-week vendors of raspberries and blueberries at the Madison Farmers' Market. They are looking to the market to determine how much of a premium consumers are willing to pay for early-season strawberries.

"In this situation, where we have the first strawberries, we may never want June to come," Finley says. "The beauty of this is that we don't have a lot to sell."

The Finleys started their project last spring, when they planted some Chandler strawberries. Chandler is a variety developed for California markets, but it is considered the best-tasting of the varieties grown there. Considerably larger than plants in Wisconsin strawberry beds, the variety is noted for its prolonged, five- or six-week harvest.

When the plants sent out runners last summer, the Finleys harvested them, putting them in cold storage briefly before starting them in a soilless mixture under a shade structure. They used a misting system to maintain proper moisture and, after 30

days of misting, hardened plants off. In September, they planted the strawberries into the greenhouses and fields. In all, they started 10,000 plants, with 2,400 going into each tunnel and the rest planted to field culture.

When winter came, though, the Finleys ran short of time and didn't get the greenhouses completed on schedule. Instead, they used two heavyweight polypropylene covers over each bed to protect from the worst of the Wisconsin winter weather.

The greenhouses - which the Finleys constructed themselves - were completed in March.

"The plants started growing right away," Finley says. "It's my feeling we lost some days doing it this way."

Inside the tunnels, three rows, each about 40 inches wide, have plants spaced on a one-by-one-foot grid. A drip irrigation system maintains proper moisture.

To facilitate pollination, Finley bought 50 live bumblebees and 100 larvae from Koeppert Biologicals in Ann Arbor, Michigan, which specializes in

bumblebee production for hot-house tomato facilities in the Netherlands. The bees and larvae, which were let loose in the tunnels, cost \$150.

Finley says the bumblebees are highly effective. Honeybees, in contrast, will spend their time bumping against the tunnel's plastic, trying to escape.

Air temperature at nights remains significantly above outside temperatures, and the tunnels warm up nicely on days with any semblance of sun.

"With any type of sunshine, we can get it up to 75° to 85°, regardless of the outside temperature," Finley explains. "After 85°, we vent the tunnels."

Finley has speeded production of his strawberries by at least four weeks despite this spring's cool weather. Hipp's usually opens for the strawberry season on June 15. In a normally sunny spring, he hopes to have six weeks of extra production prior to the harvest of field-ripened berries instead of four weeks this year. Weather may have played a role in having less than six weeks of pre-season production, but Finley admits he needs to experiment with optimum planting dates.

Otho Wells, the University of New Hampshire researcher who used this production system last year for the first time, found he preceded his regular, field-harvest season by six weeks of greenhouse-strawberry harvest, Finley notes. His first strawberries last year were picked the last week of April.

Finley picked his first fruit on May 12 - Mother's Day - but did not have enough strawberries to justify taking it to market until 10 days later.

A late frost, heavy rainfall during harvest or over-wet conditions can destroy, pummel or otherwise compromise fruit quality and plant health.

"This system gives us the opportunity to grow in a more sophisticated system," he adds. "In the field, we're always dealing with compromises. Here, we can certainly moderate the extremes."

It's always intrigued me that this would be the ideal way to grow strawberries. I've seen that they do it a lot in Europe."

To develop this system, the Finleys received a \$7,000 grant from the Wisconsin Department of Agriculture, Trade and Consumer Protection's Agricultural Development and Diversification program a year ago.

"One of our selling points was that once we got the technology down, it would be able to be brought to other parts of the state," he says of the tunnel system. "It's not just applicable to our situation."

In late June, they received a

.....
My lawyer said now that I have some money, I should have a will. But I figure, now that I have some money, there's no point in dying.

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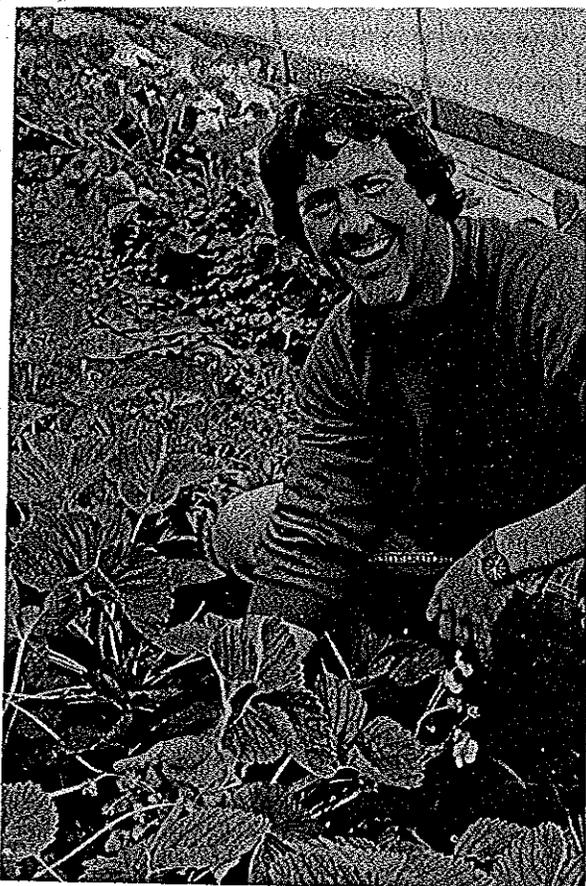
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MIKE FINLEY of Hlpp's Fruit Farm in Janesville, Wisconsin is targeting premium markets by offering the first vine-ripened strawberries of the season to consumers.

\$9,000 grant for a second-year study.

Not only do the Finleys have to submit reports to DATCP about their project, but Finley expects to talk about their project at the annual meeting of the Wisconsin Berry Growers Association and, likely, to the North American Strawberry Growers Association.

Since the strawberry plants will be ripped out after harvest, Finley is considering other ways to spread out the expense of tunnels to other enterprises. The production of strawberry plugs for his own use and that of other

strawberry growers is one possibility.

Ultimately, it is the bottom line - production volume and premium prices paid by farmers' market consumers - that will determine whether this type of system makes a go of it in Wisconsin.

"I think this is something that can vitalize the (strawberry) industry in Wisconsin," Finley says. "For the first year, I'm pretty pleased with the way things are progressing now. What we have to find out now is whether, economically, it justifies all the hoo-hah we've gone to." △

Orbit registered for disease control in cherry orchards

Ciba Crop Protection recently received federal registration from the Environmental Protection Agency (EPA) for use of Orbit in cherry production.

The locally systemic fungicide will control brown rot blossom blight and fruit brown rot, two perennial disease problems for cherry producers, according to the company. Orbit has been popular with growers of peaches, nectarines, apricots and plums since it was approved by the EPA in 1993. Orbit is not registered for use in California.

"These disease concerns should be at an all-time high in 1996," predicted Marty Wigglesworth, senior field research representative for Ciba

Crop Protection, maker of Orbit. "In the Great Lakes region, for example, tart cherry prices were so poor last season that growers left lots of fruit on the ground. That will create an ideal environment for disease spores to quickly regenerate when warmer temperatures come. We're pleased to be able to provide cherry producers a new option for disease control this season."

Orbit provides effective control at low use rates, so growers handle less chemical product and packaging, according to the company.

For blossom blight control east of the Rocky Mountains, apply four ounces of Orbit per acre in each of up to three applications per season. The first

application can be made at early bloom (popcorn), another at 50%-75% bloom and at petal fall if the blossom period is prolonged or if conditions favorable to disease persist. West of the Rockies, two four-ounce applications are permitted, one at 5%-10% bloom, then again at 80%-100% bloom, if necessary.

For fruit brown rot, Orbit can be applied at one or two four-ounce-per-acre sprays beginning three weeks before harvest, up until the day of harvest.

Orbit can be applied either by ground or aerially, the company said. It's important to get thorough and uniform coverage with the spray. Unlike contact sprays, Orbit is systemic, so brown rot protection is not lost to rainfall. However, applications should be made with sufficient time for the spray to dry before a rainfall. Always read and follow label directions.

Michigan, U.S. peach production falls

The 1996 Michigan peach forecast calls for a one-third smaller crop than the prior year.

The 1996 forecast was for 40 million pounds, according to the Michigan Agricultural Statistics Service. The frigid winters of 1994 and 1996 have caused the death or poor performance of many trees. Buds were killed this February in many sites that are not close to Lake Michigan. Frost damage varied from slight to severe.

Many peach blocks close to the lake, however, have very good yield potential, despite a fairly heavy June drop. Pit hardening was complete.

The United States peach crop, excluding California clingstones, was forecast at 988 million pounds, down 31% from last year. Most of the decline is due to freeze damage in the southeast. The South Carolina crop was pegged at only 20 million pounds, while Georgia is expected to produce only six mil-

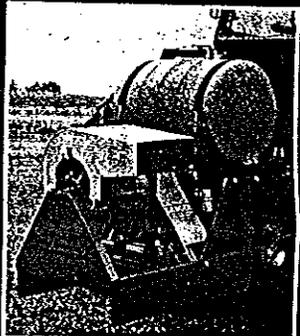
lion pounds. Normally, those two states account for 400 million pounds of peaches annually. △

AG-AIR

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