

Greenhouse and Covered Agriculture Infrastructure Program

SUSTAINABLE YEAR ROUND AGRICULTURE (SYRA)

Project Summary and Thesis, August 2020:

Maine farms have a long history of creative ingenuity. Greenhouse, covered agriculture and season extension systems that were developed over the last fifty years, lead directly to the nursery, horticulture and extended season food system products we have grown to appreciate throughout the year. Fifty years from now, we're anticipating that greenhouses will play a much larger role in defining the Maine farm landscape, perhaps in a way barns have historically.

Today, as is evident in our [2018 GREENHOUSE GROWERS SURVEY](#) of over 30 greenhouse operators in the state, there is a variety of infrastructure styles that cater to new or existing markets. These styles help businesses sustain grow a year round labor force in the peri-urban and rural communities where they operate. The work presented here is a building block for those efforts.

In 2014, ME SAS launched the "SYRA Cluster Program", to provide a clearinghouse of research across high-tech, mid tech and low tech greenhouse, season extension and covered ag systems. A partnership with Portland based greenhouse design/build entrepreneur ArchSolar allowed for applied research and demonstrations to be conducted on four commercial farms from 2016 – 2019. Through this work ME SAS set out to grow a cross disciplinary network of greenhouse, covered ag and season extension collaborators who share a passion for improving heat and energy efficient year round greenhouses along with tools and production systems therein. For a full summary of the program and its findings, the SYRA [FINAL REPORT](#) is now available.

ME SAS is currently working to connect Maine's many covered ag early adopters with the new generation of farms and their most urgent needs. On one hand, high tech (and often hydroponic operations) are selling the general public an idea of new and even gravity and sunlight defying ways of growing. On the other hand, the early adopter food and horticulture businesses and a new wave of high tunnel users through have diversified and added value to their operations through low tech and mid tech covered systems.

Research conducted through the SYRA Program set out to test novel concepts without bias and across all styles. We thus began a process of providing data for public benefit that can mitigate risk of novel systems for farmers who are eager to employ regenerative and socially responsible infrastructure concepts into their farming style.

This is a vast field of potential in Maine and the region, but with many unanswered questions that demand further research. Hybridization of utilities is key. Renewable heat and energy systems, tech gadgets, insulation, ventilation, tools, along with best practices for production, all have a place in this "cluster building" work. However the most notable is a shift away from investments in steel and tractor implements designed to tame a broad acreage, and toward systems that concentrate commercial farm lifestyles into smaller, often bio-intensive ecosystems, under more protection and control. Similarly notable is that all efforts aim to reduce utility costs and off-farm inputs per yield.

In addition to the itself, the appendices include an excel based [ENTERPRISE BUDGET TOOL](#) that is useful for fiscal accountability and for infrastructure budget planning.

Fall/Winter 2020 Fact Sheet Program

Following the Final Report we are working on a fact sheet program that folds in work from the many creative farm geniuses across Maine who were not involved in the SYRA demonstrations. We are currently working on a follow up to this research and have highlighted six high priority categories all farm infrastructure businesses should consider before designing production infrastructure. They include:

- designing for plant positive* ecosystems
- greenhouse insulation, heat retention, phase change material, and ventilation
- radiant greenhouse floors and raised beds (permeable and impermeable)
- heat pumps, pellet boilers, hot water systems, and ground-to-air heat exchange
- locally made and low cost environmental sensors, monitoring and relays
- on-farm energy production

We're recommending an expansion of research and increased collaboration across the state in these areas in research and through public/private partnerships. Fact Sheets will include curriculum framework and recommendations for Higher Ed, educational organizations and agriculture in the classroom.

Cluster Development

The SYRA Project was administered by the Maine Sustainable Agriculture Society (ME SAS) and is guided by educational non-partisan mission that aims to build bridges between the many farms and farm service organizations in the state to help small and mid-sized farm businesses in Maine and their service providers succeed.

ME SAS' reports, events, publications and videos center sustainable farm businesses who have lead through example through profitable, ecologically sound, and socially equitable business models for Maine's rural and peri-urban communities.

Maine's many farm infrastructure, sustainability and social science leaders such as [Johnny's Selected Seeds](#), [Organic Growers Supply](#), [Paris Farmer's Union](#) and regional greenhouse businesses such as [Griffin Greenhouses](#), [Harnois Industries](#), [Rimol Greenhouses](#) and Portland-based [ArchSolar](#). We also keep an eye on relevant work happening further afield such as hybrid systems from [Ceres Greenhouses](#) in Colorado. Maine also has countless small business thought leaders and early adopters whose financial and social equity have positively impacted suppliers and service providers.

Increasing connections with the renewable energy and tech sector is also important. To date we've collaborated with [True North Energy Services](#), [Assured Solar](#), [InSource Renewables](#), [Shift Energy](#), [Insolcorp](#), [Powerwise](#), [Intellergy](#), and also worked with the [University of Maine New Media and Computer Science Program](#), the Office of the Vice President of Research, and the Center for Technology Enhanced Learning and the [America East Hackathon](#) to focus Higher Ed research on the needs of small and mid-sized farmers.

* "Plant positive" is a term coined by Eliot Coleman that implies a resilient and healthy agricultural plant, with strong cell walls and properly balanced growing conditions and micro and macro nutrient density, can repel pests and mitigate disease, not so different from the human immune system. (Coleman, Eliot. *New Organic Grower*. Chelsea Green Publishing. Vermont, 1989)

We encourage all entrepreneurs of all types to talk with and center Maine's farmers in their work. The [MAINE BEGINNING FARMER RESEARCH NETWORK](#) has the most comprehensive list of resources to date. Maine's agriculture industry is a multi-generational resource rich in natural science, social science, macro and micro economics, climate science, transportation, engineering and more. Ask a farmer first.

Finally and foremost, as the systems of North American farming inch closer toward sustainable endeavors, we must always work better to recognize, with humility, that all of this work is built on a shaky and exploitative foundation of an imported style of agriculture aimed at producing scalable surpluses to make a living. We tend to fail in sustainability when we don't consider that our agriculture and our spreadsheets can be practice in land restoration and social science. Centering the more than 1000 year wisdom traditions of indigenous land stewards is a surefire way to see to it a system is indeed sustainable for a time beyond this one. We are more collectively wise to see to it that [WABANAKI VOICES](#) are always welcome at the table.

Please consider [ADDING YOUR VOICE](#), sharing your project, idea, farm need, or vision and let us know how we can help your project succeed to serve a socially equitable, profitable and restorative future for Maine agriculture.

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