This presentation will discuss some aspects of the subject of sustainable nursery production. It will cover the concept of sustainability in agriculture, a few of current topics relevant to the nursery industry, and couple of resources available to growers on the topic of sustainability.
The concept of sustainability in agriculture.
The term *sustainability* is often defined as “meeting the needs of today without compromising the needs of the future”, or sometimes “…of future generations.” One common way to conceptualize sustainability in agricultural production is to see at the intersection of three spheres: the economic, the social, and the environmental. Or “profit, people, and planet.” And sometimes called “the triple bottom line.” Sometimes people think of sustainability as doing things a little bit better, keeping in mind considerations of environmental consequences and social concerns, and considering how today’s production and business decisions influence the viability of the nursery operation in the future.
Economic sustainability involves considering long term profitability. While almost every aspect of a business’s operation plays into its profitability, a few aspects of economic sustainability include the efficient use of resources and labor, the production of profitable crops, and the interplay of short-term and long-term profitability. One question from this perspective is if decisions for long-term profitability would be different than those for short-term profitability. As a separate consideration, if resources such as fertilizer, water, pesticides, energy, and labor will become more expensive in the future, investing in equipment or knowledge to require less of these resources may be profitable.
Social sustainability includes considering how your operation affects all people outside your operation. Typically in discussions of sustainability in agriculture, social sustainability is mostly concerned with workers’ pay and living conditions, social justice, and also how agriculture contributes to the economic life and agrarian character of a community. In ornamental plant production, an additional consideration is the ways in which the products contribute to beauty and enhance the lives of their end-consumers.
Environmental sustainability in agriculture usually focuses on water conservation and water pollution prevention, as well as soil conservation. For container-grown crops, considerations of the sustainability of soilless media materials is sometimes discussed, with alternative materials—such as wood chips in the Southeast U.S.—considered. Some aspects of environmental sustainability are related to good production practices such as proper nutrient management, integrated pest management, and good irrigation practices. Other aspects may be somewhat external to crop production, such as recycling tailwater and using vegetated buffers to treat runoff and stormwater.
To a large extent, these three aspects of sustainable production coincide with one another: for example, the efficient use of water and fertilizers promotes the profitability of an operation, both in keeping down costs and producing better crops. The efficient use of water and fertilizer also conserve water resources and minimize the risk of nutrient runoff. Together these economic and environmental benefits enhance the local community through contributing economically and preserving local resources.
Putting these three aspects of sustainability together, sustainable nursery production is found at the intersection of economic, social, and environmental sustainability. Here decisions are made considering how today's production and business decisions influence the viability of the nursery operation in the future as well as considering the people and environment affected by these decisions.
Current topics in sustainability.
The concept of sustainability could apply to just about every aspect of production and management. Some topics that are sometimes discussed with the idea of sustainability include crop selection for better profitability; good water, fertilizer, and pesticide management; energy conservation, especially considering rising energy costs; labor supply and efficiency; marketing; and soil conservation, runoff prevention, and stormwater management.
One current topic of interest for the nursery industry is water conservation and availability. Water resources in New Jersey are strained by a combination of large population, residential landscapes, agriculture, industry, and environmental and recreational uses, despite being a relatively water-rich state. Outdoor water use, including for landscape irrigation, is a significant portion of residential water use, particularly in summer months. Total freshwater use New Jersey in 2005 averaged 1,930 million gallons per day, with the portion of this for public water supply and domestic well use being 1,038 million gallons per day. Given a population of about 9 million people, this amounts to about 120 gallons per person per day for just the domestic and well use.
This table is adapted from a U.S. Geological Survey publication, and was developed for a Rutgers Cooperative Extension bulletin. It shows the water use in New Jersey, in 2005, in million gallons per day. Public supply and domestic well—the two columns on the left—total 1,038 million gallons per day, or more than half of the total. The other notably large figure in the table is for thermo-electric power—second from the right—with 663 million gallons per day. Crop irrigation used 95 million gallons per day, or about 5 percent. When interpreting these values, it is important to appreciate that a distinction is often made between consumptive use of water and non-consumptive uses. Much of industrial, thermo-electric, and indoor domestic use of water is considered non-consumptive, since the majority of water is relatively quickly returned to a river or other surface water. In contrast, crop irrigation and landscape irrigation is considered consumptive water use, since the majority of the water evaporates to the atmosphere.
In New Jersey, water withdrawals over the last several decades have caused a lowering of aquifer levels and in some cases issues of saltwater intrusion into groundwater supplies. Since 1998, some aquifers have recovered, but in other areas they have not improved. Municipalities often impose watering and other water-use restrictions during drought conditions, and the state Department of Environmental Protection is considering developing a model ordinance that municipalities can adopt to restrict landscape irrigation throughout the year. These observations underscore the fact that water conservation will continue to be a resource management issue in New Jersey.
Water conservation
Importance to the nursery industry
- If the cost of water rises or there are supply limitations
- Good water management equals better nutrient management and better crops
- Public perception

The issue of water resources may directly impact the nursery industry if the cost of water rises or if there are supply limitations. Judicious water use benefits the industry since good water management leads to better nutrient management and better crops. Furthermore, the industry benefits from positive public perception of the industry as a good neighbor who conserves local water resources.
Industry actions that conserve water include: efficient irrigation systems and proper irrigation rates; rainwater harvesting; tailwater reuse; the possibility of reclaimed water use; and industry involvement in government and public discussions.
A second topic of interest to the nursery industry is water pollution prevention. In several areas of the country, there has been concern about the potential for nutrient and pesticide losses from agricultural lands including those in nursery production. This had lead to interest in laws or regulations in several states to prevent water pollution related to agriculture.
In New Jersey, several lakes and rivers are impacted by phosphorus pollution. Phosphorus can come from a variety of sources including home and agricultural fertilizers, wildlife wastes, treated wastewater, and many other sources. Nitrogen is a pollutant of concern in coastal waterbodies including Barnegat Bay and can also come from fertilizers among many other sources. Water quality problems in Barnegat Bay are usually blamed on increases in residential development in the watershed development in recent decades. The potential for pesticide runoff from agricultural land and residential development has been investigated nationally and in specific studies and areas.
Legal mechanisms exist to attempt to improve impacted waters. These include the Total Maximum Daily Load (TMDL) process where states determine the reductions of pollutants needed for rivers and lakes to meet their designated uses. While states historically have used education and voluntary approaches to address non-point source pollution, including that from agriculture, regulatory approaches consistent with state law are possible.

Locally, in Cumberland and Salem Counties, the upper sections of the Cohansey River and Salem River are both impacted by phosphorus and fecal contamination and are listed by the state Department of Environmental Protection as priority watersheds.
Nursery industry actions to prevent water pollution include: good irrigation management to minimize nutrient leaching and runoff; good nutrient management and integrated pest management; and the treatment of runoff and stormwater through tailwater recycling, vegetated filters, and other methods.
One other current topic of interest to the nursery industry is concern about the potential for impervious cover at nursery sites, including greenhouses and temporary structures, compacted soils, and roads. In evaluating the amount of impervious cover at nursery sites, it’s important to consider the distinction between connected impervious cover—where impervious surfaces like greenhouse roofs and roads drain directly to other impervious surfaces and then to stormwater conveyances like ditches and storm drains, and can contribute significantly to stormwater amounts—, and disconnected impervious cover—where impervious surfaces drain to pervious areas like grassed alleys or crop areas, and thereby contribute to stormwater runoff far less.
One final current topic of interest to the nursery industry is the prevention of soil erosion. Land in nursery production is usually stable through the use of grassed alleyways, perennial crops, shell or gravel cover on roads, and other practices.
As a final subject in this presentation, a few resources available to growers who are interested in exploring sustainable production in more detail.
One resource is the Rutgers Experiment Station sustainable nursery production website.

http://njaes.rutgers.edu/nursery/
Subject areas on this site include a list of expert faculty and publications.
Posted publications include guides specifically on sustainable practices,
and those on other topics such as irrigation and nutrient management.
One document available on this site is a manual for field nurseries covering sustainable practices.

http://njaes.rutgers.edu/nursery/documents/Protecting Natural Resources at Field Nurseries.pdf
Its cover.
And a few pages from it.
Sustainable Agriculture Management Practices (SAPM) for fertilizer application:

- Use fertilizer rates as well suited to crops.
- Use uniform application rates to conserve nitrogen more efficiently. This prevents over-application and runoff from leaching.
- Limit fertilizer use in the vicinity of water bodies to protect water quality.
- Incorporate fertilizers with slow-release formulations to minimize nutrient loss.
- Plant crops with a high nitrogen demand early in the season to maximize growth.
- Monitor crop nitrogen status regularly to adjust fertilizer application accordingly.

Fertilizer application efficiency:
- Precision placement (strip, broadcast) can improve efficiency by reducing leaching and runoff.
- Timing of fertilizer application is crucial; late application can lead to loss through volatilization.
- Crop rotation and residue management can enhance nutrient use efficiency.

New Jersey Agriculture Experiment Station
http://salem.rutgers.edu/nre/

http://salem.rutgers.edu/nre/contact.html