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United States Department of Agriculture
Project Initiation

Project Data for Accession Number 1034948

Project Title

Overcoming Pest Management and Labor Challenges to Increase Profitability and Grower Adoption of Day-Neutral Strawberry Production in the Upper Midwest

Project Details

Sponsoring Institution National Institute of Food and Agriculture	**Project Status** ACTIVE
Funding Source NIFA Non Formula	**Grant Year** 2026
Grant No. 2026-51106-46972	**Cumulative Award Amt.** $999,778.00
Proposal No. 2026-08897	**Multistate No.** (N/A)
Project Start Date Sep 15, 2026	**Project End Date** Sep 14, 2030
Program Code [112.E] Organic Transitions	

Project Director

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Recipient Organization

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Performing Department

(N/A)

Non Technical Summary

The long-term goal of this multi-state, multi-disciplinary project is to reduce the pest, disease, and labor barriers that impede growers from transitioning to and sustaining organic day-neutral strawberry (DNS) production in the Upper Midwest. Strawberries represent the largest fruit crop in Minnesota and the third largest in Wisconsin, yet organic strawberry production remains minimal in the region, despite strong interest among growers, high consumer demand, and premium prices at local markets. Building on results from our previous research, we identified two major barriers limiting transition to organic DNS production: reduced marketable yield due to damage from insect pests and diseases and the high production costs, particularly labor, associated with organic production. To address these challenges, this project will implement an integrated systems approach that combines research and grower engagement to increase profitability and adoption of organic DNS production. Specifically, we will: 1) assess cultural and biological control

strategies to reduce insect pest abundance and damage; 2) assess OMRI fungicide application patterns and row covers on disease incidence; 3) improve labor efficiency; 4) integrate improved management and labor-saving strategies into a comprehensive production system; and 4) develop a mentorship program that connects experienced organic DNS growers with new producers to increase grower adoption of and transition to organic DNS production.

Animal Health Component

Animal Health Component: 0%

Research Effort Categories

Basic	0%
Applied	100%
Developmental	0%

Classification

Knowledge Area (KA)	Subject of Investigation (SOI)	Field of Science (FOS)	Percent
215	4020	1160	25%
216	1122	1130	50%
205	3110	1060	25%

Knowledge Area

[215] Biological Control of Pests Affecting Plants

[216] Integrated Pest Management Systems

[205] Plant Management Systems

Subject Of Investigation

[4020] Fungi (includes yeast)

[1122] Strawberry

[3110] Insects

Field Of Science

[1160] Pathology

[1130] Entomology and acarology

[1060] Biology (whole systems)

Keywords

Fragaria x ananassa, biological control, cultural control, diseases, tarnished plant bug, trap crop

Goals / Objectives

United States Department of Agriculture
Project Initiation

The long-term goal of this multi-state, multi-disciplinary project is to reduce the pest, disease, and labor barriers that impede growers from transitioning to and sustaining organic day-neutral strawberry (DNS) production in the Upper Midwest.Specific Objectives:Objective 1:Assess cultural and biological control strategies to reduce insect pest abundance and fruit damage in organic DNSObj 1.1Determine the impact of managing an adjacent trap crop to reduce TPB abundance and fruit damage in organic DNS.Obj 1.2Determine the impact of floral resources and nutritional supplements on natural enemies of TPB and suppression of TPB in adjacent organic DNS.Objective 2: Assess the impact of OMRI-approved fungicide application patterns and row covers on disease incidence in organic DNSObj 2.1Evaluate the effectiveness of different OMRI-approved fungicide application strategies in reducing disease incidence in organic DNS.Obj 2.2Determine the influence of row covers on disease development and their interaction with OMRI-approved fungicide treatments in organic DNS.Objective 3:Evaluate labor efficiency and an integrated approach to pest management practices and labor efficiency practices in organic DNS.Obj. 3.1 Optimize runner removal strategies to reduce labor demands in organic DNS.Obj. 3.2Determine the impact of integrating management practices on insect and disease pressure, and labor efficiency practices in organic DNS.Objective 4.Increase grower adoption of, and transition to, organic DNS production through education and outreach, including a grower-to-grower mentorship program.

Project Methods

Objective 1.Obj 1.1. A field trial in Wisconsin will evaluate management of TPBin an adjacent alfalfa trap crop and its effects on TPB abundance and fruit damage in organic DNS. Three replicate plots will each contain four 40-m rows of 'Cabrillo' DNS. A 40-m × 1-m alfalfa strip will be established 1 m from one side of each plot. Each plot will be divided into three 10-m treatments separated by 5-m buffers: untreated alfalfa, alfalfa treated with an insecticide, and alfalfa baited with a TPB-attractive trap. Plots will be at least 20 m apart. The insecticide treatment will receive Pyganic (pyrethrins) at 50 fl oz/acre by backpack sprayer every two weeks. The trap treatment will use a red sticky trap containing a 4-mL vial with 500 mg racemic linalool, positioned above the alfalfa canopy in the center of the treatment section; traps will be replaced every two weeks and captured TPB counted. TPB abundance will be sampled every two weeks from June through September in the alfalfa and the three adjacent DNS rows using a sweep net over 10 m of row. Every two weeks, ripe fruit will be collected from a 1-m harvest zone in the center of each row and categorized as TPB-damaged, other unmarketable, or marketable following Lu et al. (2024).Obj 1.2 A second field experiment at three Minnesota sites (MAES, WCROC, and SWROC) will evaluate floral resources and supplemental nutrition for natural enemies of TPB and their effects on TPB suppression. Each plot will contain four 40-m rows of 'Cabrillo' DNS and one of three treatments: an insectary strip, an insectary strip supplemented with additional food resources, or a control surrounded by mowed natural habitat without nearby flowering weeds. Treatments will be separated by 5-m buffers, with plots at least 20 m apart. Insectary strips will be 40 m × 1 m and contain approximately equal proportions of sweet alyssum, buckwheat, phacelia, dwarf sunflower, and borage transplanted into landscape fabric at 20-cm spacing. Greenhouse-grown seedlings will be replaced as needed to maintain continuous flowering. Supplemental nutrition will consist of Nutrimac™ containing sterile, frozenEphestia kuehniellaeggs, applied to flower strips at 1.5 times the recommended rate beginning three weeks after planting and weekly thereafter, and Biogluc applied at the recommended 10% concentration in insect-feeding stations that will be replaced weekly. Fruit yield and marketability will be assessed every three weeks throughout the July-October harvest season. Ripe fruit will be collected from a 1-m central section of the rows and evaluated for TPB damage using Lu et al. (2024). Insects will be sampled every three weeks using a reversed-flow leaf blower fitted with a net; each sample will consist of five minutes of suction from the middle of each DNS row and the flower strip, following Nieto et al. (2023).Objective 2Obj 2.1. A replicated field trial will evaluate OMRI-approved fungicide application strategies using four commercially relevant strawberry varieties. Each variety will be planted in a 30-m row and replicated across four blocks (16 rows total) in a randomized complete block design. Two fungicide strategies will be compared. The Preventative Rotation Strategy will use calendar-based applications every 7-14 days, rotating copper, Bacillus-based biorationals, and hydrogen peroxide to reduce resistance development; potassium bicarbonate will be applied after prolonged wet conditions. The Disease-Responsive Strategy will apply fungicides according to environmental conditions and early disease symptoms using a threshold-based model. Polyoxin D zinc salt and plant extracts will be applied at symptom onset, while hydrogen

peroxide and potassium bicarbonate will be used as curative treatments during periods of increased disease incidence. Anthracnose, Botrytis, and other foliar fungal diseases will be rated biweekly throughout the growing season. Plants showing decline or collapse will also be evaluated for root and crown rot. Marketable and unmarketable fruit counts will be recorded to assess effects on production.Obj 2.2. To evaluate row covers and their interaction with fungicide strategies, each 30-m plot will be divided into two 15-m sections, with one section covered by a plastic row cover and the other left uncovered. Covers will act as barriers to rainfall and airborne pathogen inoculum and may alter humidity and temperature. Disease ratings and yield measurements will be collected from both sections using the procedures described above. Symptomatic plant material will be collected for pathogen confirmation, and environmental conditions, including temperature and humidity beneath covers, will be monitored to aid interpretation of disease development.Objective 3Obj. 3.1. A replicated split-plot field trial will evaluate runner-removal frequency and its effects on yield and plant productivity, including interactions with row-cover treatments. Four commercially relevant cultivars will be planted in 30-m rows and replicated across four blocks (16 rows total). Half of each plot will receive plastic row covers and half will remain uncovered. Runner removal will occur manually at three frequencies: weekly, every two weeks, or every three weeks throughout the growing season. Measurements will include runner number per plant, canopy size, and leaf area index. Yield will be measured weekly using marketable and unmarketable fruit counts, total fruit weight, and berry size.Obj. 3.2. In year 3, the most effective treatments identified from the trap-crop, insectary, fungicide/row-cover, and runner-removal experiments will be combined into an integrated pest management (IPM) system. Three replicate plots will each contain two paired DNS patches, representing a control and the integrated approach, with four 20-m rows per patch planted with the optimal variety identified from the preceding trials. Control patches will be surrounded by mowed natural habitat and receive no management. IPM patches will be flanked by the optimal alfalfa trap-crop treatment on one side and the optimal biological-control treatment on the other, while disease management and runner removal will follow the best-performing treatments identified previously. Ripe fruit will be collected from a 1-m central section of each row and evaluated for TPB damage. Visual disease ratings and pathogen confirmation from symptomatic tissue will be conducted. Weekly yield measurements will include marketable and unmarketable fruit categorized as TPB-damaged, diseased, or otherwise unmarketable, as well as total fruit weight and berry size. TPB abundance will be sampled every two weeks from June through September using sweep nets over 10 m of each DNS row. Labor time for each management task will be recorded for the IPM and control treatments and compared with labor estimates from the previous study.Objective 4A grower-to-grower mentorship program will connect experienced organic DNS growers with producers interested in transitioning to organic DNS production. The program will be modeled on the USDA Transition to Organic Partnership Program mentorship structure. Experienced certified organic growers will be recruited to provide practical guidance, host farm visits, and assist with seasonal problem solving. Mentors will be paired with mentees according to production goals and farm context. During years 2-3, pairs will complete onboarding training, communicate at least three times during the growing season, maintain timely communication, and visit one another's farms at least once annually. Mentors and mentees will meet quarterly with the program coordinator and complete biannual evaluations. Mentors will receive stipends and professional development in teaching and facilitation, while mentees will receive stipends to support participation in organic DNS educational events and reciprocal farm visits.