

Day neutral strawberries

Building a farm to table ecosystem



For many in the upper midwest, strawberries are a quintessential marker of summer. Strawberries evoke childhood memories of farmer's markets, strawberry picking, and homemade jam. Typically, fresh, locally grown strawberries are only available for a few months each summer during a short growing season in June and July.

Over the past eight years, researchers at the University of Minnesota have explored ways of extending the growing season for local strawberries, focusing on day neutral strawberries (DNS) that flower as long as temperatures are adequate for growth. Day neutral strawberries extend the season for local berries and provide economic opportunity across the supply chain from farmers to consumers.

With the same taste, texture, and sweetness of regular in-season strawberries, these berries can help Minnesotans remember the strawberries they fell in love with as kids. Local strawberries mean fresher produce for consumers, a more sustainable delivery system, and economic growth for local farms and businesses.

Stakeholders

Farmers & Growers	Families & consumers
Farmer Cooperators	Urban homeowners
Nurseries	Wholesale buyers
Laborers & migrant workers	Schools/school directors
Minnesota Department of Agriculture	Jam makers
Crop research granting agencies	Fresh & frozen
Transportation facilitators	Farmer's markets
Packaging engineers	Caterers
Equipment developers	Restaurants & bakeries
Faculty, staff, & student researchers	CSAs
	Co-ops & upscale groceries
	Retail marketing
	U-pick

Research & Development

► Propagation & sustainability

Currently, four cultivars have been tested extensively in Minnesota: *Portola*, *Albion*, *Monetary*, and *Seascape*. Although unique growing processes have been developed for DNS, there is an opportunity for further research on deep winter greenhouses, trough cultivation, and other novel technologies for strawberry cultivation.

Testing of new varieties, planting equipment, ways to minimize plastic use, and the impact of soil pH is also needed.

► Post-harvest handling

Strawberries require almost immediate cooling after harvesting. Educate growers on the best practices for post-harvest handling. Explore immediate-cooling tactics like special containers, immediate placement on cooling trucks, and in-field coolers.

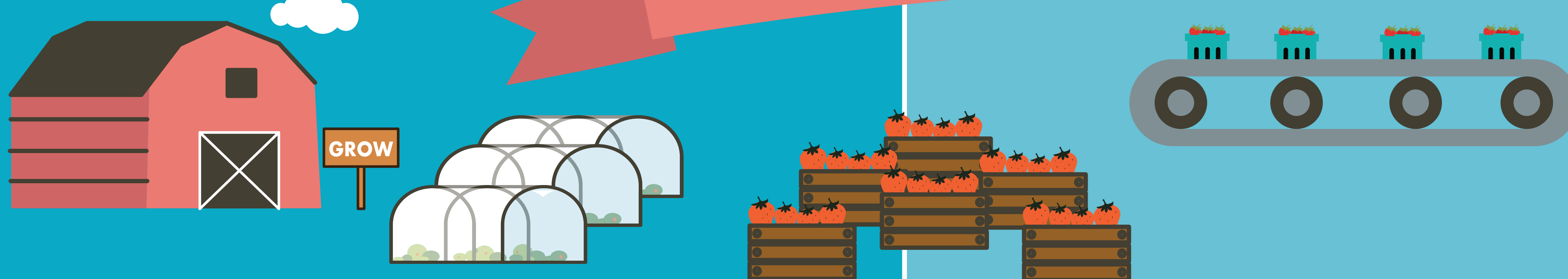
► Food safety & quality

Like regular strawberries, DNS must pass quality standards enforced by food safety officers. Strategies are needed to help DNS growers pass GAP & FSMA audits. Research on pest management, flavor, and other quality parameters is also needed.

► Research funding

Funding for this type of research through the current sources is limited. Current funding: North American Strawberry Growers Association (NASGA), MN Dept. of Ag, MN Specialty Crop Block Grant, and Nourse Nursery. Some funding sources to explore: Crop research granting agencies, grant funding, Philanthropy, State/Federal Grants

DAY NEUTRAL STRAWBERRIES



Cultivation & Harvest

► Growers

There are huge opportunities for farmers to expand or extend their growing capabilities with DNS. More produce means a larger market and more crop-owning power. Easily-accessible curriculum needs to be developed so that researchers and other agricultural stakeholders can teach growers how to expand into DNS.

► Grower's Network

Connecting DNS growers can help reduce the need for each grower to have their own unique DNS growing equipment, lower transportation costs, and allow enough quantity to sell to wholesalers.

► Labor

Strawberries are labor-intensive produce. Finding ways to make strawberry-harvesting labor more efficient through potential corporate partnerships or mechanical harvesting. Improving the environment for current laborers through better facilities, training, and keeping a consistent, knowledgeable labor force.

Transport, Storage & Processing

► Capacity/Refrigeration

Finding or creating local storage and cooling facilities around farms can help reduce post-harvest loss. Places like commercial kitchens, flash freeze facilities, or MFMA affiliates are all possibilities.

► Packaging

Strawberries need to be kept in regulated temperatures and levels of CO₂ in order to preserve quality during transportation. Explore alternatives to container-based berry transportation such as slicing, dehydration, and other types of processing. Explore alternative transportation methods such as UPS and CH Robinson, new sensor technology for maintenance, and cross-docks for more efficient transfers.

► Storage partners

- Farmers
- Bakeries
- Winery distillers
- Franchise outlets
- SnoPac
- Test kitchens
- Commercial kitchens
- Jam makers
- Co-ops
- Local chef/franchises

Selling & Consuming

► Marketing

DNS-specific marketing strategies are needed to inform Minnesotans/consumers about the availability and significance of DNS. Many people have nostalgic, summer-associated memories with strawberries, and this can be helpful to appeal to consumers who already frequent U-pick and Farmer's Markets. Working with groups such as the Minnesota State Fair and Annie's Project will also extend outreach. Create an "MN strawberry day" for Minnesotans to celebrate/recognize locally-grown strawberries.

► Direct Sales

Develop market opportunities for farmers to connect directly to consumers and earn full profit margins. Create direct connections with churches, food shelves, school kitchens, and meanders. Alternatively, develop systems for farmers who do not want to handle direct consumer access.

► Indirect Sales

Create relationships and/or offer premiums for year-round markets such as flash freezing, local kombucha, liqueur, puree, fruit bouquets, and smoothies.

Create relationships with processors for berries that are less appealing or seconds.

Ideas to explore

🍓 Propagation

- Alternative production systems Deep Winter Greenhouses (DWG)
- High-value crop for DWG
- Evaluating new cultivars
- Utilizing novel cultivation technologies

🍓 Sustainability

- Develop eco-friendly & sustainable growing processes
- Grow strawberries efficiently using less plastic
- Plastic mulch recycling
- UV-limiting plastics
- Disease resistance
- Life cycle assessment
- Carbon footprint

🍓 Quality Standards

- Ensuring quality standards as the number of farmers increases
- Growing safe, nutritious food
- Quality testing panel
- Market research on flavor, profile, texture
- Pest control research
- Tarnish plant bug control
- Fungal diseases like leaf spot

🍓 Growers

- On-farm research network curriculum organized by Extension (varieties, pest management, economic analysis, and enterprise analysis)
- Find more farmers willing to risk new ventures & grow DNS
- You can be your own boss in farming
- Potentially more money for farmers
- Families working together to farm
- Educate row crop & livestock farmers about diversification into strawberries
- Create easily-accessible curriculum to teach DNS growing techniques
- Involve extension educators in horticulture systems
- Equity & diversity

🍓 Growing Technologies/Tactics

- Cover crops & ground cover
- Field sites and ROC locations
- Inter-row planting crop, trough growing
- Low tunnels & Raised beds
- Plant fertility
- Planting equipment
- Reproductive management
- Soil type and pH

🍓 Food safety

- Vendor requirements for food safety
- Government, food safety laws including cottage foods
- Cleaning processes
- GAP audit
- GAPs/FSMA
- Grower's Network
- Grower hub to produce big enough quantities for wholesale
- In field coolers for post-harvest handling
- Fruit cooling technologies
- Timing
- Possibly on trucks
- Potential for equipment sharing system so that farmers spend less money

🍓 Labor

- Using corporate partnership to leverage the labor force for more intense periods/days
- Labor efficiency research
- Mechanical harvesting
- Facilities for pickers (bathrooms, sanitation, shade)
- Training
- Maintaining consistent labor force
- U-Pick
- Harvest Aid

🍓 Post-harvest handling

- Educate growers on postharvest handling
- In field coolers for post-harvest handling
- Develop on-farm cooling technologies, possibly on trucks
- Timing
- Create network of cold storage to lower post-harvest loss
- Harvesting containers
- Buckets, crates, clamshells, containers
- Cleaning materials for equipment like crates
- Being able to easily propagate next year's plants off of this year's plants

🍓 Capacity/Refrigeration

- Subsidized usage of communal commercial kitchens
- Create/find 4-5 sites around MN for cold storage & processing
- Palletized standard
- Produce timetables
- Refrigeration aggregation project, potentially collaborate with backhaul project of MFMA's aggregation project
- ID flash freeze & cold storage capacity around the state
- Freeze Dried
- Freezers
- Connect with rurally located cold storage facilities
- Identify existing surplus cold storage in rural areas

🍓 Packaging

- Slicing and flash freezing
- Development of a dehydration facility
- Packing shed/warehouse
- Sensor technology
- Getting to market
- Using UPS for transport
- Backhauling
- Blockchain

🍓 Packaging (cont'd)

- CH Robinson's fresh
- CO₂ /COLD temps in transit
- Cross Dock
- Farmer's trucks
- Strawberry cultivators coordination

🍓 Marketing

- Explore direct subscription-based markets through the internet. Retail market pricing and portioning should be explored
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- Direct subscription-based market
- Internet
- Price sensitivity
- Pricing and portioning for retail
- Retail marketing
- Campaign on the true seasonality of strawberries
- Extend relationships to apple orchards who already have a U-pick crowd
- Supply chain focused on driving consumer value - customer-centric orientation
- Work with groups such as the MN State Fair and Annie's Project to extend outreach
- Organic vs. conventional MN strawberries
- Marketing/Teaching consumers about DNS
- Tap into childhood memories/nostalgia in marketing campaigns
- Explore/market to different MN cultures & ethnicities
- Convincing consumers these strawberries are special
- Developing a specific MN strawberry brand
- Branding for DNS containers
- Local day neutral strawberries July-Nov at farmer's markets
- Work with farmer's market managers
- Community fruit of the year (Snap-Ed)
- Differentiate from California berries
- How consumers can access MN grown strawberries
- Special menu creation at restaurants
- Teaching consumers about the true seasonality of strawberries
- Create an "MN strawberry day" for Minnesotans to celebrate the first days of summer with locally-grown strawberries.
- Hold a day in August or September to let everyone know strawberries can still be grown

🍓 Indirect Sales

- ID year-round markets for fresh-frozen
- Flash freezing
- Give small producers of kombucha, liqueur, jam, and baked goods a premium for DNS
- Puree market: brewers, jams, bakeries
- Fruit baskets/bouquets
- Blenders for smoothies
- Organize auctions for excess product
- Processors for seconds or thirds/less-appealing products
- Potential Corporate Partners:
 - Schwan's
 - Dairy Queen
 - Panera Bread
 - The Good Acre Food Markets
 - Lund's/Kowalski's/Coborn's
 - MN Grain

🍓 Direct Sales

- End-to-end partnerships that can scale
- Support growers in maintaining direct access to the market and give them a full margin
- Pilot farm to market to aftermarket to events
- Marketing co-op for producers
- Farm Meander: connect consumers more to farming and combine with arts meanders
- Establishing a marketing system so that farmers don't have to figure out where their berries will be sold
- Community harvest events: churches, food shelves, school kitchens
- Giving these groups farm tours