

1. Introduction of the SBIR/STTR Project and Expected Outcomes:

The Vertical Growing Strawberries in Stacked Pots (VGSP) is an alternative soil-grown method for growers to produce strawberries. Many of the US 9000 strawberry growers use “U-pick” or “Pick-your-own” methods for consumers to pick berries. But the VGSP offers consumers an alternative to picking strawberries on their hands and knees: instead, they can stand and pick berries. The VGSP used in high tunnels also offers the benefit of a longer growing season: production can occur up to at least seven months and longer in all kinds of weather.

A seamless transition from VGSP R&D to commercial success is incorporated into this Phase 2 project. Growers can participate in project development and testing to become familiar with VGSP while generating income and passing their experiences onto other growers.

The soil-based VGSP system is a good fit for berry growers for the following reasons as well:

1. Soil-grown strawberries (as well as other produce) have a higher Brix (sugar level). Scenic Valley Farms (SVF) in Readstown, WI, performs Brix testing on all its fruits and vegetables. The strawberries get sweeter as the season progresses: July, Brix 7.5; September, Brix 10; and November, Brix 14. By comparison, when we tested Bushel Boy hydroponic strawberries in May, they recorded at Brix 5.
2. Small and medium farms are acquainted with growing in soil.
3. The cost of our soil-based vertical growing system is less than the cost of a hydroponic system. The VGSP presently costs \$275 per a four-pot stack of 83 plants. The projected gross profit is 72%—\$1,000 or \$12 per plant. If each plant produces 1.5 lbs at retail price of \$7.50/pound, the ROI is one year. SVF’s yield is currently 1lb per plant but further development of the VGSP will increase that yield to 1.5 lbs..
4. A high tunnel/per ft is one-fifth the cost of a greenhouse, since the NRCS EQIP program provides significant financial assistance to growers who wish to purchase a high tunnel.
5. Locally grown produce, which VGSP facilitates, is preferred by the consumer.
6. Growing Day-Neutral strawberries in high tunnels allow for extending the season and harvesting berries nine months a year.
7. Aside from the ergonomic benefits to the consumer, the VGSP also allows laborers to maintain and harvest the berries with greater ease and productivity.

8. Growing berries in high tunnels allows for picking and plant maintenance during inclement weather—although the VGSP can also be operated in outside operations.

9. Because “U-pick” farms are popular with the general public, VGSP will be an added benefit to growers marketing this style of harvesting.

10. With the uptick in AI technology, harvesting robots may soon assume some of the picking duties. The VGSP system is ready-made for such innovations.

11. VGSP can be certified USDA Organic whereas [a hydroponic system organic certification is controversial](#) (see Biblio 1)—hydroponic strawberry growers have had a difficult time receiving organic certification from the USDA.

To actualize the potential of the VGSP and tap into these benefits to grower and consumer, the technical objectives of this proposed project are as follows:

1. Improved yield to 1.5 pounds per plant
2. Develop a metal racking system

There are two disadvantages to the VGSP. Since this system is a newer technology, it has yet to find confidence among growers dedicated to in-ground systems. In addition, the initial outlay of equipment required—the high tunnel (if used) and the VGSP itself—is more extensive and costly than in-ground systems.

Nonetheless, VGSP is practically a plug-and-play farming technology. All small and midsized farms can use the VGSP, especially “U-pick” farms. Likewise, Amish owned farms can use the VGSP if they incorporate solar pv to generate electricity to run the direct current (dc) irrigation valves and controllers. Also, as mentioned in the narrative section of this proposal, VGSP has a wider possible market base since single or multiple stack VGSP systems can be sold to consumers, businesses, and education/public facilities.

2. Company Information:

Scenic Valley Farms is a family run, organically certified farm that specializes in producing high quality, nutritious field-grown fruits and vegetables in high tunnel greenhouses. Founded in



2009 in the Driftless Region of southwest Wisconsin, we currently have 15 high tunnels that produce a mix of blackberries, strawberries, raspberries, melons, tomatoes, peppers, cucumbers, garlic, and basil. In order to boost organic matter and promote

healthy soils, we apply organic compost and pH enhancers to the soil underneath our high tunnels. We also use innovative solar thermal heating methods that warm the soil and air while reducing farm greenhouse-gas emissions. Inside the tunnels, cooling, heating, air circulation, and irrigation are automatically controlled by a plc (programmable logic controller) microprocessor that is remotely accessible via the internet. All of our produce is certified organic by Quality Certification Services. (Adjacent is a pic of one of our solar heated high tunnels.)

SVF also develops technology-based products and services that enhance small and midsize farms. SVF's research & development efforts are described in detail at the farm's website, [SVF Website](#). SVF has received numerous [state and federal grants](#) totaling over \$2m. Its current R&D efforts include:

1. [Vertically Growing Strawberries in Stacked Pots](#) (VGSP) in soil for growers
2. [Recycle Compost System \(RCS\)](#) for growers. This effort involves a new composting method, "Enhance Compost," which generates aerobic "hot" compost in 30 days with minimal labor. The RCS for growers includes worm or vermicompost.
3. Developing and maintaining the [Driftless Arboretum and Botanical Garden](#) for the people of the region.

Erik Gundacker, founder and owner of SVF, has a computer engineering background and a lifelong love for plants. When he graduated from college and moved with his wife to a job with Univac's Navy surface ships Command and Control in the Twin Cities, he was so eager to get his hands dirty in a garden that even before finding an apartment he secured a plot of land suitable for planting. (See his resume in support letters.)

SVF farm has had as many as ten employees throughout the years. It currently has 4 employees. Along the way, SVG has cultivated friendships with other individuals involved in agriculture-based interests. Brent Crompie owner of [Poly- Tex](#) and Aaron Wills founder and owner of [Little Hills Berry Farm](#), and Dennis Clark developing the prototype O2Grow System will be involved with VGSP Phase 2 project and beyond. (See their support letters.) SVF has also allied with many university-level researchers in the past and, including Mary Rogers (University of Minnesota), Kathy Demchak (Penn State University), Amaya Atucha (University of Wisconsin), and Jan Janse (Wageningen University & Research, Netherlands), all of whom will be valuable assets to the proposed VGSP project.

3. The Market, Customer, and Competition:

The market potential for the VGSP project is low-hanging fruit indeed: SVF sees a ready customer base among the small and medium size strawberry growers which are part of the 9,000 strawberry farms in the US, according to the 2017 Census (See Bibl #1). Many of these farms are “U-pick” entities; their owners and managers have shown interest in vertical-grown strawberries. SVF is already compiling a database of such growers by Google searching by state for “U-pick” or “Pick-your-own” strawberries farms. In addition, agriculture associations and organizations have indicated an interest in assisting our efforts in this project.

We have presented and plan to continue presenting the VGSP system at growers conferences in the Upper Midwest, including [WI Fruit and Vegetable Grower Conference](#), [WI Growing Conference](#), [MN Fruit and Vegetable Growers Conference](#), and [Mappleseed \(formerly known as MOSES\) Organic Conference](#). We plan to enlist the help of strawberry and fruit associations as well, many of which are listed at the [Nourse Farms associations website](#). As noted above, we have also formed strategic alliances with companies such as [Poly-Tex](#)

Although private grower/consumer marketing is not strictly speaking a part of this phase 2 project, nonetheless, there is a market for the VGSP with consumers. We had a booth displaying a single-stack VGSP at the 2019 WI Fruit and Vegetable Conference. We maintained a list of interested parties and half of those on the list are consumers wanting to place a single stack VGSP on their back yard patio, businesses placing stack(s) on their entry foyer, school entries and schools offering agriculture-related courses. Indeed, whether an individual, a business, or a school, the VGSP system can find a ripe market base with the urban farmer.

As for potential competition for the market that the VGSP hopes to secure, there are many vertical hydroponic systems and a few vertical soil stacked systems. SVF believes it has advantage in the market, however; as a small farm that has built and uses the system, SVF developed a network of like-minded small farms which see the VGSP as a viable alternative to these more costly and labor-intensive systems.

4. Intellectual Property:

The VGSP is made from off-the-shelf components such as pots, dripline, irrigation valves, and irrigation lines, and is assembled at SVF and Little Hill Berry Farm in Northfield, MN. We plan to protect the design with a minimum of the following:

- A. The compost in the substrate originates from the previously mentioned “Enhance Composting,” [RCS for Growers](#). The RCS can be sold to growers to make their own compost. While growers will be able to use compost not generated by the RCS, SVF will make it clear that their yields and performance would be less certain than if that of RCS-generated compost.
- B. The VGSP racking system will be made by Poly-Tex. For proprietary reasons, SVF and Poly-Tex have contracted an agreement that only SVF can sell the racking system.
- C. One of the unique features of the VGSP is its ability to potentially produce greater yields by adding dissolved oxygen through the prototype O2Grow System developed by Dennis Clark. (See his support letter.) The prototype O2Grow system has previously had a patent, and SVF will help renew this patent once the prototype O2Grow system is optimally viable (i.e. by increasing strawberries yields substantially). As mentioned previously, other ag related applications, including [“Enhanced Compost” RCS](#), are using the prototype O2Grow System. Beyond this project and with the assistance of Dennis Clark SVF is seeking to become the sole manufacturer of the present prototype O2 Grow System, including the development of the previously mentioned “Dioxyflow.” Other ag-related applications for the prototype O2Grow System include aquaponics, aquaculture, fish hatcheries, etc.

The strategy for building a sustainable business is building a reliable product that will help small and midsize businesses grow. With more than 15 years of experience in agriculture, SVF is confident that its business model will dovetail successfully with this new proposed project.

5. Revenue Stream

As noted above, the VGSP system seeks to increase SVF's current strawberry yield from 1 lb per plant to 1.5 lbs per plant, thereby improving the ROI from one-to-two years to less than a year

Projected revenue:

	Single Stack (\$1000/stack)	4 Stacks (\$950/stack)	20 Stacks (\$900/stack)	80 Stacks One 30x96' Ht accommodates 80 stacks(\$800/stacks)	Total Sales
Year 2028	5	5	5	0	\$104,000
Year 2029-2033	15	30	30	30	\$2,817,000
Total by Stacks	20	35	35	30	\$2,931,000

Growers who invest in the VGSP will probably start with one stack or four stacks the first year. As they become familiar with the VGSP they will buy many more. The VGSP is scalable by buying single stacks or multiple of four stacks.

6. Financing:

SVF plans to secure financing through Value Produce Grants (VAPG), strategic financial planning, and working capital grants. In 2011 and 2012, SVF received VAPGs for growing blackberries in high tunnels. (See SVF website, [Innovations](#).) We understand there are 100% matching fund requirements, half cash and half in kind. The in-kind funding will be provided through SVF assets/labor; the cash funding will be accessed through SVF's retained earnings and equity loans. The estimate needed initially for manufacturing and marketing is \$100,000. (See SVF support letter.) We will apply for a VAPG grant in 2026 to be used in 2027 and 2028 when the VGSP is ready for manufacturing and sales.

As noted above, Poly-Tex, a large manufacturer of [high tunnels](#), will be manufacturing the VGSP racking system, and SVF will continue to synergetically collaborate with Poly-Tex in its manufacturing process.

As previously mentioned there has been considerable interest for a smaller (one to four stacks) VGSP system for the consumer. The one-to-four stack system we manufacture and sell to the grower will be virtually the same as the one for the consumer. We believe we can manufacture a single stack and have it ready for sales in the summer of 2026. Profits from this single stack system will help finance the marketing and sales of VGSP systems to farm-based growers in the summer of 2028.