Growing Uncertainties

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After a very warm spring, temperatures dove at the end of April and threatened grape buds at Natural Selection Farm Winery in Washington County. Ken Denberg, like other owners of orchards and vineyards, watched the weather like a hawk. March had been so warm that fruit trees across the state budded and blossomed early, leaving them prone to later spring frosts.

When citrus crops face a freeze, growers will spray the trees because ice gives off heat and protects the crop. Most New York fruit operations don't irrigate overhead, but through driplines on the ground, so that isn't an option. Klein's Kill Fruit Farms hired a helicopter to push air around their Hudson Valley orchards, hoping to regulate temperatures and protect the buds.

Denberg couldn't do much but hold his breath and fret on Facebook.

"It's not one night I am concerned about," he wrote, "rather three in a row." He said his fingers were crossed, and asked friends of the winery's page to cross their fingers, too.

Luckily, he came out OK.

"I got tip burn on the grapes, lost maybe 2 percent of the buds," he says, though he's not out of the woods yet. Two years ago, 3 consecutive nights in May were below 25 degrees and he lost 90 percent of his crop. Spring 2011 was touch and go for fruit producers, too.

"Last year's tree fruit frost risk was something worth noting," says

Alan Lasko, fruit crop physiologist at Cornell University. “But this year’s early bloom was even more dramatic in terms of potential loss.” In 1945, there were similar conditions, a very warm March, followed by freezes once the apple tree’s leaves had come out and the fruit had started developing. Only 10 to 15 percent of the normal crop survived.

The New York Apple Association won’t make a statement about the 2012 crop until June, when the results of the weather can be fully measured. However, Lasko notes that stone fruits like peaches, plums and cherries were very hard hit. The maple industry had a hard time because of the warm weather, too, which abbreviated the long stretch of warm days and cool nights that sap production requires. The New York State Maple Producers Association won’t have numbers until June, either, but estimates that production was about 60 to 65 percent of normal.

What does this mean for New York state agriculture, and the $4.5 billion it contributes to the state’s economy each year?

“People who are in business have to cope with new realities,” says David Wolfe, chairman of the Cornell Climate Change Program Work Team, a group of researchers studying climate change. “This is the first generation of farmers ever who can’t rely on the historical climate to inform them about how to manage their operations down the road. That’s a moving target now.”

While some people may wriggle away from the term climate change, since 1970, the annual average temperature in the Northeast has increased by more than 2 degrees Fahrenheit, and in that same span, New York state’s winters have warmed by almost 5 degrees. In January, the United States Department of Agriculture released a new plant hardiness zone map, which is used by growers and gardeners to determine what varieties of plants can survive what temperature

swaths. And the new map reveals an ominous northward warming trend. For example, on the 1990 map, New York was divided mostly among zones 3, 4 and 5 (zone 1 is the coldest); now zone 6 has taken over most of central and western New York, while zone 3—the ideal zone for maple sugaring—has nearly disappeared.

Even if gardeners and growers aren't planting things that can live in warmer zones yet, they have been able to plant crops earlier. For instance, the Produce Project, Capital District Community Garden's youth powered farm in Troy, planted cool season crops like carrots and beets a full two weeks earlier than they normally would have.

Climate scientists predict more of this warming trend, and also an increase in high rainfall events. The rains of April 2011 and floods caused by tropical storms Irene and Lee are hard to ignore. Extreme weather is becoming the rule rather than the exception. Bearing this in mind, what, if anything, are farmers doing differently this spring because of last season's capricious weather?

Ken Denberg is long pruning to reduce bud damage.

Photo by Ken Denberg

"You leave quite a few extra buds in the event you do have frost damage, or you do have freeze damage, you still have lots to choose from," he says. Once the dangerous nights have passed, he'll begin to cut a lot of those canes off, leaving 10 to 15 buds per cordon, aka the arm of the grape vine.

Denberg established his three-acre vineyard seven years ago with some insulation against the elements. He chose varieties of grapes suited to cold climates. Some of the types he planted are hardy to almost 40 degrees below zero. Hedgerows buffer the vineyard from severe conditions.

Witnegamot Farm's hedgerows didn't keep Art and Suzy Place from losing about $20,000 in potential revenue when the Hoosick River swelled over their neighbor's riverfront land and flooded their Schaghticoke vegetable farm. While the Places haven't done anything differently this spring, they treated the affected fields much differently in the fall, testing the soil for contamination, and using moldboard plows to deeply turn over the soil. They planted cover crops, same as always.

The banks of the Hoosick near their farm have been repaired with riprap. The county shaped the banks with 1000-pound boulders, and planted trees and shrubs.

"We went out there as soon as the water went down," says Tom Sanford of the Rensselaer County Soil and Water Conservation District. "We went up and down the Hoosick River, looking for problems. Where we found damage we wrote up what was wrong and what it was going to take to fix it."

The county addressed these problems, and ones on other waterways in the county with grants from the state Agriculture and Community Recovery Fund. Homestead Farm in Cropseyville has had some work done, too, a culvert and roads repaired.

This helped the Bulsons get back into their fields. Linda Bulson says things have been pretty much the same on her farm, where she and her family grow vegetables and flowers for CSA members, and pasture-raise livestock and chickens.

"I'm always optimistic, that's no different," she easily declares, but after some thought, recalls one change. "I have never, ever before had to put in irrigation in April. We had to irrigate as we were putting crops in April."

They haven't had to use it again, though. The dry weather turned to rain. Bulson wishes for a little moderation.

Despite the flooding that stopped operations dead in their tracks Aug. 28, Richard Ball of Schoharie Valley Farms is also approaching the growing season as usual.

"We kind of got ready to get ready," he says, and didn't plant early, not wanting to risk much after having lost everything last year. The mild winter allowed them to repair roads and stream banks, and pick up debris. They too tested the soil for food safety issues and nutrient analysis, and planted cover crops, which they would have done, storm or no storm.

The farm's store, the Carrot Barn, is up and running, and spinach, he says, is some of the tastiest ever. Rhubarb is in, and asparagus and spring garlic are too, right on schedule.

“Looking at the fields,” Ball says of the farms around him, “you probably hardly realize anything was wrong. Farmland is plowing up pretty well. Crops are going in like they’re supposed to.”

The town of Schoharie, where 274 of 290 homes were flooded, is not bouncing back so quickly, he notes, but community spirit is strong. Ball sees an opportunity for changes off-farm, rather than on, in the aftermath. Maybe the dam could be managed differently, and the streams and banks need help, too.

“We went through a historic event,” he says. “What did we learn? What can we do better to respond to an emergency countywide?” Tom Della Rocco at the Farm Service Agency however, does see farmers reconfiguring their operations, thinking about how they store equipment or whether to cover crop.

“People are looking at establishing buffers on stream banks to help mitigate flood damage,” says Della Rocco.

While one farmer sold his dairy cattle right after the flood because there was so much damage to his building and milk dairy infrastructure that it wasn’t feasible for him to continue, most people are persevering.

While Claudia Kenny and Willy Denner faced some loss at Little Seed Gardens last year, their learning opportunity came earlier, in 2010, as they recovered from flooding and two hailstorms, and reconsidered the ways they ran their 97-acre Columbia County farm.

“We’re changing our plan for financial viability and that relates to extreme climate change,” says Kenny. “When we started farming we had an extreme month every year, and now it seems like every month is a record-breaking month.”

This means their business needs to be a lot more flexible. They've quadrupled their indoor growing capacity so they can sell vegetables year-round, and shifted more of their business to retailing at farmers markets, which keeps profits in their hands. The hailstorms made them focus more on short season crops. They still grow food that stay in the ground longer, like root vegetables, but recovery time is faster for other crops, like salad greens.

"We can have a new crop ready to harvest one month after damage occurs," says Kenny.

They've also been adjusting what parts of their property they farm, making more land available for use that's not flood prone. This year, they bought a rock picker to help make some higher ground suitable for growing vegetables, and move some of their 20 acres of vegetable production up off more vulnerable grounds.

All of these farmers are figuring out what to do with this weather, watching the forecasts, watching each other, and changing course. Support systems like Cornell Cooperative Extension can help provide information as needed.

David Wolfe and other researchers working on climate change at Cornell have put together fact sheets on Farming Success in an Uncertain Climate, and Farm Energy, Carbon and Greenhouse Gases. Wolfe and colleagues were among collaborators on a broad report commissioned by New York State Energy Research and Development Authority to help the state adapt to climate change. ClimAID was released late last year, and has a section geared toward agriculture. All of this literature contains the same general info. Heat stress will be an issue for crops and livestock, especially the dairy industry, since milk production drops as temperatures climb above 70 F. Cool-season

crops like cabbage—the state competes with California to be the number one fresh cabbage producer in the nation—don't and won't like heat, either. Increased pest and disease pressure will be in play, and there will be periods of too much, and too little water for crops.

These forecasts and the topic of climate change creep into conferences and field days for grape growers and other agriculture sectors, but reluctance to admit the realities of a changing climate temper interest in the subject. This contrasts with what Wolfe experienced when he spoke at a meeting in Ottawa with the ministry of agriculture, and farmer-leaders from across Canada.

"They were all about taking advantage of climate change and seeing this as a huge opportunity for their ag industry," Wolfe says. The opportunity was seen as something to be seized with government support like subsidies to help farmers get into the wine grape business, increase maple syrup production, and get into some crops they haven't traditionally grown, like soybeans and canola, corn and wheat.

For the time being, researchers are amassing data to help farmers here understand what is happening, and creating decision-making tools to help farmers figure out when to invest in adaptations.

"I think we can help them sort through, is this normal wacky weather, or is this really climate change, and something I should begin adapting to?" says Wolfe.

When to move to higher ground, or install drainage tile? Will cooling a dairy barn be worth the investment? When does it make sense to plant crops that have longer growing seasons, like peaches or watermelons?

The private sector is also gearing up to help agriculture adjust, not

necessarily to global warming, but to the associated conditions.

“We are consciously selecting for varieties that perform well under the given set of circumstances,” says Jan van der Heide from Bejo Seeds, an international company with breeding stations on all continents. Bejo has demonstration and research gardens in Geneva, in the Finger Lakes, where the cabbage-breeding program is focusing on developing varieties that can serve as lettuce alternatives, with good resistance to summer bolting and thin, juicy-textured leaves. They are working with Cornell to develop broccoli varieties that are suited to the warmer growing conditions along the East Coast.

One of the elements breeders at Bejo is selecting for helps plants deal with water problems.

“We need to have varieties that have a stronger root system to be able to take advantage of greater fluctuations in the soil and moisture,” says van der Heide. “When the ground is very dry, these root systems have to be able to strong enough to penetrate the soil and find whatever moisture is left there.”

The root systems also have to be strong enough to be submerged in water and perhaps sitting in waterlogged soils for four and five days at a time. These characteristics are already established in some of the root crops Bejo has developed. Bejo’s seeds are sold through a number of distributors, including Johnny’s Selected Seeds and High Mowing, names that gardeners and curious CSA members might know. Seth Jacobs of Slack Hollow Farm in Argyle, like other vegetable farmers in this story, isn’t consciously changing his seed selections yet. The adjustments he’s making to his system are market driven, such as adding a fourth high tunnel system to add capacity for winter growing.

Photo by Seth Jacobs

High tunnels are greenhouses—generally unheated ones—that allow farmers to extend the growing season. Starting in 2010, the USDA provided grants for farmers to erect high tunnels as part of a pilot program to conserve water, reduce use of pesticides, and increase crop yields. High tunnels give a jump-start to summer crops like tomatoes and peppers, allowing farmers to get them to market sooner, and stretch the amount of time farmers can sell vegetables in winter. They also protect crops from wind and water extremes.

Slack Hollow's fourth half-acre high tunnel—which is part of the USDA grant cycle—will put one-twenty-fourth of their farm under cover. Having fresh, locally grown spinach, arugula and mesclun mix to sell year-round at farmers markets and wholesale is valuable: That fraction of their crop ground yields about 40 percent of their gross. Jacobs, who runs the vegetable farm with Martha Johnson, says the high tunnels also help control the climate in season. This secondary consideration is becoming more important over time.

Rimol Greenhouse Systems made Slack Hollow's high tunnel. The New Hampshire based company's overall business has grown due to increased interest in crop protection greenhouses.

“It does not matter if you are located in Florida or Alaska, protecting our food supply with greenhouses will become ever so important as the world population continues to grow and weather becomes more unpredictable,” says Bob Rimol, owner and founder.

Jacobs sees the Northeast as fortunate, compared to other parts of the planet, in terms of climate change.

“The good news is there’s going to be enough moisture to continue farming,” he says. The irregularity of that water’s delivery is the problem. “To take advantage of the good soils and adequate rainfall overall, farmers are going to need good erosion control, good irrigations, and greenhouses play into it too.”

Like many who practice sustainable farming, Jacobs controls erosion by cover cropping, and contour cultivation. The weather is changing the way he farms.

During the warm stretch in March, he did every ounce of fieldwork he could. This was because last April was very wet. Albany rainfall measured almost 5 inches, compared to only 1.25 inches in April 2010. This year, rainfall was close to 3 inches.

“We all got caught with our transplants backed up, couldn’t work the ground,” he says. “You couldn’t work the ground, then you’d have two sunny days, but it wasn’t enough time to get the ground worked up and get the crops in.”

Any other year he might have let the warm weather go without taking advantage of it.

“I’m feeling a lot more scared when we go into these rainy periods,” he says. “Farmers are always nervous, but I’m even more nervous now.”

The reason farmers are nervous, he says, is that they’re gamblers.

“The whole thing is a gamble every time you plant,” he says.