



Department of Plant Biology
School of Environmental and Biological Sciences
Rutgers, The State University of New Jersey
59 Dudley Rd., New Brunswick, NJ 08901-8520

durner@sebs.rutgers.edu
phone: 932-848-6366

NCCC 212 State Report for New Jersey 2020

Submitted by:

Edward Durner

Associate Research Professor

1. NJAES Project 12159

Alternative Small Fruit Production Strategies

Edward Durner, Rutgers- The State University of New Jersey

Goldenberry (*Physalis peruviana*)

Strawberry

Accomplishments and plans are presented below for each specific project included in this umbrella NJAES project.

Publications for all projects:

Refereed:

Durner, E.F., 2020. Growth of 'Seascape' strawberry (*Fragaria X ananassa* Duch.) is altered by photoperiod and nitrogen conditioning. *The Journal of Horticultural Science and Biotechnology*, DOI: 10.1080/14620316.2020.1719906.

Durner, E.F., 2019. Effective Analysis of Interactive Effects with Non-Normal Data Using the Aligned Rank Transform, ARTool and SAS® University Edition. *Horticulturae* 5(3): 57 – 69 <https://doi.org/10.3390/horticulturae5030057>

Durner, E.F., 2019. Responses to nitrogen conditioning in 'Albion' strawberry (*Fragaria X ananassa* Duch.) for off-season plasticulture production are primarily qualitative rather than quantitative. *Scientia Horticulturae*, 257 <https://doi.org/10.1016/j.scienta.2019.108684> , published online 18 July 2019.

Non-refereed:

Durner, E.F. 2020. Growing Goldenberries. Proceedings of the 2020 New Jersey Agricultural Convention and Trade Show (NJ ACTS) and New Jersey Vegetable Growers Meeting. Harrah;s Resort Hotel Convention Center, Atlantic City, New Jersey.



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Durner, E.F. 2020. Enhancing Fall “Albion” Strawberry Production. Proceedings of the 2020 New Jersey Agricultural Convention and Trade Show (NJ ACTS) and New Jersey Vegetable Growers Meeting. Harrah;s Resort Hotel Convention Center, Atlantic City, New Jersey.

Durner, E.F. 2020. Enhancing Fall ‘Albion’ Strawberry Production with Inexpensive Field Lighting_Does It Really Work? Proceedings of the 2020 Mid-Atlantic Fruit and Vegetable Convention, Hershey, Pennsylvania.

Durner, E.F. 2019. Fall Strawberries and Goldenberries: Alternative Annual Fruits for New Jersey Growers. Proceedings of the 2019 New Jersey Agricultural Convention and Trade Show (NJ ACTS) and New Jersey Vegetable Growers Meeting. Harrah;s Resort Hotel Convention Center, Atlantic City, New Jersey.

Durner, E.F. 2019. Goldenberries: A New Superfruit for North America. Proceedings of the 2019 Mid-Atlantic Fruit and Vegetable Convention, Hershey, Pennsylvania.

Durner, E.F. 2019. Strawberry Flower Mapping: Understanding Plant Development and Its Effect on Yield. Proceedings of the 2019 Mid-Atlantic Fruit and Vegetable Convention, Hershey, Pennsylvania.

Article in the American Fruit Grower, 19 April 2019 about this project.
(<https://fruitgrowersnews.com/article/goldenberry-new-superfruit-grows-in-us/>)

Article in FreshPlaza newsletter, 7 May 2019 about this project.
<https://www.freshplaza.com/article/9101020/goldenberry-superfruit-can-be-grown-in-the-us/>

Article in Acres magazine August 2019 about this project.
<https://www.ecofarmingdaily.com/grow-crops/growing-goldenberries-and-ground-cherries/>

Presentations for all projects:

Durner, E.F. 2020. Enhancing Fall ‘Albion’ Strawberry Production With Holiday Light Strings. North Jersey Commercial Vegetable Growers Meeting, Flemington, NJ. February 26, 2020.

Durner, E.F. 2020. Growing Goldenberries. North Jersey Commercial Vegetable Growers Meeting, Flemington, NJ. February 26, 2020.



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Durner, E.F. 2020. Growing Goldenberries. 2020 New Jersey Agricultural Convention and Trade Show (NJ ACTS) and New Jersey Vegetable Growers Meeting. Harrah;s Resort Hotel Convention Center, Atlantic City, New Jersey, February 5, 2020.

Durner, E.F. 2020. Enhancing Fall “Albion” Strawberry Production. 2020 New Jersey Agricultural Convention and Trade Show (NJ ACTS) and New Jersey Vegetable Growers Meeting. Harrah;s Resort Hotel Convention Center, Atlantic City, New Jersey, February 5, 2020.

Durner, E.F. 2020. Enhancing Fall ‘Albion’ Strawberry Production with Inexpensive Field Lighting_Does It Really Work? 2020 Mid-Atlantic Fruit and Vegetable Convention, Hershey, Pennsylvania, January 30, 2020.

Durner, E.F. 2019. Strawberry Flowering Physiology and Things You Need To Know About It. Southeastern Strawberry Expo, Raleigh, NC, November 7, 2019.

Durner, E.F. 2019. Enhancing Fall Strawberry Production Using Inexpensive Light Strings. Southeastern Strawberry Expo, Raleigh, NC, November 8, 2019.

Durner, E.F. 2019. Fall Strawberries and Goldenberries: Alternative Annual Fruits for New Jersey Growers. 2019 New Jersey Agricultural Convention and Trade Show (NJ ACTS) and New Jersey Vegetable Growers Meeting. Harrah;s Resort Hotel Convention Center, Atlantic City, New Jersey, February 5, 2019.

Durner, E.F. 2019. Goldenberries: A New Superfruit for North America. 2019 Mid-Atlantic Fruit and Vegetable Convention, Hershey, Pennsylvania, January 31, 2019.

Durner, E.F. 2019. Strawberry Flower Mapping: Understanding Plant Development and Its Effect on Yield. 2019 Mid-Atlantic Fruit and Vegetable Convention, Hershey, Pennsylvania, January 31, 2019.

2. **NJDA Specialty Crop Block Grant #AM180100XXXXG017**
Summer and Fall Strawberry Production for NJ Using the Long-day Cultivar ‘Albion’.
Edward Durner, Rutgers- The State University of New Jersey
Peter Nitzsche, Rutgers- The State University of New Jersey

Objective 2 - Develop practices for small fruit production tailored for climatic and market needs of growers.



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Strawberry

In 2019, experimental plantings of 'Albion' were established at two growers farms as well as at Rutgers Fruit and Ornamental Research Extension Center, Cream Ridge, to encourage the adoption of off-season strawberry production and marketing using a long day cultivar with supplemental field lighting. Severe deer pressure on one grower's farm and weed pressure at the other grower site resulted in lack of production on both farms. In addition, growers indicated that there was considerable difficulty establishing field lighting in their fields due to the distance from their electric source. There was also significant deer pressure at Cream Ridge, however, yield through September (prior to deer damage) from the Cream Ridge planting was on average 140 g/plant. At 15,000 plants per acre, this translates into ~4,600 lbs per acre. With an establishment cost of \$10,315 per acre, Net income per acre through September would be \$8085 at \$4.00/lb and \$12685 at \$5/lb.

In 2020, plantings were established on two grower's farms as well as at Cream Ridge. Plugs were conditioned immediately after propagation and prior to field planting to avoid problems associated with field lighting. Netting was installed to prevent deer damage at Cream Ridge and one grower established plants in a greenhouse to avoid deer problems. Data will be collected through next spring for evaluation of this system.

- 3. Northeast Region SARE Project LNE18-362-32231**
Goldenberries (*Physalis peruviana*) : A New Fruit for CSA Farms and Farmers Markets.
Edward Durner, Rutgers- The State University of New Jersey
Thomas Gianfagna, Rutgers- The State University of New Jersey
Thomas Molnar, Rutgers- The State University of New Jersey

Objective 1 - Develop improved small fruit germplasm through cooperative breeding and evaluation programs:

Goldenberry (*Physalis peruviana*)

Objective 2 - Develop practices for small fruit production tailored for climatic and market needs of growers.

Goldenberry (*Physalis peruviana*)

Goldenberries are an underutilized, highly nutritious fruit that could prove to be easily incorporated in CSA farm production and farm market sales. This project is aimed at providing growers with a reliable alternative small fruit



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crop for inclusion in their standard vegetable rotation. This project includes the first systematic evaluation of *Physalis* germplasm to identify true goldenberry (*P. peruviana*), genotypes with characteristics that make them well-suited for commercial production. The project is also evaluating production systems utilizing white and black plastic mulch, trickle irrigation, and several training systems.

One hundred thirty five growers participated in on-farm goldenberry evaluation in 2019. As in 2018, thorough grower evaluation of the 'Schoenbrunn Gold' genotype was limited in that many growers again reported that they did not harvest ripe fruit. The major factor contributing to this lack of production is the long growing season required by goldenberry. This limitation will be addressed in 2021 via a high tunnel trial at Rutgers Fruit Research Center in Cream Ridge. Based on general e-mail interactions with growers, many of them enjoyed participating in this work. The lack of productivity has discouraged many of the participants. The number of fruit, average fruit weight and estimated potential yield per plant was assessed for 18 globally sourced genotypes in a study at Rutgers, Cream Ridge. No significant differences in yield were detected among the genotypes and productivity was greater in 2019 compared to the previous year.

Variability among goldenberry genotypes in 2019 was limited as in 2018. Again, two fruiting 'types' could be discerned among the 18 goldenberry lines evaluated: (1) genotypes producing smaller, marble sized and shaped fruit weighing approximately 2 -5 g each and (2) genotypes producing larger, more irregularly shaped fruit weighing 5 - 8 g each. The average number of fruit per plant ranged from 240 to 742 and smaller fruited genotypes generally tended to produce more fruit per plant compared to larger fruited genotypes. Yield per plant ranged from as low as 900 g per plant (~1.9 lb) to as high as 2200 g per plant (4.9 lbs per plant). Fruit size and estimated yields were much higher in 2019 compared to 2018 and closer to previous estimates from 2017. Larger fruited genotypes had a more fruit-like, tropical flavor compared to the smaller fruited genotypes which often had a background bitter flavor and the bitter flavor did not make the smaller fruited genotypes undesirable. The larger fruited genotypes received more favorable comments from informal taste tests than the smaller fruited genotypes with respect to desirability, similar to 2018. All genotypes were fairly consistently attractive with nice fruit shapes (round rather than irregular) and color (golden yellow/orange). The larger fruited genotypes sometimes had slightly irregularly shaped fruit, however, they were still attractive and nicely colored. Based on general observations over the two year test period, we recommend growing goldenberries on black plastic mulch, with a simple trellis and pruning plants until the first bifurcation of the main stem.



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A goldenberry fact sheet is available from:

<https://projects.sare.org/information-product/goldenberry-fact-sheet/>

4. Northeast Region SARE Project LNE20-395-34268
Empowering Northeastern Strawberry Growers with Flower Mapping
Edward Durner, Rutgers- The State University of New Jersey
Peter Nitzsche, Rutgers- The State University of New Jersey

Objective 2 - Develop practices for small fruit production tailored for climatic and market needs of growers.

Strawberry

Current recommendations for fall nitrogen application and row cover management in annual strawberry plasticulture are based on tradition and calendar date. Decisions regarding both practices would be more appropriately based on the floral status of plants in production.

This project has two goals (1) to establish, document and demonstrate the clear relationship between floral status and productivity in strawberry and (2) to demonstrate that plant floral status can be modified with N and row cover manipulation based on floral maps. We will demonstrate the usefulness of floral mapping by demonstrating floral modification with pulsed N fertilization and appropriate row cover management.

Both goals are being addressed with one large integrated field study. Weekly flower maps and associated floral goals from propagation in July through harvest the following June are being developed for 2 cultivars in the annual plasticulture system. Modification of plant floral status via controlled N-pulse treatments and row cover manipulation will be assessed from September through December.

Research is being conducted at Rutgers Fruit and Ornamental Research Center in Cream Ridge, NJ and duplicated at The Clifford E. & Melda C. Snyder Research and Extension Farm - Rutgers Center for Sustainable Agriculture in Pittstown, NJ.

This project will also develop the procedural manual for flower mapping and provide suggestions regarding the use of data generated by flower mapping.