

1. Project name and contact information

Use the same title for your report as you used for your proposal, followed by the grant number, which always begins with the letters “FNE.” You can find this on your contract. Include your mailing address, your phone number, and your e-mail address if you have one.

Propagating Day Neutral Strawberry Plugs for Fall Planting
FNE08-647
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2. Goals

Briefly summarize your objectives as presented in the original proposal. Don’t worry if your project objectives changed over time—we’ll get to that later.

The objective of the project was to determine if we can establish an on-farm economically feasible method of producing day neutral strawberry plug plants for fall planting.

3. Farm profile

Give some basic information about your farm, including any changes since your project started. Include acres farmed, your current crops or livestock, and any unusual features of your operation.

Brook View Farm located in Garrett County, Maryland is owned by Jim Strawser has been producing strawberries for the local fresh market for the past four years. We grow day neutral strawberries that allow us to market fruit at farmers markets during the summer months. The summers in Garrett County are ideal for ever bearing strawberries because we have cool summers. Our typical system is to plant day neutral plug plants in the spring of the year and start harvesting in early summer and continue harvesting until frost in the fall. The only problem in this system is that we have cool and wet spring weather which often keeps us from planting the plants as early as possible and once planted fruit production is late. The University of Maryland as part of a SARE project in 2007 planted day neutral plants in the fall with production set for the spring of 2008. The fall planted plants out produced the spring planted plants and production was earlier on the fall planted plants. We would like to have strawberries that would produce earlier in the season than those planted in the spring but still have fruit production throughout the summer. The problem is that plug plants of ever bearing varieties are not available for fall planting.

4. Participants

Describe your technical advisor, cooperators, and their roles in the project.

This project involved cooperation with the University of Maryland Extension Agriculture Agent, Willie Lantz and strawberry breeder and former University of Maryland Professor, Dr. Harry Swartz. Willie Lantz assisted with planning the growing system and with publishing the results. Dr. Swartz assisted by providing the day neutral tissue culture plants and provided technical assistance for runner production.

5. Project activities

Tell us what you actually did and how it was done. If the project changed over time, describe what those changes were and why change seemed necessary.

In mid May we planted tissue culture strawberry plants in 10' long plastic gutters. Each 10' gutter was planted with 24 plants and two gutters were placed back to back. The gutters were placed on a wooden rack about 6' off the ground inside of a high tunnel. The plants were hand watered throughout the summer. A spray of 50 ppm of Gibberellic Acid (Pro-Gibb) was applied a month after planting in the gutters. This prevents flower formation and increased the runnering of the plants. Any remaining flower blossoms were removed weekly to force the plants to produce more runners. The runners were harvested in early September. The runner tips were placed in 50 cell growing trays and prepared for planting into the field by the first part of October. The first year we did not get good propagation from the runner tips. The second year, the runner tips were placed in a homemade high humidity low tunnel that was constructed near a tree line. The plant trays were placed on landscape fabric and then covered with a layer of greenhouse plastic and a layer of thick spun-bound floating row cover. The plastic and row cover were held above of the plants using 2' diameter single row wire hoops. The plants were watered daily. This method proved to be a good way to propagate the runner tips as nearly all of the tips were made into plugs.

6. Results

Share the data or observations that were collected. Describe your results and accomplishments—including any unexpected results. Explain your results so that other farmers can understand what happened and what it means.

In 2008, we harvested a total of 2,566 runner tips from 525 plants. This is an average of 4.9 runners per plant. In 2009, runner production was higher with 1405 tips from 90 plants which is an average of 15 runner tips per plant. We were limited in the number of tissue culture plants as Dr. Swartz was in the process of setting up a new lab and did not have large numbers of tissue culture plants available. While the number of runner tips in 2009 was higher than 2008 we fell short of the expected 30 runner tips per plant. Even though these numbers may be lower than expected we were able to create our own plug plants on the farm without much investment in irrigation and substantial construction.

7. Conditions

Describe any site conditions or conditions specific to your farm and this growing season that may have affected your results.

The number of runner produced per plant was much lower than expected. Several factors

may have contributed to the lower runner production. Getting materials and supplies together for the first season was a challenge. The tissue culture plants were ready before the planting station was constructed. The tissue culture plants were held at a local commercial greenhouse until we were ready to plant. During this period of time, the plants were accidentally exposed to very cold temperatures (23°F). Normally temperatures below freezing would have killed these tender tissue culture plants, however a majority of the plants survived. While a majority did survive, the plants had to be held for a couple of extra weeks. The later planting date and the fact that the plants were injured would probably explain why the plants did not produce as many runners as would have been expected. Another unexpected situation was that the plants required a larger amount of water than expected. During the mid summer, the plants with many runners would dry out between daily watering times, which was not ideal for plant or runner growth. Of the over 2,500 runners collected from the plants, only about 500 survived propagation. This lower number was due to a later than expected harvest of runners and extremely hot dry weather during propagation. The runners did not establish well enough in the plug trays to be planted in the fall of the year.

In 2009, runner production increased to 15 per plant. Conditions for growing the tissue culture plants were improved. We did learn that we needed to create a better low cost propagation area for the runner tips. We found that using high humidity low tunnels under trees and daily watering, gave 100% rooting. The area we selected was under a tree canopy. We covered the ground with a weed barrier then placed the tray on the ground. We used wire hoops to create a mini type tunnel about 2' wide and 18" tall. We covered the hoops with greenhouse plastic and covered the plastic with a floating row cover. This created conditions of nearly 100% humidity which kept tips from wilting while establishing roots. After 3 weeks the tunnel was removed and the plants were watered as needed.

8. Economics

Describe your economic findings, if any. This would include changes in expenses or net farm income triggered by the project such as fewer inputs, improved product or profit, fewer treatments, etc.

Since a large portion of the cost of producing plugs is in the fixed cost of the tissue culture plants, the cost of producing plug plants is greatly affected by the number of runner tips produced from the tissue culture plants. The cost of producing spring plug plants in 2009 was \$.32 per plant. The cost of purchasing fresh dug plants from California in the fall is about \$.18 per plant including shipping. If this system of runner tip production could be increased to 30 tips per tissue culture plant the cost could be reduced to around \$.20 per plant. While the cost of the plants is not greatly reduced the survival in the field is better with plug plants which results in more complete stands over fresh dug plants. In the field, very few of the plug plants failed to establish and produce fruit the following year. With fresh dug plants only about 75% of the plants established. While yields were not collected on the plants the following year, the plug plants had noticeably higher yields.

9. Assessment

Say whether the results from your project generated new ideas about what is needed to solve the problem you were working on. What do you think is the next step?

The project established that plug plants can be created on the farm from tissue culture plants. The cost of producing plug plants in this project was higher than the cost of purchasing fresh dug plants, however plug plants survived better in the field and appear to have had higher yields. If the number of runner tips can be increased the cost of producing plugs could be reduced. Increasing the number of runner tips would require more constant management of temperature and water.

10. Adoption

Explain why you plan to continue to use the practice you investigated, or—conversely—why you are *not* going to. If you plan to revise your approach in light of what you learned, describe those revisions.

Producing the plug plants proved to be more challenging and require more management than was anticipated. With other farm work, it was often difficult to have enough time to attend to the tissue culture plants and runners. In order to make creating the plug plants economically feasible high levels of management are required. It is unlikely that we will continue to make our own plug plants for fall planting. Dr. Harry Swartz, owner and operator of Five Aces Breeding has established a tissue culture lab in Garrett County that is capable of producing 5,000 tissue culture strawberry plants. Dr. Swartz is considering starting a nursery to produce plug plants for fall plantings. Dr. Swartz will also have tissue culture plants available for farmers that would like to create their plug plants.

11. Outreach

Explain what you did in your outreach program. Send copies of any articles written about your project, along with any outreach materials you or your technical advisor may have developed such as flyers, tip sheets, bulletins, or handouts that were used to explain or publicize your results.

Since the results of this project were less successful than anticipated, we decided not to produce a publication that would explain how to create plug plants for fall planting. The process for creating plug plants that were used in this project are being included in a new extension publication at the University of Maryland entitled “Season-Long Strawberry Production with Everbearers for Northeastern Producers” on pages 46 & 47. The publication will be available in the summer of 2010 on the University of Maryland Extension website. The section that includes information pertaining to this project is attached to this report.

12. Report Summary

To write a summary, think about what you just put in your final report and condense it to the most important information. State the purpose of the project in one sentence, use two to three sentences to summarize the methods, and another two to four sentences to describe the results and your assessment of the project.

The goal of the project was to establish a procedure for on farm production of fall planted ever bearing strawberry plug plants from tissue culture plants. Juvenile tissue culture everbearing strawberry plants were planted in raised gutters and forced to runner using Gibberellic Acid and removing flower blooms. The runners were removed in the late summer and runner tips were placed in 50 cell trays for propagation. Propagation was done in a homemade high humidity chamber created by covering the plants with greenhouse plastic and heavy row cover held up using wire hoops. In the second year of the project 15 runner tips were harvested per tissue culture plant. This was only about half of the expected number of runner tips per plant. The lower than expected runner tip production resulted in a cost of \$.32 per plant which is nearly twice the cost of fresh dug plants purchased and shipped from California. While the cost per plant was higher the plug plants did establish in the field better than the fresh dug plants and appear to have yielded better the following spring. While the project was successful in creating plug plants from tissue culture plants the lower than expected runner tips caused the project not to be economically feasible. More time and attention to tissue culture plants and runner tips would possibly improve the number of runner tips produced. If farmers decide to produce their own runner tips, they need to be committed to the time and management to the project if it is to be successful. Information on creating plug plants can be found in the University of Maryland Extension Bulletin #401 entitled "Season-Long Strawberry Production with Everbearers for Northeastern Producers" on pages 46 & 47.