

Collaboration reaps water quality benefits

Working together, federal and state agencies, educators, and poultry producers are bringing about improvements in the way the Potomac Valley's growing poultry industry manages waste.

Through programs that deal with use of poultry litter for fertilizer and proper disposal of dead chickens, the West Virginia Potomac Headwaters Quality Improvement Project has set the stage for improving and maintaining high-quality stream conditions in Grant, Hampshire, Hardy, Mineral, and Pendleton counties.

The project, which began in 1992, includes educational programs to help producers develop nutrient management plans and technical assistance in nutrient and waste management as well as grazing lands management. The results have included increased local awareness of water quality issues and increased adoption of water quality improvement practices, according to Thomas Basden, West Virginia University Extension specialist.

"The goal of the project is to protect and improve water quality in the Potomac River," Basden noted. "This is being accomplished with voluntary producer implementation of recommended practices and systems."

Besides educational and technical support, the collaborative program makes financial assistance and incentives available to producers to help them accelerate their implementation of practices that protect water quality. For example, farmers who complete approved nutrient management plans are eligible for federal cost-sharing programs to help them install animal waste management systems.

Poultry production in the five-county region has increased more than 100 percent in 1993. More than 900 poultry houses are operating there, generating about 140,000 tons of poultry litter a year.

Used poultry litter and manure are rich in nitrogen and phosphorus, and many farmers apply it to their fields and grasslands for fertilizer. Applying too much, however,

can lead to a buildup of the nutrients in the soil. During wet weather, the nutrient-rich litter can run off into streams.

"When you boil it all down, it's a distribution problem," said Basden. "We've got a lot of nutrients generated in a concentrated area. One solution is to redistribute those nutrients to areas outside the watershed where the soil is not as fertile."

To facilitate that, project officials have established a toll-free hotline (1-888-3LITTER) to link litter producers with farmers looking for litter as a feed or fertilizer source. Since 1996, the service has helped to move more than 8,000 tons of litter out of the watershed.

Another program that officials have introduced encourages the construction of dead bird composters—above-ground, ventilated sheds where dead chickens are stacked between layers of manure and straw. More than 60 percent of the area's poultry farmers now use this method to dispose of dead chickens. Before this effort, about 3.5 million pounds of dead birds were disposed of in less environmentally sustainable burial pits.

Federal agencies cooperating in this program include the U.S. Department of Agriculture's Cooperative State Research, Education and Extension Service, the USDA Farm Service Agency, USDA Natural Resources Conservation Service, U.S. Geological Survey, and the U.S. Environmental Protection Agency.

State agencies include the West Virginia Department of Agriculture; West Virginia State Soil Conservation Agency; Potomac Valley Soil Conservation District; WVU Extension Service; WVU College of Agriculture, Forestry and Consumer Sciences; Potomac Headwaters RC&D Council; and the West Virginia Division of Environmental Protection. ●

WVU research targets environmental issues

By DAVID WELSH

WVU College of Agriculture, Forestry and Consumer Sciences

Just as there is no single cause of environmental problems, there is no single solution. Keeping that in mind, the West Virginia University College of Agriculture, Forestry and Consumer Sciences and West Virginia Agricultural and Forestry Experiment Station continue to pursue a multidisciplinary approach to environmental research.

Environmental research efforts in the WVU College's Division of Forestry center around uses and impacts on West Virginia's forest resources. Mary Ann Fajvan and Ray R. Hicks, faculty in the Division, are exploring the impacts of logging on water quality and forest stand development in Preston County, W.Va. Steve Hollenhorst is studying recreational uses of wilderness and backcountry conditions. A project by wildlife expert Kyle Hartman is exploring the effect of land use/forest management practices on fish and invertebrate production, measuring how brook trout respond to changes in water quality.

Faculty members in the Division of Plant and Soil Sciences are taking a similarly broad range of approaches to the issues of environmental protection. Devinder Bhumbla and Brad Bearce recently completed a study exploring the use of coal ash as a potting medium for ornamental plants such as roses. Jeffrey Skousen and John Sencindiver are exploring another use for coal ash, specifically as a tool in surface mine reclamation to neutralize acidity. Alan Sexstone and Gary Bissonnette, environmental microbiologists, have evaluated the impact of point-of-use/activated carbon filters for treatment of rural groundwater

supplies by evaluating the viability of microbial species in water samples.

The Division of Resource Management explores policy issues affecting environmental efforts. The factors that influence the effectiveness of watershed organizations were examined by Alan Collins, Timothy Phipps, and Jerry Fletcher, who found that the West Virginia policy of providing small grants showed a positive, statistically significant impact on watershed organizational survival. Collins, Fletcher, and colleague Dale Colyer are also exploring the benefits and costs of poultry litter transportation, to gather information to assess the economic feasibility of transporting litter away from the South Branch of the Potomac River to central West Virginia where soil nitrogen and phosphorous are in short supply.

The Division of Animal and Veterinary Sciences recently began a different look at the problem of poultry litter. Richard Russell initiated a study of the conversion of agricultural wastes to liquid fuels. Russell hopes to modify the liquefaction process currently used to convert coal waste to fuel to apply to agricultural wastes, such as manures, crop residues, and municipal wastes. He estimates that approximately one-third of the national energy use could be supplied by this procedure.

For additional information on research programs of the WVU College of Agriculture, Forestry and Consumer Sciences and West Virginia Agricultural and Forestry Experiment Station, please call the station at (304)293-4421, or visit their web site at <http://www.caf.wvu.edu/wvafes/main.htm>. ●

Time is right to spring forward into the greenhouse business

Highly specialized and intensive, ornamental plant production is one of the fastest growing agricultural industries in West Virginia.

While production costs are based on acres in field or row crop agriculture, greenhouse costs are calculated on a per square foot of growing area or per plant basis. In addition, expenditures for greenhouse structures and plant material are considerable.

Entering the greenhouse business requires a lot of planning since there's little room for error. Anyone considering this as a career must have a basic knowledge of propagation, plant nutrition, soil management, greenhouse structures, pest management, environmental control systems, marketing, employee relations, and business management.

Greenhouse operations often start as a single unit operated by a family. With modest-sized operations, experienced people assume the role of jack-of-all-trades. Larger operations usually require a full-time and part-time staff. Whatever the size, each must follow certain steps and make important decisions before starting a greenhouse business.

Selecting crops

Before you select a crop for commercial growing, it's important to determine the market potential. Every grower should conduct a market analysis to determine which crops, product sizes and quantities are in demand.

The crops are principally a function of the type of operation in which they are sold.

Wholesale operations might produce both cell-pack bedding plants and seasonal pot plants. Retail operations in urban markets may find a stronger market for larger bedding plants and a wide selection of flowering plants. For example, fall sales of large chrysanthemums in 3-gallon and larger containers may appeal to those who want "instant landscapes."

To determine which crops have excellent market potential, visit florists and garden centers in your area and in neighboring states. Local landscapers and professional gardeners also can provide insight into new crops. (See accompanying chart.)

Cut-flower consumption is high, but the majority of greenhouse operators produce potted and bedding plants. Although the information provided focuses on potted and bedding plant production, it is applicable to cut flowers as well.

Choosing which types of crops to produce will help establish the marketing channels. The primary marketing channels are wholesale and retail.

Wholesale growers

Wholesale growers produce a diverse group of plant material for use by vegetable growers or landscapers or for resale by florists or garden centers. They offer plants for daily, seasonal, or contract sales. If several local



Flowering plants appeal to busy homeowners who want "instant landscapes."

florists and garden centers need products in your potential trade area, consider a wholesale growing operation.

For successful daily sales, wholesale growers produce at least five different crops simultaneously. They produce various species and cultivars in order to have for sale up to 15 different items. In addition to blooming material, growers purchase foliage in Florida for resale.

Seasonal sales are based on the associations that many plants have with certain holidays or seasons. The wholesale-seasonal grower will produce a variety of plants but will specialize in the one or two most popular crops sold at a holiday. He or she usually sells directly to one or more major buyers. To increase the amount and price range of offerings, growers produce and sell diverse sizes and cultivars. For example, a grower may offer white, pink, or red poinsettias ranging from one bloom in a 4-inch pot to 25 blooms in an 8-inch pot. Growers will produce poinsettias for sale as early as Nov. 15.

If a landscape maintenance or vegetable industry is near the site you are considering, contract growing is a possibility. Contract growers produce specific crops under contract for one or more customers. For example, bedding plants grown for landscapers consist of cultivars based on the landscaper's need to quickly fill a planting area with crops in full color.

Landscapers may replant a given area three or more times a year with seasonal plants. In addition, landscapers' continuous replacing of damaged plants requires the contract grower to have replacement plants available at all times. To provide for replacement plants, contract growers must plant

continuously April through October. Initial plants are grown in 3-inch pots, but by late summer only 6-inch pots are in production.

Vegetable transplant producers grow specific vegetable varieties based on the requirements of farmers who have placed orders. Some producers grow one crop and then shut down the greenhouse for the rest of the season; others produce an additional crop of bedding plants to better utilize their greenhouse. Seeds are sown based on the farmers' anticipated dates of planting into fields.

The market for contract growers fluctuates. It is not uncommon for a grower to discard large portions of a crop during the season because markets do not materialize. Although the demand for products may vary, prompt servicing of landscapers' and farmers' needs is the cornerstone of a successful business relationship.

Retail growers

Retail growers produce crops to sell through their retail operations. A retail grower's crops may include some of the crops that a wholesale-daily sales operation produces. The exact product mix depends on the retail outlet. For instance, a retail grower with a garden center may produce crops for sale from mid-March through October. But a retail florist may produce crops for sale year-round with the majority of the production between January and June.

To increase the number of crops that can be grown in a year and decrease the amount of time the crop is in the greenhouse, retail growers often purchase prefinished crops. For example, a grower may receive prefinished poinsettias during the first week of October and

coming up...

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|-------------------|---|
| May 13 | West Virginia Agromedicine Meeting, 10 a.m.-4 p.m., Days Inn, Flatwoods.
<i>Contact:</i> David Workman, (304) 538-2373. |
| June 5 | State 4-H Shooting Sports & Safety Day,
Jackson's Mill 4-H Conference Center, Weston.
<i>Contact:</i> Jean Woloshuk, (304) 293-6131, Ext. 4238. |
| June 5-6 | Tamarack Garden Festival, Beckley.
<i>Contact:</i> Dot Montgillion, (304) 269-6416. |
| June 14-19 | West Virginia State Conservation Camp, Camp Caesar, Cowen.
<i>Contact:</i> Pam Godfrey, (304) 293-2694, Ext. 3436. |
| June 19 | Ohio Valley 4-H & FFA Heifer-Steer Review,
Wood County 4-H Campgrounds, Mineral Wells.
<i>Contact:</i> H.R. Scott, (304) 324-1960. |
| June 21 | State 4-H & FFA Horse Judging Contest, 4-T Arena, Bridgeport.
<i>Contact:</i> Jean Woloshuk, (304) 293-6131, Ext. 4238. |
| June 30 | State 4-H Forestry Judging Contest, Tucker County 4-H Camp, Parsons.
<i>Contact:</i> Jean Woloshuk, (304) 293-6131, Ext. 4238. |
| July 11-16 | West Virginia Summer Agriculture Institute, Potomac State College, Keyser.
<i>Contact:</i> Mary Beth Bennett, (304) 264-1936. |

then grow them for 10 weeks until they flower. Traditional wholesale growers would have the same crop in their greenhouse for more than 17 weeks.

Another strategy that works for retail growers is to produce crops that are not available from wholesalers during peak market periods.

During the spring, garden centers may have trouble purchasing high-quality flowering baskets, geraniums, impatiens, and begonias from wholesalers. Some retail growers produce only those crops that are in short supply and purchase the remainder of what they need from local suppliers.

Whether to undertake a retail operation depends mainly on two factors. The first is simply the grower's interest in retailing — many do not want to deal with consumers on a daily basis. The second factor is zoning restrictions, which prohibit many growers from conducting full-service retail operations on their property. Check with the appropriate county zoning office before beginning retail sales.

One additional consideration is space. Most growers who produce in less than a half-acre of greenhouse space market through a retail outlet.

Specialize or generalize?

Wholesale and retail growers both must decide whether to specialize or generalize their crops. Specialty growers improve their capability of efficiently producing a top-quality crop. When growers are able to reduce costs and improve quality through specialization, their products are more competitive than plant material imported from outside the region.

A common error new growers make is trying to diversify when they are still too small to service any one market. When small growers devote a major portion of their production area to one crop, they are able to improve their production program and become well known in the marketplace. The best advice is to first determine your options and then decide which option will become profitable most rapidly. ●

Tips for growing a blooming business

1. Location, location, location.

Location of a greenhouse is critical. Before deciding on the site, layout, and orientation of the greenhouse, however, a grower should have defined how and where crops will be marketed.

A retail operation should be on a well-traveled road, near major highways, or within 20 minutes of consumers because proximity to customers increases business. In addition, retail operators are required to have sales tax collection permits. Local Extension agents can direct growers to the appropriate departments to obtain permits and licenses.

A wholesale greenhouse should be where zoning restrictions will not limit expansion of the operation. Check with local county governments to determine restrictions that apply to a greenhouse operation. These include specific licenses or permits required to operate one. For example, only certified users may apply restricted-use pesticides. Land cost and zoning restrictions in and around most cities often preclude the establishment of wholesale operations.

2. How's the water?

Each year you will need up to 6 acre-feet of water for every acre of greenhouse. The water can come from such sources as wells, ponds, or city utilities. Some growers use low-yielding wells by pumping water into holding tanks or ponds, and then pumping from these large reservoirs at high-demand times.

Not all water is suitable for irrigation purposes. Before using any water, have it tested by a commercial water testing lab that has experience with greenhouse water requirements. State and local health department water tests will not alert you to excessive sodium, iron, or pH problems that should be corrected before using the water for plant irrigation. Finally, pond water should be chlorinated at the time of use to kill algae and root rot organisms.

3. Workers needed.

The greenhouse business is labor intensive, and obtaining experienced employees can prove troublesome. A readily available labor force and support services should be within 20 minutes of a greenhouse site. When determining area labor supply, investigate the competition for both skilled and unskilled seasonal help.

Most greenhouses have peak labor requirements from February to June. In order to attract skilled employees, some greenhouse managers allow workers to create their schedules and expand the employee pool to include retired and disabled people.

Labor-reducing equipment, such as automated irrigation equipment, computer-controlled heating and cooling systems, automated seeders, and potting machines, can decrease labor requirements. Although the initial capital outlay is considerable, these devices enable growers to increase productivity with fewer but better trained permanent employees.

4. Let there be light!

A greenhouse site must be free from both winter and summer (deciduous tree) shadows. Adequate space for expansion of greenhouses and support areas also should be available. An east-west greenhouse will transmit about 25 percent more light than one situated north-south. On the other hand, greenhouses that are connected together should be constructed north to south to provide even light coverage within the houses throughout the day.

5. Easy in, easy out.

Greenhouses must be accessed by adequate roadways and bridges. They are essential for delivery of supplies and pickup of finished plants. Retail operations should separate customer and service entrances and provide adequate parking. However, locating a greenhouse near parking areas with high lighting will limit the types of crops you can grow.

6. Check slopes and winds.

The natural topography of a greenhouse site is important. Greenhouse structures should be on slopes of less than 5 percent. This will facilitate moving carts of plants around the complex. Avoid putting greenhouse operations in a flood plain, frost pocket, or on a hilltop where heating bills will be high.

Nearby buildings or coniferous trees and hedges to the west and north of your greenhouse site act as windbreakers to slow winter wind before it hits the greenhouse, and they can greatly reduce heat loss in winter. Additionally, any windbreak should be far enough from your greenhouse to prevent shading. ●

Typical greenhouse crops and their availability

Month	Crop produced
January	spring bulbs, azalea, primula, cineraria, calceolaria, cyclamen
February	roses, spring bulbs, oxalis, cineraria, calceolaria, primula, cyclamen, azalea, lilies
March	hydrangea, kalanchoe, cineraria, calceolaria, primula, cyclamen, azalea, lilies, bedding plants
April	spring bulbs, azalea, lilies, gloxinia, heimalis begonia, bedding plants, flowering baskets
May	hydrangea, azalea, kalanchoe, lilies, gloxinia, potted roses, late flowering bulbs, geranium, new guinea impatiens, bedding plants, flowering baskets
June	gloxinia, heimalis begonia, foliage, hibiscus, gerbera, potted bedding plants
July	gerbera, gloxinia, streptocarpus, heimalis begonia
August	hibiscus, azalea, heimalis begonia, foliage, field chrysanthemum
September	foliage, gloxinia, azalea, hibiscus, ornamental pepper, field chrysanthemum
October	hibiscus, foliage, flowering cabbage, flowering kale, cyclamen
November	poinsettia, cyclamen, Christmas cactus
December	poinsettia, Christmas cactus, cyclamen, heimalis begonia

Base forage fertilization on yield, management goals

By EDWARD RAYBURN

Forage Agronomy Specialist, WVU Extension Service

Soil testing laboratories base their fertilizer recommendations on the analysis of a soil sample and an expected yield for the particular crop. Sometimes, it is desirable to know the fertilizer needs of a crop if the yield differs. The economics of fertilizer use changes according to the value of the crop.

The crop yield depends on the soil type, crop management, and the weather. An estimate of a soil's potential yield is provided in the county soil survey manual. Average yields under two management levels are published. (Use the yield level for good management.)

The accompanying table shows the yield estimate for selected soils in West Virginia. Yield levels such as these are based on experience in the area and are a reliable first estimate. However, with improved plant varieties and management, it is possible to exceed these published levels by 25 percent or more. Where improved management is used, crop yield records for the farm give more accurate information than general area-wide yield estimates.

Crop response to fertilizer

When looking at crop fertilizer response, it is helpful to express fertilizer rates as a multiple of the plant nutrients removed by the

crop. If the soil test is medium or high and phosphorus is applied at 1 times the crop removal rate, crop yields are 90 to 100 percent of maximum.

If no fertilizer is applied, crop yields will drop to between 50 and 80 percent of the potential yield. If you cut hay three times a year, a savings in fertilizer that reduces yields by half will increase the cost per ton of hay by 40 percent. On the other hand, applying more than the removal rate results in little yield increase. Soil test levels would increase, but the extra cost would return no value unless fertilizer inputs are reduced in the future to draw on this reserve fertility.

For potassium, the effect is almost the same. When the soil test is medium or high, an application rate of 1 times removal maintains maximum crop productivity level. Even at a potassium fertilizer rate of 75 percent of the removal rate, yield is near maximum. However, soil fertility will decrease. Again, with no added potassium, the crop yield drops to 30 to 90 percent of potential over a period of three to seven years. The drop in yield without potassium fertilizer is determined by soil type, crop yield, and forage species.

When soil test levels are low, crop yields will be greatly reduced if fertilizers are not used. For soils testing low in phosphorus and potassium,



Pastures require less fertilizer than harvest crops, since most of the nutrients are returned directly to the soil by the animal.

not applying fertilizer will decrease yields to 10 to 40 percent of potential for phosphorus and 30 to 70 percent of potential for potassium. For low-testing soils, the cost to get near potential yield increases since the fertilizer rate needed is 1.5 to 4.0 times the removal rate rather than the 1 times removal rate needed on medium- and high-testing soils.

On low-testing soils, fertilizing at the removal rate gives a yield between 40 to 100 percent for phosphorus and between 80 to 100 percent for potassium. The actual yield response depends on the soil's ability to fix these minerals and on how low the test is at the start.

So, what is the removal rate? When taking hay off a field, for each ton of hay removed, you are removing about 12 pounds of phosphorus and 45 pounds of potassium fertilizer. This can be replaced using about 25 pounds of triple-superphosphate (0-46-0) and 75 pounds of muriate of potash (0-0-60).

Nitrogen and lime

Use legumes with grasses on pasture and hayfields to provide economical nitrogen fixation and improved forage quality. Where nitrogen is used in place of legumes to grow grass hay or pasture, apply 150 to 180 pounds per acre of nitrogen from chemical fertilizer or available nitrogen from poultry litter or livestock manure. If you are using chemical fertilizer, split-apply nitrogen at 50-60 pounds per acre three times during the growing season.

The lime requirement from the West Virginia University soil test report is for raising the soil pH to 6.6. For grass and clover, a pH of 6.0 to 6.2 is adequate, and lime application may be decreased.

Your WVU Extension Service Office can provide information and worksheets to help you calculate the right fertilizer application for your forage crop. These resources are also available on line at the Extension Web site (<http://www.wvu.edu/~exten/>). ●

Estimated yield, under good management, for selected West Virginia soils for clover-grass and alfalfa-grass hay and grass-legume pasture.

Soil	Slope %	Legume grass hay		Pasture days/acre
		— tons / acre — Clover	Alfalfa	
Albrights silt loam	8-15	3.0	3.5	200
Berks shaly silt loam	15-25	2.0	3.0	170
Dekalb channery loam	5-12	2.8	3.2	120
Dekalb channery loam	12-25	2.6	3.0	105
Ernest silt loam	8-15	3.0	3.5	140
Frankstown silt loam	10-20	3.2	4.3	160
Frederick cherty silt loam	8-15	3.2	4.3	155
Laidig channery loam	8-15	3.0	4.0	130
Teas and Litz silt loams	15-25	2.4	3.0	100
Weikert-Berks complex	8-15	2.0	2.2	115
Westmoreland silt loam	10-20	3.0	3.8	135
Wharton silt loam	8-15	3.5	2.9	175

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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