

Ag Progress Finds Better Ways To Manage Crops

ANDY ANDREWS

Lancaster Farming Staff

ROCKSPRING (Centre Co.) — Keys to protecting vegetable and fruit plants vary, but similarities in how the crops are irrigated and fertilized can be found. And farmers may soon benefit from data being collected in research plots at the Russell E. Larson Agriculture Research Center.

Last week, participants in the Ag Progress Days crop management tours were presented an overview of crop management techniques — many of which involve studies of fertilizer/irrigation (fertigation) practices and how to protect plant production as well as the environment.

Farmers should be aware of several integrated crop management (ICM) techniques, a field that involves a combination of integrated pest management (IPM) and the concepts of marketing, economics, labor, and production.

Various researchers were on hand at Ag Progress Days to provide fruit and vegetable producers with a first-hand look into how ICM is used in managing crops.

Tremendous problem

"Our labor supply is drastically reduced. We have a tremendous problem finding people who will work and who are willing to do the seasonal-type labor," said Rob Crassweller, associate professor, Penn State.

Crassweller detailed the importance of using ICM as the need grows for new methods of planting, maintaining, and harvesting fruit.

Penn State is studying different types of trellis systems, smaller tree varieties, labor-efficient operations, yield control, and other ways to help the fruit farmer deal with the changing economies of fruit growing.

Crassweller explained that with new, smaller tree varieties, the grower will be able to operate from the ground.

Reduce inputs

"We're trying to reduce the inputs that are necessary in order to produce the fruit," he said. This was usually the "last item" a farmer considered. ICM, said the researcher, places more emphasis on the marketing and management of the production cycle.

"We have to be prepared to spray, but we don't just go out

automatically and put a spray on," said Crassweller. Part of the management is timing the spray so that it is a lot more beneficial to the crop, while protecting beneficial insects that are part of IPM strategies.

Crassweller recommends that fruit growers obtain more detailed analyses of fruit tree samples — including the soil test and foliar analyses — to more effectively plan and implement better management practices.

Also, farmers should be aware of the studies with new and improved trellis systems, in addition to the computer package called the Penn State Apple Orchard Consultant, which will soon be available for sale from the university.

Culmination of integration

The computer package, Crassweller said, is the "culmination of integration, because now it's all in one package form." It combines many man-hours of expertise by various contributors in the field. The computer software will provide ready answers to specific problems that fruit growers encounter.

Vegetable farmers should consider how much they can gain from knowing about irrigation and fertilizer options. Understanding what is available — and what Penn State is researching — may be able to increase yield and profits.

In research in irrigation and fertigation undertaken by the center, better results were obtained when a blend of dry fertilizer and fertigation were used in pepper and potato varieties, according to Doyle Grenoble, Penn State horticulturist.

What the results indicate, said Grenoble, is to "stay away from either extreme" of using all-fertigation or all-dry fertilizer applications.

Important part

The group examined irrigation techniques for pepper and potato crops. "Irrigation is a very important part of an ICM system, because in the system one of the things we need to do is eliminate as much as possible stress from the plants, to keep them healthy and growing vigorously," said Grenoble.

The research studies scheduling of fertigation methods and how to deliver the right amount of water



Doyle Grenoble, horticulturist at Penn State, presents details of a moisture level chart used for irrigating peppers at Ag Progress Days.



Barbara Goulart, associate professor of pomology at Penn State, far right, explains how technicians use special thermocouplings to receive temperature readings of strawberry buds in several experiments at the Rockspring research farm.

and fertilizer to the soil at the proper time.

The schedule that is being followed is called a "benefit budgeting" scheme, which will study the roots and the soil in the root zone. Finding out how much moisture the soil holds at what field capacity will be used to "fine-tune" the rate, time, and amount of fertilizer and water.

Studies have involved both high frequency, small waterings and low frequency, larger waterings. Different varieties require different fertilizer and water rates. Also, soil

types must be analyzed to determine what can be used.

Nitrogen uptake

The researchers look at applying fertigation to the root zone and the possible benefits by studying nitrogen uptake in the plants through leaf samples.

"In the ICM system, there are a lot of factors that we have to look at and consider to determine what system is the best," said Grenoble. Monitoring plant insect and disease "economic thresholds" are the keys to determining the best ICM practices for the farmer, according to Ken Steffen, horticulturist at Penn State.

Steffen provided some detail on various tomato test plots at the Ag Progress Days tour. Different methods were used to grow the plants — one group using high input synthetic chemicals and irrigation, the other with high input biological materials and irrigation.

Types of materials

Different types of materials and their effect on plant growth, including trickle irrigation, fertigation, plastic and straw mulch, and combinations of trellis and non-trellis systems are being studied.

Some of the results, according to Steffen, were obtained using various ICM techniques, including organizational efforts (scouting), irrigation, materials (such as plastic or straw mulch), labor, and pest control studies.

Irrigation of strawberries is important to the survival and the

feeding of the crop, and how and when to irrigate may mark the difference between profit and loss for fruit growers.

The center manages 1-1/2 acres of strawberry plants, including several varieties studied for irrigation, fertigation, pest control, and weed control capabilities.

Frost devastating

"Frost, by the way, is devastating," said Barbara Goulart, associate professor of pomology at Penn State. "We can lose up to 50 percent of the crop here because of frost."

It is important for the farmer to understand how critical it is to apply water at the right times to the sensitive buds as well as the shallow roots of the strawberry plant.

Studies at the center on fertigation techniques, canopy preparation, and the susceptibility of the root zone to drought and other stresses may provide keys to better crop management.

Frost is under particular study at the center. According to Goulart, the center is subject to eight or more frosts during the blooming period. Application of frost-damage prevention using irrigation and the study of temperature on the development of buds may provide better ICM techniques for the farmer.

An expert system, using various temperature-monitoring devices, continues to gather data for irrigation control experiments. The information uncovered over a long period of time may help in formulating better ICM techniques.



This tomato test plot indicates strong, healthy growth using organic fertilizer and biological weed control, as part of the crop management tours at Ag Progress Days.