Monthly Highlights from Rutgers New Jersey Agricultural Experiment Station April 2009

Sustainable Greenhouse Practices begin with Energy Audits

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When considering sustainable practices we recognize that sustainability can be viewed at different scales: from the scale of inputs like water and growing media, to the greenhouse operation, to the local community or region, the nation and ultimately the globe. What may appear sustainable locally or regionally may not be sustainable when evaluated on a national or global scale (e.g., shipping supplies or harvested products over vast distances). There is also a time scale involved (e.g., accumulation of CO^2 in the atmosphere impacts our environment in future years). While often implicitly assumed when considering sustainable practices, it is helpful to include a statement that defines the scale involved. The place where we do have ability to adopt changes is in our own business.

First is the realization that greenhouse operations need to be financially sustainable; they have to generate net income to stay in business and grow. This may seem obvious, but implementing sustainable practices has to have a positive impact on the bottom line. There is no point in jeopardizing the future of your business by implementing purportedly sustainable practices that do not return a profit. Economic considerations are a key component of managing sustainable greenhouse operations.

Secondly, sustainability is not much different from what we used to call "common sense." We know from economics that increases in input prices drive conservation and changes far quicker than any other method. But while the impact of resource pricing may be sensitive and fast, price does not always move us toward sustainable practices due to external economic factors (e.g., subsidized competitors, our inability to access and invest capital in the business, or regulatory restrictions). Even as we adapt to price changes, we cannot assume that fossil fuels are an infinite resource; that releasing significant quantities of certain compounds in the environment will not result in problems down the road; that construction over the best farmland will not eventually result in increased food prices; that pumping groundwater without sufficiently recharging aquifers will not eventually result in water shortages; or that generating large quantities of waste is not inefficient and expensive. The list goes on.

Where do you start if you like the concept of sustainability, and you feel it makes business sense for your greenhouse? The first step is conducting a thorough audit, including a comprehensive energy audit. Measure. Assess where things stand. Farm and greenhouse energy audits are highly specialized compared to those usually conducted by utilities for their customers. An outsider may be valuable to conduct the audit since they are likely to focus on more measurable factors, and less on other considerations (e.g., history, relationships, personal preferences). Audits typically reveal savings opportunities, as well as opportunities for course corrections. After these opportunities are evaluated and ranked, changes providing the highest return on investment can be implemented. During implementation, monitoring and reporting procedures should be followed to ensure that projected goals remain attainable.

Plainview Growers in Allamuchy, N.J., installed an alternative energy system delivering wood pellets to a newly installed biomass boiler. The plan is for the biomass boiler (Crone, B.V., Netherlands) to be fired in the near future with biomass pellets produced on the farm (from switchgrass and/or Miscanthus).

As part of an NRCS funded project, the New Jersey Agricultural Experiment Station is currently developing checklists and other tools for growers to use in conducting their own audits of greenhouse facilities. These self audits are intended to identify the areas of greatest opportunity for improvements and to deter-

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Kube Pak Corp. in Allentown, N.J., installed rollup fan shutters (RollSeal, Inc., Bremen, AL) reducing air leakage and energy loss when the exhaust fans are turned off.

An example using alternative energy (cogeneration) is this landfill gas-fired microturbine system installed at the Rutgers EcoComplex greenhouse in Bordentown, N.J. (Ingersoll Rand Co., Portsmouth, NH).

mine whether the services of an outside auditor may be useful. For further information, contact A.J. Both (both@njaes.rutgers.edu) or Tom Manning (manning@njaes.rutgers.edu).

Information gathered through audits can be used to develop longer-term (5-10 year) business strategies incorporating sustainable practices. For example, a greenhouse grower can aim to reduce fuel consumption by 5% per year over the next five years; reduce chemical applications in favor of alternative or IPM practices; or recycle a certain amount of the waste generated from crop production. When developing an updated business strategy, enlist input from employees and feedback from customers. Both groups have a significant impact on the bottom line.

Common sustainable greenhouse practices include energy conservation and energy savings. Greenhouses are designed for maximum light transmission, which typically results in increased heat loss during the night and colder times of the year compared to insulated buildings. Reducing greenhouse heat loss and improving the efficiency of converting fuels into usable heat reduces operating expenses and fuel consumption. Similarly, installation of energy efficient equipment reduces operating costs and electric consumption. Producing crops with less energy is becoming an attractive selling point to consumers.

Reducing water use is another goal, whether forced by drought or implemented as a conservation practice. Recirculating irrigation systems have been developed, and more growers are constructing rainwater collection systems. Recirculating systems often include water treatment so water reuse does not increase water-borne disease pressures and minimizes the residual effects of chemicals in the water. Access to sufficient high-quality water is an increasing challenge, and adopting sustainable water use practices is vital to our industry's future.

Another obvious sustainable practice is waste reduction and management. Much of the waste generated from crop production can be reduced or recycled (pots, containers, media, plant biomass, etc.). Some of our products create significant waste for the buyer/consumer, e.g., plug trays, bedding plant flats. Many growers implemented waste reduction and management strategies and identified profitable uses for a variety of materials that were previously discarded (e.g., composting plant biomass, burning biomass for heat generation, recycling waste materials).

To residents of densely populated New Jersey, current land management is not sustainable and wider scale planning is advocated to provide for all our future land needs (residential and commercial space, transportation, agriculture, recreation, etc.). While the issue is disputed politically, for our industry concentrating greenhouses in designated Ag Enterprise Zones can result in improved infrastructure (roads, utilities, suppliers, etc.) increasing efficiencies and sustainability of the entire area.

An area of sustainability not often considered is information sharing. Most greenhouse operators willingly share information about crop production practices but are less willing to share confidential financial results. This is understandable. After all, greenhouse businesses compete for customers. However, as a result, it is difficult to benchmark how your business is advancing its sustainability goals compared to similar operations in the region or across the country. Perhaps more importantly, it is often difficult for a greenhouse operator to identify areas where improvements are possible as indicated by anonymous financial benchmark information pooled by colleagues. I believe sharing financial information can lead to increased efficiencies and ultimately increased sustainability.