2007 Annual Reports

Polyculture System for Urban Farmers

Taking an IPM Approach to Preventing Wheat Disease

OSU Vegetable Team Goes Digital

More Food Grown Near Home, Less Oil: Ohio State Tests Eco Plots for Small Farms Serving Cities

2/21/2008
WOOSTER, Ohio – Joe Kovach set out to gross $10 per row foot, equal to a robust $90,000 per acre, in his innovative farm plots of mixed fruits and vegetables.

So far, based on the crops that he has in production, the Ohio State University scientist has achieved exactly that. The two final crops in the lineup, apples and peaches, are set to start producing this summer.
An ecological pest management expert, Kovach is midway through a six-year study of four different types of polyculture modules – plots with a mix of such high-value crops as snap peas, green beans, blueberries, raspberries, strawberries, tomatoes and edamame, or edible soybeans.
He aims to determine the best-working layout – best in terms of economics, efficiency and pest density – for intensive mixed plantings by small farmers. He calls it "modular ecological design." The goal is food for urban consumers that needs precious little oil to reach them.
"The whole concept of urban agriculture is to grow the food close to where the people are," said Kovach, who holds joint appointments with the Ohio Agricultural Research and Development Center (OARDC) and with Ohio State University Extension.
Urban agriculture cuts shipping and fuel use; Ohio's rural/urban Medina County, for example, is closer to Cleveland than California is.
"My view," Kovach said, "has always been that eventually we're going to run out of oil."

Good for Small Farms, Big Yards

The researcher, who heads Ohio State's Integrated Pest Management (IPM) Program, designed, established and continues to study a total of 16 polyculture plots: four treatments replicated four times each. Each plot measures about 44 by 60 feet, good for small farms or even big yards.

The study began in 2005.

"My goal at the start was to get $10 per foot of row," Kovach said. "Of the six crops we had producing last summer, on average, we got $10 per foot of row. We lost on things like edamame soybeans, but we made it up on other crops.

"Right now, we're still not in full production," he said. "We don't have any

peaches or apples yet. So we haven't technically hit our goal. But I'm hopeful with everything producing we will. I don't think we'll have any problem reaching it."

The peach trees were planted in 2005. But spring frost killed their flowers in both 2006 and 2007.

The apple trees, planted in 2006, will start to bear fruit this summer.

"Then we'll really get an idea of how productive we can be," Kovach said. "The system's starting to balance out now. It takes a while. But I think we're reaching some stability."

Among the past three years' returns, all based on prices received through a local farmers' market: $1.99 per row foot for green beans in 2005; $3.65 per row foot for edamame last year; $5.67 for blueberries last year, the first fruiting year; $11.83 for tomatoes in 2005, $26.67 in 2006 and $25.52 last year; $9.21 and $12.65 for strawberries in 2006 and last year, respectively; and last year $13.27 for summer raspberries and $15.36 for fall raspberries.

Layouts Hinder Pest Spread

The four test treatments – solid row, mixed row, mixed row on raised beds and "checkerboard" – represent four different ways to arrange the crops.

The aim of each treatment is to earn a living – for a farmer or gardener to do it, that is – while keeping pests from doing the same.

The layouts are meant to stop or slow the spread of pests from plant to plant – previous studies having shown that alternating crops and heights can do that. Kovach wants to verify it and to see which arrangement does it best.

Each "solid row" grows a single crop, with crop height switching from row to row: a row of tall apples, a row of short strawberries.

The "mixed row" treatment has multiple crops in a single row but keeps tall types and short types together in their own rows: a row of tall apples, peaches and raspberries; a row of short tomatoes and strawberries. The same layout then is used in raised beds to make up treatment #3.

The "checkerboard" treatment has varying types of crops within a row and also alternates heights in the row. The same row down the line may have low tomatoes, high apples, low strawberries and tall peaches.

New High Tunnels a Boon

Changes made last year included laying weed-stopping landscape fabric in all 16 of the plots. And high tunnels were set up over four of the plots – one plot representing each treatment.

The landscape fabric eliminated the need to weed or mulch the plots. "Basically, weeds are a non-issue now," Kovach said. Weeding costs, thanks to the fabric, fell from $1.35 per foot to less than 10 cents per foot.

And the high tunnels – unheated structures covered by clear plastic designed to lengthen the growing season – boosted average growth inside by 14 percent when compared to the same crops grown outside.

Tunnel-grown raspberries especially saw big gains: the yield of summer raspberries inside went up by 96 percent, of fall raspberries, by 79 percent.

The tunnels added $9.50 per foot to the $3.20-per-foot establishment cost of the basic, non-tunneled, plant-in-the-ground plots.

The raised beds added $1.20 per foot to the basic establishment cost.

All together, the establishment cost for the raised-bed plots totaled $4.40 per row foot, for the high-tunnel plots $12.70, and for the raised-beds-in-high-tunnel plots $13.90.

Are raised beds, high tunnels or both in fact worth it? The results so far suggest that they are. Kovach said the yield jump seen in the raised beds – 20 percent to 125 percent more than the on-the-ground plots, depending on the crop and probably due to better drainage and fewer pests – paid for their extra cost the first year. After that, the yield jump is "pure profit," he said.

The high tunnels, meanwhile, will take another year or two to pay off their establishment cost. Then their higher yields should start to show up, too, as profit.

Overall, the crops in the tunnels saw different but generally fewer pest problems. For example, last summer, while Japanese beetles plagued outside crops, few of the pests ended up getting inside. Instead, the tunnel crops saw aphids and mites and also more powdery mildew, a disease.

The tunnel's benefits, including greater growth, higher-quality fruit, and earlier- and later-in-the-season yields, should more than offset such drawbacks, Kovach said.

The Japanese beetle indeed created tremendous problems last summer, Kovach noted, especially on raspberries and edamame. Populations of the ravenous pest were 15 to 20 times higher than they had been the past two

years.

"We kind of expected that to happen," Kovach said, since the beetle is a generalist and the plots serve a wide-ranging, general menu. Certain varieties of certain crops saw little if any damage, however – a possible clue to controlling the pest.

"If it wasn't for the Japanese beetle," Kovach said, "it would have been paradise out there."

Also invading Eden last year: deer, which jumped the electrified woodchuck-height fencing and caused modest but unwanted crop damage. Tall, plastic deer fencing went up.

The plots stand ready for 2008.

'I'm Pretty Optimistic'

"Right now I'm pretty optimistic," Kovach said. "We've accomplished our goal of increasing biodiversity out there. We have spatial diversity – we have different heights of plants – and we have temporal diversity through different planting times and different varieties and when they mature.

"I think we can produce a lot of food," he said. "But success all depends on your market. The more you can get, the better off you are; it's a lot easier to earn $10 per foot of row if you get $6 a pound for a crop versus $2. You really need to make sure that your market is available. I think that it is.

"All indications are that we're moving in a direction where this will work."

Photo: Joe Kovach's polyculture modules, located on the Wooster campus of Ohio State University's Ohio Agricultural Research and Development Center (OARDC), with high-tunnel plots in the background. Photo by Ken Chamberlain/OARDC.

Links: Ohio State modular ecological design research, http://ipm.osu.edu/pageview.asp?id=16. Ohio State high-tunnel research, http://www.ag.ohio-state.edu/~news/story.php?id=3392, http://www.ag.ohio-state.edu/~ news/story.php?id=3944.

Take an IPM Approach to Preventing Wheat Disease

2/11/2008
WOOSTER, Ohio -- As spring approaches, along with the subsequent "green-up" of Ohio's wheat crop, growers are looking to prevent the development and spread of barley yellow dwarf virus.

The virus, which is transmitted by several aphid species in either the fall or early spring, was found in relatively high levels in some wheat fields across Ohio last year, with as much as 20 percent of the plants showing symptoms of the disease in some cases.

Pierce Paul, an Ohio State University plant pathologist with the Ohio Agricultural Research and Development Center, said that growers are tempted to use insecticides this spring to control aphid populations and prevent the development and spread of the disease. OSU Extension specialists, however, are recommending an Integrated Pest Management approach, and indicate that spraying insecticides to control aphids may not be cost-effective.

"Any aphids present prior to spraying may have already transmitted the virus, while other aphids may continue to arrive in the field after the spraying. When spraying insecticides to control aphids early, growers should know that the residual effect of the insecticide may not last long enough to protect against later aphid population buildup nor virus transmission," said Ron Hammond, an Ohio State University Extension entomologist. "Though insecticides applied after infection will reduce the aphid population, it will not prevent the disease from developing once the plants have been infected." Paul said that growers should be aware of the fact that barley yellow dwarf virus development and the success of insecticide treatments to manage the disease are affected by several factors including the efficiency of aphid transmission of the virus, the source and strain of the virus being transmitted, the difference in aphid mobility and feeding habits, the age and susceptibility of plants when infected, and weather conditions.

Hammond added that spraying insecticides in the spring might not be cost-effective since yield reduction due to barley yellow dwarf virus is generally greater when infections occur in the fall rather than in the spring.
"Fields planted before the Hessian fly-free date are at greater risk for barley yellow dwarf virus development in the spring," said Paul, who also holds an OSU Extension appointment. "Barley yellow dwarf virus tends to be most severe in fields planted before the Hessian fly-free date at a time when

aphid populations are high and aphids are still actively feeding or in years such as last year when warmer than usual fall and winter conditions occur."
Recommended management tactics to prevent and control barley yellow dwarf virus include:

• Planting varieties less susceptible to barley yellow dwarf virus.

• Delaying planting until after the Hessian fly-free date to avoid fall infections.

• Implementing a balanced fertility program.

• Controlling volunteer wheat, barley and oats. For aphids to successfully transmit the virus, they normally need between 12 and 30 hours feeding to acquire the virus, and then four or more hours of feeding to transmit it. However, aphids are capable of acquiring the virus after feeding on infected plants for only 30 minutes and once they acquire the virus, they can transmit it to healthy plants for the rest of their life.
There are acceptable situations where spraying for aphids might be warranted. They include:

• Spraying when wheat is under drought stress with aphids present.

• Growing a variety known to be susceptible to barley yellow dwarf virus with aphids present.

• Growing wheat for seed.

• Intensively managing wheat for a 100-plus bushel per acre yield potential.

• Planting wheat before the Hessian fly-free date.
If using insecticides is warranted, log on to http://bugs.osu.edu/ag/545/sgiap.pdf for a list of labeled materials. For more information on wheat management, log on to http://agcrops.osu.edu.

The OSU Vegetable Team – Adapting to Grower Needs in a Digital World

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Introduction

The OSU Extension Vegetable Team has existed formally since the implementation of the team concept in the late 1990's, though it had existed informally for year's prior. The mission of the team is to serve the vegetable industry and growers in Ohio through highly integrated programs of research, instruction, and Extension. Traditionally, the delivery of programs has been through field days, vegetable schools & workshops, presentations at the annual Vegetable Grower's Congress, articles in trade magazines, and newsletters. The VegTeam is looking to expand its sphere of influence into the digital world by upgrading the VegNet website to provide production and management information in several new formats to growers.

IPM surveys conducted by the Great Lakes Vegetable Working Group revealed that 43-86% of growers occasionally or usually search for information on the Internet. To acknowledge this trend we need to take steps to proactively organize the existing and future VegNet content in an effort to retain and recruit grower traffic to the website.

The two objectives in our original proposal have been addressed as follows:

1. Creation of a revamped VegNet website.

Upon grant award notification, a series of three meetings were held April 5th, May 10th, and July 13th, between key members of the Vegetable team and staff at Communications and Technology. The substance of these meetings was to exchange ideas on the visual appearance, format, and content organization of the new VegNet website.

During these meetings, we clearly outlined two new key features of the new VegNet website, a digital library and an audio podcast archive. The digital library will be a collection of thumbnail images of pests and crop injury to support content referenced in the VegNet newsletter. It will also contain video clips generated and submitted by Veg Team members for the purpose of bolstering pest identification and illustrating pest management practices. Podcast content would initially be based on articles submitted to the VegNet newsletter. The podcasts will be posted in either all audio or audio plus images format. Currently 8 podcasts have been created based on newsletter content. Traditional content areas of the new website will include an online version of the VegNet newsletter, faculty web pages, current and archived research reports, presentations, trap reports, insect trap reports, weather links, and highlights of the vegetable production guide.

The maintenance of the new website will be distributed across members of the Veg Team so that updates can be more timely and frequent. A four hour PLONE training session was given to five VegTeam members and staff on December 7th in Columbus. Content is now being actively uploaded into the new website with an anticipated go live launch date of April 1, 2008. A mock up image of the new website is shown below (Figure 1).

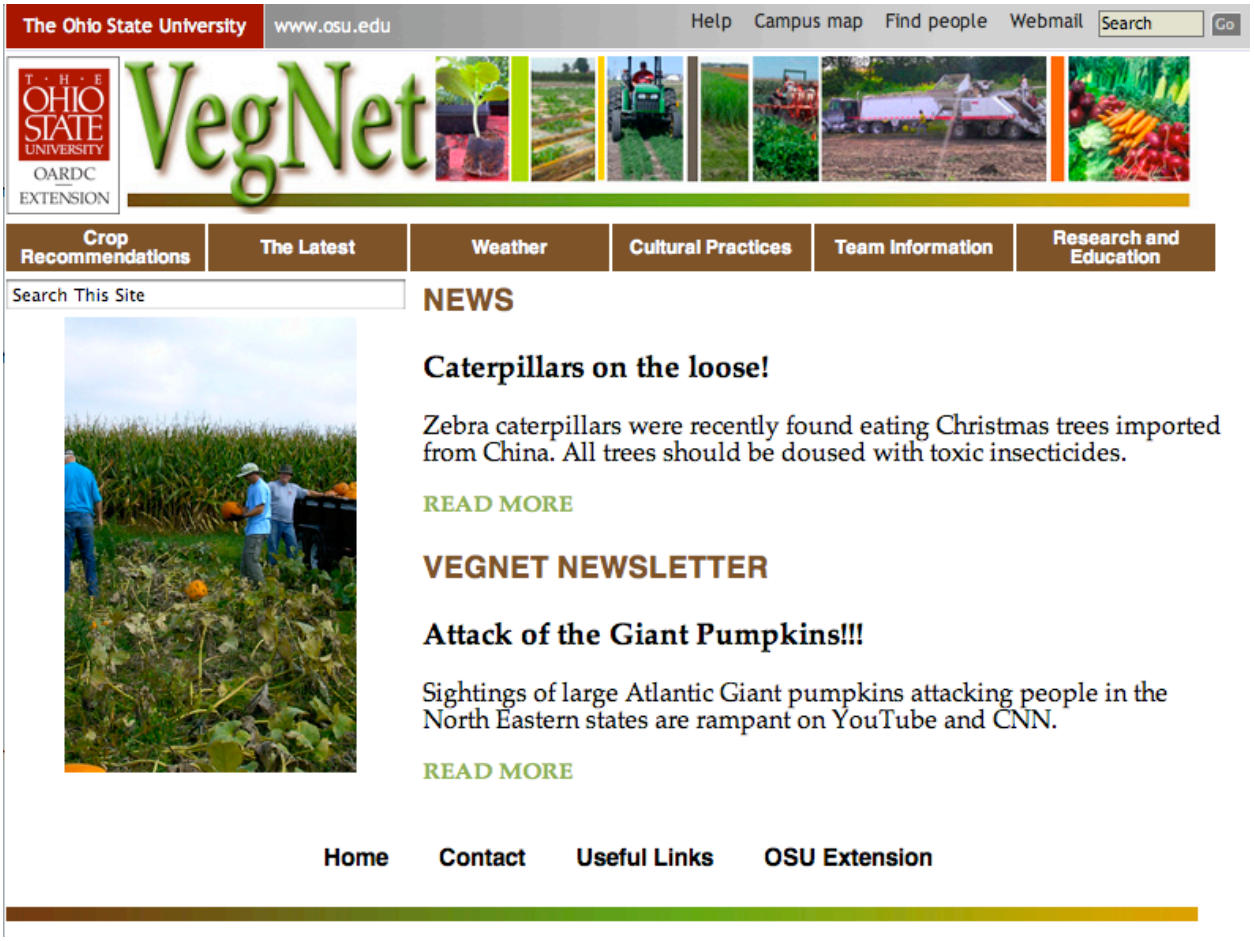

Figure 1. Screen shot of new VegNet website.

2. Creation of Rapid Alert System for Growers.

The second objective in our original proposal included the development of a cell phone based rapid alert system using Simple Message System (SMS) protocol to deliver small messages (ca. <150 characters) to text capable phones. These alerts would be issued based on significant pest discoveries throughout the state during the growing season. This objective had to be abandoned when it was discovered that broadcasting messages to several cell phones simultaneously skirted the boundary of cell phone telemarketing, an illegal practice. This objective was not carried out.