

Researchers converting WVU farm to organic methods

By DAVID P. WELSH

Public Relations Specialist, WVU College of Agriculture, Forestry and Consumer Sciences

Researchers at the WVU College of Agriculture, Forestry and Consumer Sciences are converting a 65-acre horticultural farm from conventional to organic farming methods to establish a resource for farmers and home gardeners trying to meet a growing demand for organically grown food.

The project, supervised by a team of faculty in the Division of Plant and Soil Sciences, is funded by grants from the U.S. Department of Agriculture (USDA). James Kotcon, associate professor in the division and a member of the research team, says the program is unique.

“In contrast to other research farms that compare organic methods with conventional production systems, the WVU farm will be devoted entirely to comparisons among organic production methods,” Kotcon explained. “Researchers will compare the effects of farming systems on crop yields, soil quality, and pest populations. An economic analysis of labor and management inputs will estimate profitability on a whole-farming-system basis.”

“Organic farming is intended to promote environmentally sustainable farming

practices that reduce use of toxic chemicals while protecting soil quality, reducing water pollution, and coexisting with wildlife populations,” Kotcon added. “Our goal is to provide growers with scientifically sound research on the farming practices that will help them achieve those objectives.”

The farm will include a demonstration market garden, field crops, perennial fruit crops, and permanent pasture and hay land. Organic livestock production also will be studied as part of the overall farming system. During the conversion, research results will be gathered to provide information for growers interested in converting to organic methods. Three years will be required to make the transition and obtain certification as an organic farm.

When the conversion to and certification as an organic farm are complete, long-term research will be geared toward supporting existing organic growers. The research focus will be divided between whole-farm systems and individual organic practices.

Hands-on experiences for WVU students in organic production methods will be an added benefit of the research program. The

researchers plan to make the farm available as “an outreach and demonstration facility, where the general public can observe specific agricultural practices and develop an understanding of the connections among

people, food, and land,” Kotcon said.

For more information, contact Kotcon by calling (304) 293-3911, or sending an e-mail <jkotcon@wvu.edu>. ●



The transition of the WVU horticultural farm in Morgantown to a completely organic operation will take three years.

IPM: A commonsense approach to managing pests

By JOHN JETT

Horticulture Specialist, West Virginia University Extension Service

Integrated pest management (IPM) represents a holistic approach to pest control that promotes good management and stewardship strategies. It involves understanding and observing many factors and their interrelationships as they influence plant growth. These include soil, water, air, nutrients, insects, diseases, landscape design, weeds, animals, beneficial organisms, weather, and cultural practices.

The goal is to manage problems at acceptable levels rather than attempting to eliminate them. In many cases, pest

problems can be prevented by selecting the proper plants and providing the best possible growing conditions. Regular observation of the plants in your landscape or garden is critical to help you decide if a problem requires corrective action. Plant problems may occur after a plant has been weakened by other factors, including poor site characteristics, cultural practices, or environmental and nutritional problems.

Before you can recognize or prevent problems, you need to become familiar with the plants, their growth habits, and the

conditions necessary for good growth. Here are some suggestions that may help achieve that goal.

- Make a plan of your existing landscape or garden. Identify the location of the plants and trees.
- Note which plants look healthy and those that have problems.
- Know what the plants *should* look like.
- Be willing to remove plants with chronic problems. For example, azaleas grown in full sun often have severe lacebug problems.
- Replace problem plants with plants adapted to your area. Check gardening references and reputable local nurseries and greenhouses for ideas.

Healthy soils lead to healthy plants. Here are some soil-building tips.

- Incorporate organic matter like compost or manures in flower and vegetable beds regularly.
- Perform a soil test every three years and adjust the pH accordingly.
- Fertilize as needed to maintain vigor.
- Avoid overfertilizing the soil, which can make plants more susceptible to pest problems.
- Establish deep soil beds for better rooting

IPM is not a strictly organic approach to pest control. When necessary, chemicals are applied; however, broad-spectrum pesticides are not the primary management strategy. Residual pesticides remain effective

IPM...

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in the environment for days, weeks, or months, which impacts beneficial organisms and pests. In all cases, the least-toxic solutions—physical, mechanical, biological controls—should be tried first. The impact of gardening and pest management decisions often extends far beyond property lines.

Concern for the environment, development of pesticide resistance, problems with pesticide safety, and the effects of pesticides on nontarget organisms have sparked interest in finding alternative means of controlling pests. One approach is to identify, establish, and conserve beneficial organisms. Beneficial organisms can be grouped into three categories—predators, parasites, and pathogens.

Predators attack and consume pests directly. They usually are larger and more active than their prey. For example, insect predators tend to move rapidly and have large eyes and forward-pointing mouthparts.

Parasites use pests as food sources for their young. For example, insect parasites lay their eggs in, on, or near the pest insect. The offspring then grow in or on the host, and eventually kill it.

Pathogens are disease-causing organisms such as bacteria, viruses, and fungi that can infect, kill, or debilitate insects and mites.

Predatory and parasitic insects are often collectively referred to as beneficial insects or “beneficials.” It is important to remember that many other beneficial organisms such as fungi, bacteria, and earthworms also exist in your yard.

Some common insect predators and parasites

- **Ladybird beetles** (ladybugs, lady beetles) are predators of aphids, mealybugs and other small insects. Adults vary in length from 1/8 inch to 3/8 inch. These can be purchased, or they will come into your garden or landscape on their own, as long as residual insecticides are not sprayed.



Lady beetle

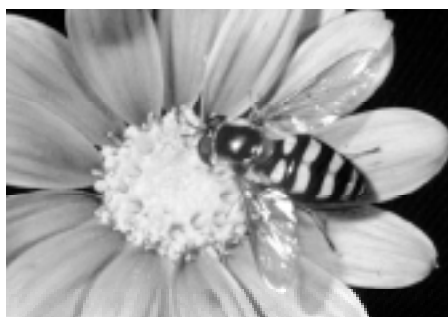
- Lacewings are predators of aphids and other small insects. Adults are 1/2-inch to 3/4-inch long, green or brown, with small heads and

large eyes. The wings are longer than the body, are transparent, and have a fine network of veins.



Green lacewing

- **Syrphid or hover flies** are aphid predators. The adults are 1/8-inch to 5/8-inch long. They resemble bees with yellow-black or white-black striped abdomens.



Hover fly

- **Praying mantids** are large, general predators. They will eat anything they happen upon, including each other. The green or brown adults are 2 1/2 inches to 4 inches in length, with long bodies, large eyes, and papery wings.



Praying mantid

- **Parasitic nematodes** are tiny, parasitic worms that are not harmful to humans, animals, or plants. These occur naturally—mainly in soils—and can be purchased to control clear-wing borers and cutworms. Some species work on insects that feed near the soil surface or inside plants. Others move through the soil profile to attack certain beetle grubs.



Juvenile nematode

Attracting and conserving beneficial organisms

To conserve and protect beneficial organisms in the garden or landscape, provide water, food, cover, nesting places, and a diversity of flowering plants. Reduce or eliminate pesticide use or switch to careful timing of biorational, nonresidual pesticides such as insecticidal soaps, horticultural oils, and *Bacillus thuringiensis* (Bt) products. Soaps, oils, and botanical pesticides have short-term effects on populations of beneficials compared to typical synthetic pesticides.

In addition, try to maintain a diverse habitat. Provide pollen and nectar sources for adult beneficials by growing a wide variety of annual and perennial flowers so that some plants are blooming throughout the growing season. Check the box below for some good choices.

Plants that attract and feed beneficial insects

Umbelliferae family:

carrot, yarrow, Queen Anne’s lace, dill, anise, fennel, coriander, parsley

Compositae family:

zinnia, marigold, aster, daisies, mums, black-eyed susan, coneflower, Coreopsis

Mint family and perennial herbs:

mints, thyme, sage, oregano, bee balm, basil

Other plants:

salvias, wallflowers, nasturtiums, poppies, many types of wildflowers

Provide water by misting or wetting down plants and mulch. This also cools the area during hot weather. Leave shallow, open containers of fresh water on the ground in the shade for birds, toads, frogs, turtles, snakes, spiders, and insects. A diverse habitat of trees, shrubs, and other plants provides shelter, hiding places, and overwintering sites. Straw mulch is especially attractive to spiders.

Here are some commonsense nonchemical control strategies for plant pests.

- Learn to tolerate some damage: Most healthy herbaceous and woody plants can tolerate 20% to 30% leaf defoliation without suffering long-term damage or yield reduction.
- Wait for the “good guys”: Aphids feeding in the spring alarm many gardeners. Natural predators and parasites usually clean up local infestations in about a month.
- Remove plant or plant parts. The simple disposal of badly damaged plants may minimize the problem on adjacent plants and prevent recurrence.
- The timing of seeding and planting is

important. Some pests can be circumvented by growing vulnerable plants when damage is least likely. For example, late-summer squash crops are less troubled by squash vine borer. This practice requires knowledge of pest life cycles.

Observation and diagnosis

While monitoring plants for pest problems, you should look at the area surrounding the problem plant. Consider such factors as exposure to elements, proximity to roads or buildings, lighting conditions, and drainage. Look for physical evidence of a problem such as injury, changes in site conditions, soil compaction, construction injury, lawn mower injury, insects, and diseases. Examine all parts of the plant including roots, shoots, trunk, and leaf undersides. Use a hand lens if necessary. Look for a pattern to the injury.

The ability to accurately diagnose a wide range of plant problems is developed over time by patient observation and consulting reliable reference materials. Timely diagnosis of plant problems can help you keep your garden and landscape beautiful and productive. It can also prevent expensive removal and replacement of damaged plants.

For additional information or names of suppliers of beneficial organisms, contact your county’s WVU Extension agent. ●

Composting adds value to farm operations

Researchers at West Virginia University recently examined composting, and their findings offer encouraging possibilities to West Virginia farmers. The research team—composed of faculty and staff from the WVU College of Agriculture, Forestry and Consumer Sciences, and sponsored by the West Virginia Agricultural and Forestry Experiment Station—explored the development of a manure composting system for dairy producers.

A bulletin outlining the study is available from the West Virginia Agricultural and Forestry Experiment Station. To obtain a copy, call the station at (304) 293-4421.

For additional information on composting or the study, contact Robert Diener, professor of resource management and research team member, at (304) 293-5031. ●

Forage budgeting helps producers manage livestock

By ED RAYBURN

Forage Agronomist, WVU Extension Service

Forage budgeting is balancing forage production and use. The three main types of forage are livestock carrying capacity budgeting, winter feed budgeting, and growing season pasture production budgeting.

Livestock carrying capacity budgeting

Whole-farm forage budgeting to determine the farm's livestock carrying capacity is done by the Natural Resources Conservation Service to evaluate the safe stocking level of livestock on the farm. Forage budgeting also looks at potential changes in stocking level because of improved forage management. Most farmers arrive at an estimate of their farms' carrying capacity through years of experience, including some accounting for risk because of drought and wet weather effects on pasture and hay production.

Winter feed budgeting

Livestock producers budget winter feed by maintaining (on paper or in their heads) an inventory of the hay supply on hand, which is tied to an estimate of the hay required to feed the farm's animals. The producer decides whether feed supplies are in excess or deficit of the herd's need. The farmer then knows if hay can be sold or must be purchased, or if some animals that normally would be kept need to be sold.

Pasture budgeting

Budgeting pasture production over the growing season is not as well managed by many livestock producers as the previous two forms. Often, pastures are undergrazed in the spring and overgrazed in the summer and fall.

This results in less than optimal animal performance because of overmature forage in late spring and inadequate forage availability in the fall. The pasture plants may be weakened by overgrazing since the reduced leaf area may not intercept enough sunlight for adequate root growth.

Research at WVU and other universities has shown that if pasture is grazed too short, animal performance is reduced. WVU research on continuously grazed, mixed short-grass pastures shows that the minimum pasture height for good animal performance is about 3 inches for the calf in a cow-calf system and 3 to 4 inches for a growing steer (Fig. 1). When pasture height is above the 3- to 4-inch level, animal performance may decrease because of reduced forage quality, if the excess spring growth is not controlled by haying part of the land or by using a variable stocking rate.

The growth rate of pasture varies over the season (Fig. 2). Managers must vary either the acreage grazed or the number of animals on the pasture as the season progresses, if optimum forage and livestock management is to be achieved. Another option is stocking for slower growth in August and clipping the excess pasture growth in June, to maintain quality. This waste of forage is sometimes the most economical approach where pasture and hay land are not situated next to each other. If none of these management practices is followed, animal performance will be reduced.

If overgrazing occurs, soil erosion increases, resulting in a loss of topsoil, soil fertility, and future productivity of the land. The eroded soil also reduces water quality for people living downstream from the mismanaged land.

Forage and livestock production can be optimized by using rotational grazing with a hay field buffer. The hay field buffer is where part

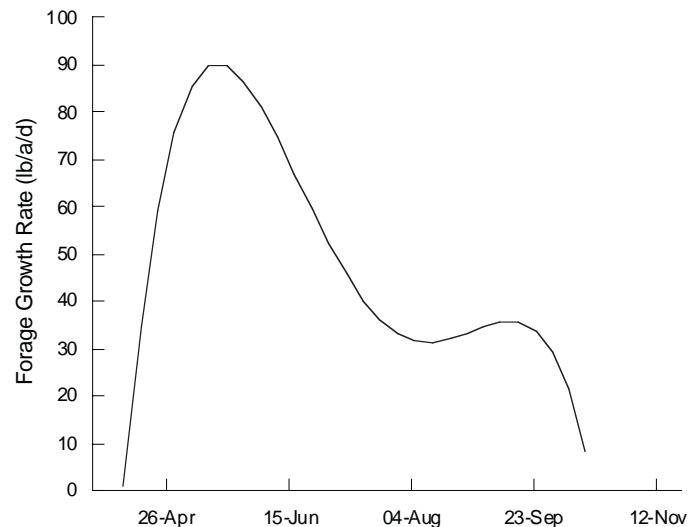


Figure 2. The effect of the date and year on pasture growth rate on fertile soil with good water-holding capacity.

of the land is harvested for first-cut hay, then brought into the system for grazing the hay aftermath. Under rotational grazing, a short grass (bluegrass-white clover) pasture should grow to 4 to 6 inches high, then be grazed to a 1- to 2-inch stubble. This results in an average pasture height of 3 to 4 inches during the grazing period, which is optimal for animal performance. This management is also beneficial for clover production in pasture. Under rotational grazing, tall grass stands such as orchardgrass-red clover should grow to an 8-inch height, then be grazed to a 2- to 3-inch stubble.

When drought reduces the pasture growth rate and animals begin to graze the pasture shorter than what is good for the pasture and animals, start supplemental hay feeding. Move the animals to a field that needs the fertility supplied by the manure from the feed. Above all, protect the grass over most of the farm so it will stay healthy for growing once the rains return.

When this management is followed and once moisture returns, the grass will grow up to twice as fast as it would if the livestock were allowed to graze it into the ground. If fertilizer is applied also, the growth rate may be even higher. In 1999, managers using these practices did feed hay much of July, but got the cows back on quality pasture in August and kept them on pasture until the end of December.

Budgeting pasture growth over the year—by using rotational grazing and hay field buffers, controlling grazing by using proper pasture height guidelines, and not overgrazing during dry weather—is the key to optimizing forage and livestock production and reducing the risks and damage from drought. ●

Effect of Pasture Height on Calf Growth

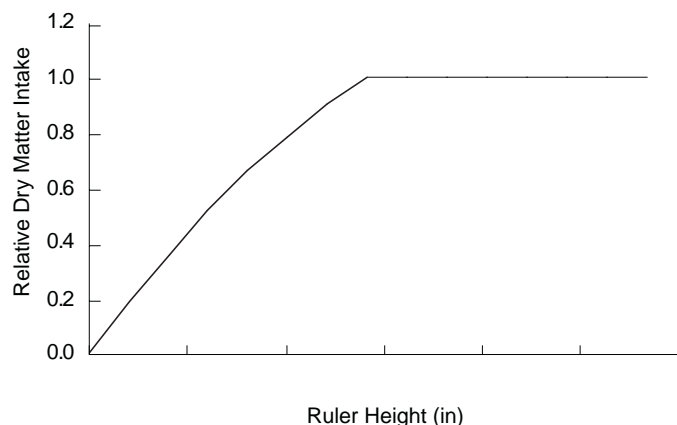


Figure 1. Expected effect of pasture height on calf growth in a cow-calf system.

Sources of live fish in West Virginia

By KENNETH SEMMENS

Aquaculture Specialist, WVU Extension Service

Do you know where to get fingerlings to stock your new pond? Perhaps you would like to get some eating-size trout for the Cub Scouts to catch. Maybe you just want a well-stocked private fishing hole to brag on. Whether it is trout, catfish, bluegill, bass, or another kind of live fish, someone somewhere has what you want if you are willing to pay for it.

When it comes to pond management, the first step should be to contact the district fisheries biologist with the W.Va. Division of Natural Resources. He may refer you to our Live Fish List (www.wvu.edu/~agexten/aquaculture/aquacult.htm). If you don't have access to the Web, your county Extension office can print out the list for you.

The Live Fish List names West Virginia vendors for eating-size fish (food fish), fingerlings, and more. The food fish section features 16 sources for trout, four sources of catfish, and one source each of hybrid striped bass and tilapia. The fingerling section features six sources of trout, three sources of catfish, and six sources for bass, bluegill, and other sport fish fingerlings. Bait fish producers also are listed. The list includes names, addresses, and phone numbers, as well as occasional e-mail addresses and Web sites.

In the past, you may have purchased fish through the Soil Conservation District offices—also on the Live Fish List—or from an Arkansas vendor you met at the Southern States Cooperative. Maybe you want the fish right away; need delivery to your pond; or were unhappy with the size, condition, price, or service the last time you bought fish. Purchasing food fish and fingerlings from West Virginia farmers might solve these problems.

Grass carp are another matter. Consult with the local district fisheries biologist to get a permit for triploid (sterile) grass carp. If you don't know who to contact, look up the names and numbers of district biologists listed on our Web site (www.wvu.edu/~agexten/aquaculture/recrpnds.htm). Visitors can download a copy of the application for a triploid grass carp importation permit. We also list vendors who have provided grass carp to West Virginia residents in the past. All are out of state. Most are located in Arkansas or obtain their fish from Arkansas fish farmers.

The next time you are looking for live fish to stock your pond, check out the Live Fish List on the Web, or contact your county Extension Service office to receive a list. ●

Plant invaders threaten forests, roads, fields

By WILLIAM N. GRAFTON

Wildlife Specialist, WVU Extension Service

Invasive plants infest more than 100 million acres of land and cost landowners \$123 billion annually. Invasive exotics are a major reason why 29 percent of all native plants in the United States are at risk of extinction. President Bill Clinton signed an executive order in February 1999 to coordinate a federal strategy that addresses the growing environmental and economic threat of invasive plants and animals that are not native to ecosystems of the United States.

All West Virginia landowners constantly fight invasive exotic shrubs, such as multiflora rose, Morrow's honeysuckle, and autumn olive, to keep them from invading forests, pastures, and fencerows. Forests are invaded and dominated by tree-of-heaven. Kudzu, common in southern West Virginia, is scattered statewide. It overruns large areas of openings and forest margins. Garlic mustard, dame's

rocket, and eulalia grass carpet the forest floor so densely that they endanger many of our wildflowers.

Pastures and meadows are excellent sites for common milkweed, chicory, teasel, blue thistle, white and yellow bedstraws, and spotted knapweed to invade when they are poorly managed. Musk thistle and *Carduus acanthoides* thistle are two weeds that are especially bad pasture-invaders in the Potomac River watershed. Leafy spurge is a huge problem in the western United States, but is seen only as scattered plants in Grant and Randolph counties. It should be on a "search and destroy" list.

Some of these plants get started on roadsides and spread to farms and forests. Crown vetch, birdsfoot trefoil, and sericea lespedeza are used to reclaim roadsides and disturbed areas; they later become invasive

weeds. Still others, such as Canada thistle, silvergrass, and common reed, spread along roads and railroads before colonizing fields and openings.

Purple loosestrife has escaped from road ditches and ornamental plantings and taken over wetlands and wet meadows. Reed canary grass, a coarse grass of limited grazing quality, is aggressively taking over wetlands and wet meadows. These wet meadows are often the salvation of beef producers during times of drought. Kentucky 31 fescue is great for reclamation, so-so for grazing, and deadly to cottontail rabbits and bobwhite quail. Kentucky 31 plants contain an endophytic fungus that causes abortions in rabbits and quail.

Japanese knotweed was introduced as an ornamental and now lines the banks of many streams and rivers where it is virtually impossible to eliminate. Mile-a-minute is a most unwelcome pest growing in Wood, Mineral, and Hampshire counties. Its 20-foot-long vines, covered with "fish hook" prickles, blanket roadsides and brushy areas.

These are some of the worst weeds, except those in cultivated fields and gardens. They can and do destroy native plants and are

highly invasive in farmlands, forests, and yards.

How can these invasives be controlled? They won't be eliminated. Herbicide sprays and pellets are probably the most widely used control method. Most are foliage sprays that are absorbed by leaves and move downward to kill the roots. Multiple sprayings usually are needed to kill plants and seeds that germinate when exposed to sunlight.

Farmers often use mechanical means such as mowing and brush-hogging before seeds mature. Native plant preserve managers often use handcutting, digging, and pulling, as well as controlled burning. Biological controls involving the introduction of natural enemies (insects and diseases) have been tried with varying degrees of success. Other landowners have used one of the strategies above and then planted the area with a competitive native plant that prevents invasive plants from returning.

Using a combination of methods is usually better than using just a single method. Perhaps the most important advice is to monitor your lands constantly. When you find a new weed, get rid of it before it multiplies. A stitch in time really can save nine! ●

Extension center helps farmers meet 21st century challenges

By RICHARD K. ZIMMERMAN

Director, Center for Agricultural and Natural Resources Development, WVU Extension Service

The WVU Extension Service's Program Center for Agricultural and Natural Resources Development (ANRD) has entered the new millennium on the run. I am very pleased with the strong program development occurring throughout the center. We are conducting programs in six major initiatives: Food Animals; Horticulture; Agronomy; Forestry; Agriculture Education; and Recreation, Wildlife, and Tourism. Under these initiatives our faculty have formed program teams, each led by a specialist and a county faculty member. Each initiative has focused on a primary program, such as beef production and marketing, vegetable production and marketing, and grassland management. Primary programs within each initiative area may shift from year to year in response to emerging needs such as a drought. This approach to programming fits well with the mission of the ANRD center.

A number of exciting and challenging situations have occurred and will continue this year. The center received an initial gift from the Bob and Jewell Evans Foundation in support of our extended grazing/grassland management program. In addition, several of our faculty are involved in a collaborative project with Virginia Polytechnic Institute, the WVU College of Agriculture, Forestry and

Consumer Sciences (CAFGS), and the U.S. Department of Agriculture Pasture Laboratory in Beckley to conduct research on managed grazing, warm-season grasses, and grass species diversity.

Further program partnering in grassland management involves the Natural Resource Conservation Service and the W.Va. Soil Conservation Agency. Obviously, forage (grass) production is very important to beef and sheep production in West Virginia, and ANRD is providing significant leadership in this effort. We anticipate additional outside funding, which will allow us to greatly expand our grassland management programs across the state.

Multistate programming is now mandated by the U.S. Department of Agriculture, and ANRD is moving quickly to respond. A recent survey found more than 30 examples of strong, collaborative, multistate programs being conducted by center faculty. In addition, we are planning significant multistate programs in conjunction with our Extension colleagues in the mid-Atlantic and Northeast regions. The programs will address farm efficiency and profitability and focus on livestock marketing strategies, forage utilization, and farm management skills.

One of the goals is to enhance profitability for agricultural producers. A program of significant impact in this arena is the calf pool-marketing program. This project of "pooling" similar animals based on age, weight, body condition, and—to some degree—genetics is providing significant market advantages for cooperators.

Another program that has had a major impact has been the agriculture dinner meetings held across the state. These meetings were initiated by Bob Cheves in Hampshire County nearly six years ago. They have become a major means of information delivery and in many cases a much-needed opportunity for farmers and their families simply to "get together" for an evening. Our faculty has provided leadership for more than 30 sessions since January.

Finally, the forest industry has a combined economic impact of nearly \$3 billion in West Virginia. In response to this industry's needs, the ANRD center and the CAFGS Division of Forestry are collaborating to redesign the Appalachian Hardwood Center to be a premier outreach/extension arm to the forest industry. We are searching for extension specialist positions in forest management, wood products, wood products marketing, and forest operations. We anticipate a \$150,000 grant from the legislature in support of our enhanced capacity to deliver quality programs to the state's forest industry.

The faculty and staff of Extension's ANRD center are prepared to help you with research-based information, which will enhance your skills and abilities to sustain your farm and forest enterprises. Please call on us to help you "put knowledge to work." ●

WVU UPDATE

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The West Virginia University Extension Service and the WVU College of Agriculture, Forestry, and Consumer Sciences are pleased to offer this educational insert to the Farm Bureau NEWS as a service to West Virginians. We welcome your questions or comments.

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