AW93-011

COOPERATIVE EXTENSION

Pacific Northwest
Sustainable Agriculture
Farming for Profit & Stewardship

September, 1995 **Volume 7, No. 3**

Farm Business Workshops Offered in Fall of 1995

Washington State University Cooperative Extension, in concert with Grays Harbor and Centralia Community College, is pleased to announce a number of different farm business management workshops in the fall of 1995. Classes will be held mostly in the evening and on Saturdays.

Workshops have been designed for both the beginning, as well as the experienced, farmer. Instructors will include faculty members from both Washington State and Oregon State universities, Small Business Development Center advisors, and experienced producers from southwest Washington. A brief description of each workshop is provided. Key contacts include: Centralia Workshops: **Carol Miles**, WSU agricultural systems extension advisor, 360/ 740-1295; Montesano Workshops: **Don Tapio**, WSU Master Gardener Technology advisor, 360/ 249-4332; and for the Vancouver Workshops: **Charles A. Brun**, WSU Horticulture advisor, 360/ 254-8436.

Centralia Workshops, Centralia College

#1 Bountiful bamboo, September 14, 6:30-8:30 p.m., $10.

#2 Ginseng: Too Good To Be True?, Sept. 21, 6:30-8:30 p.m., $10.

#3 Home-based market gardening, Sept. 26, 6:30-8:30 p.m., $10.

#4 Hybrid poplar production and marketing, Oct. 3, 6:30-8:30 p.m., $10.

#5 Open space, Oct. 10, 6:30-8:30 p.m., $10.

#6 Organic production and certification, Oct. 14, 9:00 a.m.-4:00 p.m., $20.

#7 What about water? Oct. 17, 6:30-8:30 p.m., $10.

#8 Diversified small-scale farming (crops and livestock), Oct. 24, 6:30-8:30 p.m., $10.

#9 Estate planning—The next generation, November 11, 9:00 a.m.-4:00 p.m., $25.

#10 Soil management, Nov.14, 6:30-8:30 p.m., $10.

Montesano Workshops, Montesano Courthouse

#11 Hybrid poplar production and marketing, Sept. 26, 6:30-8:30 p.m., $10.

#12 Open space, Oct. 3, 6:30-8:30 p.m., $10.

#13 What about water? Oct. 10, 6:30-8:30 p.m., $10.

#14 Estate planning—The next generation, Nov. 9, 9:00 a.m.-4:00 p.m., $25.

Vancouver Workshops, CASEE Center in Brush Prairie

#15 Horticultural crop alternatives, developing a business plan, small fruit production, hydroponics and greenhouse production, Nov. 4, 9:00 a.m.-4:00 p.m., $30.

#16 Tree fruits, ginseng, specialty mushrooms, on-farm processing, Nov. 11, 9:00-4:00 p.m., $30.

#17 Farm financing, direct marketing, vegetables, organic production, Nov. 18, 9:00 a.m.-4:00 p.m., $30.

Resources

National Pesticide Telecommunications Network, 1-800-858-7378, now at Oregon State University, under the direction of Jeff Jenkins, will answer all types of pesticide questions, including those related to label information and uses. Also, in the same location, the **Extension Toxicology Network** will handle requests concerning pesticide toxicology, safety, and health issues.

The Orchard Almanac: A Seasonal Guide to Healthy Fruit Trees, 1995 Steve Page and Joe Smillie. Describes how small-scale and commercial growers can design and implement sensible orchard management systems. Includes tips on planting and pruning; soil and foliar fertilization; organic control of pests; restoration of old fruit trees; Integrated Pest Management; new fungicide-free varieties; safe use of pesticides; and harvest and storage. 154 pp. $16.95 (add $4 shipping and handling, plus 7.25% tax for California residents.) agAccess, P.O. Box 2008, Davis, CA 95617; phone 916/756-7177; fax 916/756-7188; email: agaccess@davis.com.

Attention Colleagues Interested in Community & Public Participation in Education and Research Programs

A new reviewed series of Western Region Extension Publications has just been released called "Community Ventures: Partnerships in Education and Research." Each of the publications is currently available at a cost of $1.00 from Bulletins Office, Washington State University, Pullman WA 99164-5912. 509/335-2857. The titles are --

WREP 127, **The Sondeo: A Rapid Reconnaissance Approach for Situational Assessment.** A *sondeo,* a short-term field appraisal, is used to learn about people's situations, experiences, problems and perspectives.

WREP 128, **Focus Groups: A Tool for Understanding Community Perceptions and Experiences**. Focus groups consist of an interviewer—facilitator and group of 8 to 10 participants who represent some larger population or group of relevance to the problem or situation being investigated.

WREP 129, **Ground Rules Equalize Power as Governmental Agencies Manage Citizen Involvement**. To accomplish full public involvement all participants require a level playing field and equal power.

WREP 130, **Volunteers as Partners in Community Action**. Over the last 15 years volunteers have become some of the most effective outreach workers for American universities and community related projects.

WREP 131, **Developing Community Participation and Consensus: The Delphi Technique**. As opposed to the sondeo approach, the delphi technique solicits anonymous, individual responses, without having participants come together for a common meeting.

Postharvest Cooling and Handling Publications

Northwest fruit and vegetable growers have come to realize that one of their best investments has been to install cooling facilities to extend the shelf life of the produce they raise. Recently North Carolina State University has released a series of free publications addressing this issue. **Design of Room Cooling Facilities** (AG 414-2) is a 15-page publication that provides a thorough discussion of how to calculate the heat load and resulting amount of refrigeration needed to cool various fruits and vegetables. A schematic for a 24' by 52' cooling facility is provided. **Proper Postharvest Cooling and Handling Methods** (AG 414-1) discusses common produce cooling methods including room, forced-air, hydro, icing, and vacuum cooling. **Forced-Air Cooling** (AG 414-3) provides a thorough description of the mechanics of how to build a pre-cooling set-up within a cold room. These are some of the easier to read cooling publications that I have seen. If you have been contemplating a cool room for your farm these publications will provide the perfect reading material prior to talking with a heating and cooling contractor. To order, write to: Publications Office, Box 7603, North Carolina State University, Raleigh, NC 27695-7603.

PACIFIC NORTHWEST SUSTAINABLE AGRICULTURE

This quarterly newsletter is printed for the Oregon--Washington Sustainable Agriculture Research and Education (SARE) program, through the College of Agriculture and Home Economics, Washington State University, Pullman WA 99164-6242. Please direct comments and changes to the mailing list to either of the editorial staff below.

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The intent of this newsletter is to discuss profitable low-input and sustainable farming systems and practices that protect both human health and environmental resources for Washington and Oregon.

A Summary of the *CSANR 1992-1995* Report

Colette DePhelps, CSANR Outreach Coordinator, Washington State University, 403A Hulbert Hall, 509/335-0183, e-mail: dephelps@wsu.edu

The establishment of the Center for Sustaining Agriculture and Natural Resources (CSANR) is unique. During 1990, WSU's College of Agriculture and Home Economics (CAHE) sponsored town hall meetings throughout the state. Interest and recommendations from the individuals who attended these meetings, and from a broad-based coalition of traditional agriculture and environmental groups formed the basis for the 1991 legislative initiative that created the CSANR.

CSANR's mission is to develop and foster agriculture and natural resource management approaches that are economically viable, environmentally sound, and socially acceptable.

Activities of the center are directed into three areas: teaching, research, and extension. CSANR's role includes facilitation and networking, funding, and education. The CSANR facilitates new linkages and better communication among diverse interest groups, WSU units, growers, agencies, industry, environmental groups, and the public. It identifies funding sources, research gaps, and needs; coordinates research and education grant proposals; and facilitates and recommends new research and education programs that sustain agriculture and natural resources.

The CSANR also provides factual information on relevant issues to a diverse audience through conferences, newsletters, on-farm documentation, tours, and projects.

CSANR activities fall into two broad areas: improving land stewardship and food systems education.

Improving Land Stewardship

Biosolids and Soil Quality. The CSANR is involved in a cooperative project with USDA-ARS Pullman looking at measurable impacts of biosolids on soil quality, soil tilth, potential soil erosion, and biological activity.

The results of CSANR—USDA's biosolids research on dryland wheat fields in Douglas and Adams counties are highly tentative. Initial research showed the application of biosolids raised soil salinity and decreased soil pH while favorably influencing several physical parameters.

CSANR
CENTER FOR
Sustaining Agriculture & Natural Resources

Polymers for Erosion Control. Cooperatively, the CSANR, NRCS staff, conservation districts, and the Washington Conservation Commission, established a 1994-1995 on-farm testing project to evaluate the effectiveness of using polyacrylamide (PAM) polymers in furrow irrigation to reduce soil erosion. In the first field test, erosion in the PAM treated furrows was reduced by 93%-99% compared with untreated furrows. This year, over 150 growers are using PAM in Grant County. Work on polymer use and environmental impacts is ongoing.

Development of Soil Quality Indicators. The CSANR and WSU Department of Crop and Soil Sciences have established a series of soil tests for use in evaluating soil quality and health.

Studies comparing alternate dryland crop rotations and CRP and wheat fallow are in progress. The rotation study has shown farms using grass or forage legumes in their rotations are higher in soil organic matter, microbial activity and biomass, and water infiltration than traditional wheat-pea rotations.

Results of the CRP study have shown positive trends for land held in CRP compared with land in wheat fallow. Both studies suggest more diverse cropping benefits soil quality and health. Soil quality indicators need to be further refined to provide definitive recommendations for growers.

Recycling and Composting on the WSU Campus. The CSANR facilitated the formation of a campus wide Recycling and Composting Committee with participants from academic departments, Food Services, Material Resource Services, the Physical Plant, and Whitman County. Together, the committee and the CSANR developed an action plan for composting at WSU including a grant proposal to WSU's Central Administration for the establishment of a composting facility on campus which was funded.

The facility has resulted in a substantial financial savings to the university by diverting animal bedding, food waste, nonrecyclable paper and coal ash from the landfill. The site also will be used for research and education programs. Due to the facility's effectiveness and the potential for composting additional

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Corn Earworm

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Corn earworm (*Helicoverpa zea*, once known as *Heliothis zea*) is a periodic problem in most corn fields in Western Washington. Most years it is generally benign, causing little damage, and other years it may be devastating to fresh market production. Late planted corn is most susceptible to corn earworm infestation. Corn earworm damage is not as critical in processed corn because ears are trimmed during processing and affected ear tips are removed. The fresh market, however, demands near zero infestation rates of corn ears. Because corn earworm damage varies dramatically year to year, due to migration patterns as well as climatic factors, it is not recommended that growers spray for control without first establishing current infestation levels. In large-scale commercial production, monitoring for male adults at the time or corn silking is a way of determining potential infestation levels. Planting before June 1 may be adequate to avoid high infestation rates. Fall plowing following a severe corn earworm infestation season may be an effective control technique as it exposes overwintering pupae to freezing temperatures and destroys exit tunnels. Natural flooding may also suppress overwintering populations. Most corn earworm damage appears to be caused by adults which can migrate up to several hundred miles from the southern region.

Life Cycle

In the Pacific Northwest, corn earworm (*Helicoverpa zea*) produce one to three generations a year. The insect overwinters about six inches deep in the soil as a reddish brown pupa. The first generation moths emerge in the spring. The moths are light grayish-brown in color, and have a wing span of about 1.5 inches. Moths can migrate several hundred miles which partially accounts for the year to year variability in infestation levels. Most flight activity occurs at dusk, which is when females deposit their eggs. Eggs are hemispherical, opaque white in color, and are deposited individually on the underside of the leaf by the first generation moth, or on corn silks by the second generation. Eggs hatch within 4 to 10 days, and young larvae begin to eat the surrounding plant tissue. Leaf damage by first generation larvae is generally not extensive and causes no yield loss. Ear damage by the second generation, however, can have a significant yield impact as infested or damaged ears are not acceptable to the fresh market. Second generation larvae penetrate the husk at the ear tip, and feed on kernels for 2 to 4 weeks. Infested ears can usually be detected by the brown frass which appears at the ear tip. Mature larvae drop to the ground and pupate in the soil. The second generation larvae must chew through the ear husk, leaving a round exit hole, to accomplish this final part of its annual life cycle.

Monitoring and Control

Pheromone traps have been available for corn earworm for more than 10 years and come in various shapes. The most common trap type used for monitoring corn ear worm is the Heliothis or Texas Trap developed by Hartstack et al.. Lures, which contain the female sex pheromone, are attached to the trap to attract male moths. Several studies have been conducted to relate trap counts to corn ear damage. In a 1988-1989 study in Brazos River Valley, Texas, trap count and egg number tended to be highest when corn ears were at the full-silk stage. However, in fields where corn flowering was not uniform, egg counts peaked 12 to 20 days after trap counts peaked and egg laying continued over a longer period. It is important, therefore, to relate trap count to corn growth. Where corn flowering and maturity appear uniform, peak trap counts are most likely to indicate peak egg laying.

To effectively monitor corn earworm, 3 to 4 pheromone traps should be placed at least 300-400 yards apart in the field prior to corn silking, and monitoring should continue until silking is completed. The bottom of the trap should be placed at silk height. Lures should be attached at the center of the bottom opening of the trap and replaced every 14 days. Traps counts should be made at least once a week. When the average weekly moth counts reaches 30, economic damage is likely to occur and an insecticide application is recommended. Spray applications should be made just prior to egg hatch. Eggs can be located on the corn silks, and will first appear opaque white, will then form a red ring, and 12 to 24 hours prior to hatching, a black head is visible within the egg. Spray applications should be made between the red ring and black head stages. For current insecticide recommendations, contact your local Cooperative Extension office.

Biological control of corn earworm is an alternative to chemical spray control. *Trichogramma* is the most widely used beneficial insect parasite, and it acts by laying its eggs inside the corn earworm egg. Levels of control using *Trichogramma* can range from 20 to 100%. *Trichogramma* is most effective when corn earworm populations are high. The first release should be made as soon as the economic threshold is reached (30 moths per week), and releases should be made every 2-3 days until the end of silking to insure a continuous population of *Trichogramma* in the field. A release is made by attaching a paper strip containing *Trichogramma* eggs to the underside of a corn leaf near the corn stem approximately 3 feet above the ground.

Product Sources

***Heliothis* trap**, also known as Texas Trap, and pheromone are available through IPM Technologies, 503-557-7511.
Trichogramma, traps and pheromones are available through Bozeman Bio-Tech Natural Products, 1-800-289-6656.

Publications

The Corn Earworm - Detecting and controlling in the Willamette Valley, OSU EC1180, 1984; and Corn Earworm, WSU EB 1455, 1987.

The Pre-sidedress Soil Nitrate Test (PSNT) for Field Corn

Ernie Marx, Department of Crop and Soil Science, Oregon State University, Corvallis, OR, e-mail: marxe@css.orst.edu; Neil Christensen, Department of Crop and Soil Science, Oregon State University, Corvallis, OR; John Hart, Department of Crop and Soil Science, Oregon State University, Corvallis, OR

Nitrogen (N) is the nutrient which most often limits plant growth. In agriculture, efficient N management is necessary to protect both the economic viability of producers and the environment. Insufficient N supply will reduce yields. Excessive N supply represents wasted fertilizer dollars and potential contamination of surface and ground waters.

Attempts to make accurate N fertilizer recommendations based on preplant soil nitrogen levels have met with limited success, especially in humid regions. Plants absorb N in the inorganic forms of ammonium (NH_4^+) and nitrate (NO_3^-). Approximately 97 %to 99% of the N in soil is present in organic compounds, and is, thus, unavailable for plant use. Organic N becomes plant available after being converted into inorganic NH_4^+ and NO_3^- by soil microbes through processes known as mineralization and nitrification. It is difficult to predict how much N mineralization will occur because microbial processes are highly dependent on climatic variables such as temperature and moisture. As a result, it is difficult to predict how much N the soil will supply to a crop and how much N fertilizer is needed. Preplant soil tests for NH_4^+ and NO_3^- measure plant available N at a point in time. But such tests have limited value because they do not reflect N that is potentially mineralized or lost from the system later in the season.

Pre-sidedress Soil Nitrate Test

Magdoff et al. (1984) developed the Pre-sidedress Soil Nitrate Test (PSNT) for field corn. The PSNT addresses the problems in predicting soil N supply by delaying soil testing as long as possible. By delaying testing, N mineralization and nitrification are allowed to occur and are reflected in soil test results. The PSNT is performed when corn is at the V5/V6 growth stage (Fig.1). The V5/V6 growth stage is identified by the presence of five to six collared leaves. The PSNT is performed at the V5/V6 stage because it occurs immediately prior to the corn plant's period of rapid N uptake. Also, the corn plant height at the V5/V6 stage is approximately 12 inches, which is the limit of the grower's practical ability to make a sidedress fertilizer application if needed.

applications are advised. If PSNT test values are below the critical value, sidedress N applications are likely to result in increased yields. In 17 states where the PSNT has been calibrated, critical values range from 19 to 30 mg NO_3^--N/kg soil, with ten states reporting a critical value of 25 mg NO_3^--N/kg. Nine states where the PSNT has been adopted report reductions in N applications averaging 25 to 30%.

While the PSNT is used with confidence to determine if additional N is needed, it is of little value in determining how much N to apply if fertilization is required. Uncertainty results from the poor correlation between PSNT values and relative yield on N responsive sites.

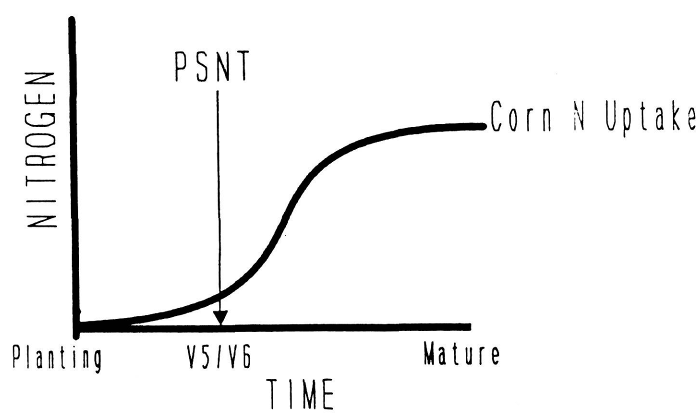

Figure 1. Timing of PSNT in relation to corn N uptake.

Magdoff and other researchers in the East and Midwest found the PSNT a useful tool for improving N management for field corn. The test is used to predict whether additional N might to result in increased yields. If PSNT soil test values are above an experimentally determined critical value, additional N is not likely to increase yields, and no sidedress N

PSNT Calibration in Oregon

Oregon State University researchers noted the usefulness of the PSNT for improving N management for field corn in the eastern United States and wanted to know if the test would work in the Pacific Northwest. A 2-year (1993-94) on-farm research project was conducted in the Willamette Valley to calibrate the

PSNT for Pacific Northwest climate and production conditions. Research focused on silage corn fields with histories of dairy manure applications. Manure constitutes a large pool of potentially mineralizable nitrogen. Because the PSNT is designed to account for mineralized N, it is especially well-suited for manured fields. Many dairies apply commercial fertilizer in addition to manure. An objective of this research was to provide growers with a method for determining if sidedress fertilizer N is needed, or if soil N from manure is sufficient for maximum silage yields.

Experimental Methods

Twenty-six experiments were conducted on 17 farms during 1993 and 1994. Twenty-three of the 26 sites had a history of manure application. Soil was sampled to a depth of 30 cm when corn was at the V5/V6 growth stage and analyzed for NO_3-N. Each experiment consisted of two treatments replicated four times. The treatments were 1) no additional fertilizer applied, or 2) sidedressed with urea at a rate of 200 kg N/ha. Plots were four to six rows in width and 8 meters in length. Growers continued to manage the corn fields containing the experimental plots according to their normal practices, with the exception that no additional commercial fertilizer was applied to the plots after the planting date.

At harvest, corn from 4 meters of the center two rows of each plot was harvested and weighed. Moisture content and dry matter (DM) yield were determined. Relative yield of the 0 kg N/ha treatment was calculated as a percentage of the yield of the 200 kg N/ha treatment for each experiment.

Relative yield and PSNT soil test data were analyzed using the Cate-Nelson procedure (Cate and Nelson, 1971). Cate-Nelson analysis separated data into two populations: 1) N responsive, and 2) N nonresponsive. The PSNT critical value is the dividing point between the two populations.

Results and Discussion

Relative yield and PSNT data are plotted in Figure 2. The plot is divided into four quadrants. Quadrant III contains sites where the PSNT predicted a yield response to N fertilization, and a response was observed. Quadrant II contains sites where the PSNT predicted no response to N fertilization, and no response was observed. Therefore, quadrants III and II represent correct predictions. Quadrants I and IV represent incorrect predictions. Data in quadrant I represent sites where the PSNT predicted a yield response, but no response was observed. In practice, this represents recommendations for unneeded fertilizer applications. Quadrant IV contains data from sites where the PSNT predicted no response to fertilization, but a response was observed. In practice, this represents lost yield resulting from the decision to forgo fertilization.

A PSNT critical value of 21 mg NO_3-N/kg soil was determined. This critical value correctly identified 23 of the 26 sites as either N responsive or N non-responsive, for a correct prediction rate of 88%. Similar critical values and prediction rates were found in research in other regions of the United States (Bock and Kelly, 1992). The PSNT gave an incorrect prediction of N responsiveness in three experiments, as shown by the three data points falling in quadrant IV of Fig. 2. The high rate of correct predictions suggests the PSNT can be used successfully when making N management decisions for field corn in western Oregon.

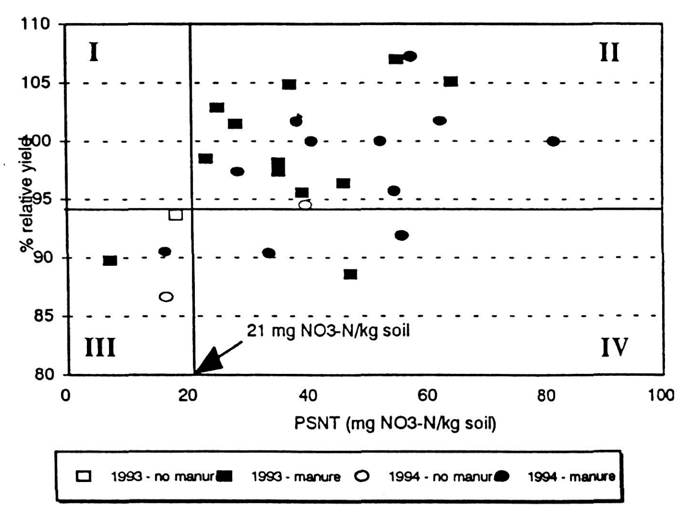

Figure 2. Cate-Nelson plot of relative yield and PSNT data. A PSNT critical value of 21 mg No_3^-N/mg soil was determined.

The distribution of data points in Fig. 2 lends insight into soil nitrogen trends on manured dairy fields. Only two (9%) of 23 manured sites were below the PSNT critical value of 21 mg NO_3-N/kg. Half of the manured sites had PSNT values of 40 or above, which is almost twice the critical value. In contrast, two (66%) of three nonmanured sites had PSNT values below 21 mg NO_3-N/kg. While the shortage of N responsive sites made it more difficult to calibrate the PSNT, the distribution of PSNT values is evidence of the opportunity to reduce fertilizer N inputs on many dairies. Fertilizer reductions can save growers money while yields are maintained. Concurrently, risk of nitrate contamination of water can be reduced. Development of N management tools such as the PSNT can aid growers in reducing N inputs while providing a certain degree of confidence that yield losses will not occur.

Conclusions

The PSNT can be used to identify N responsive and nonresponsive sites for silage corn production. A PSNT critical value of 25 mg NO_3-N/kg is suggested. This is slightly higher than the 21 mg NO_3-N/kg critical value determined by analyzing research data. The 25 mg NO_3-N/kg value is suggested to allow a margin of error and to be consistent with critical values in other states. From a practical standpoint, the difference between the two values is minimal.

While interest exists in expanding PSNT use into other warm season crops, at present the test has only been calibrated for use in field corn production.

The PSNT method is as follows:

1. **Planting:** If needed, apply a minimum of starter N in spring. Delay as much N fertilization as possible until a midseason sidedressing.

2. **Soil sampling:** Sample soil when corn is at the **V5/V6 growth stage**, or at least a week before planned sidedressing. At the V5/V6 growth stage, corn has five to six collared leaves. This usually coincides with a plant height of about **12 inches** at the center of the whorl.

3. **Sampling depth:** Sample soil to a depth of **12 inches**.

4. **Number of cores:** composite composite sample of **15-20 cores.** The chances of obtaining an accurate measurement of soil nitrate decreases as the number of cores collected decreases. Avoid sampling where fertilizer may have been banded or in irregularities in the field, such as low areas. Mix the sample thoroughly in a clean container. Save a subsample sufficient to fill a standard soil sample bag.

5. **Handling the sample: Dry the sample** immediately. Drying is important to stop biological activity that could alter soil nitrate content. Air dry the sample by spreading it on a clean piece of paper in a warm, well ventilated area. A fan may be helpful in increasing air flow. If the sample cannot be dried immediately, refrigerate the sample in a cooler and dry later the same day. Freeze the sample if it cannot be dried the same day it is collected. Microwave drying of soil samples is not recommended.

6. **Soil analysis:** Send the sample to a soil testing lab to be analyzed for nitrate nitrogen (NO_3^--N). As an alternative to laboratory analysis, some quick-test field kits can be used. Not all kits are accurate enough for PSNT applications.

7. **Interpreting results:** If soil nitrate levels are **above 25 mg NO_3-N/kg**, no additional nitrogen fertilizer is needed. If soil nitrate levels are **below 25 mg NO_3-N/kg**, additional nitrogen fertilization is likely to improve yields. Additional N should be applied at the rates suggested in Table 1. The suggested rates are estimates, and are not derived from response functions.

Table 1. Suggested N fertilization rates based on PSNT values

PSNT value (mg NO_3-N/kg soil)	Estimated N to apply (lb.N/A)
0 - 10	100 - 175
10 - 20	50 - 100
20 - 25	0 - 50
over 25	0

Literature Cited

Bock, B.R. and K.R. Kelly, eds 1992. Predicting N fertilizer needs for corn in humid regions. Tennessee Valley Authority National Fertilizer and Environmental Research Center. Muscle Shoals, Alabama.

Cate, R.B. and L.A. Nelson. 1971. A simple statistical procedure for partitioning soil test correlation data into two classes. Soil Sci. Soc. Am. Proc. 35:658-660.

Magdoff, F.R., D. Ross, and J. Amadon. 1984. A soil test for nitrogen availability to corn. Soil Sci. Soc. Am. J. 48:1301-1304.

A Summary of the CSANR 1992-1995 Report *(continued from page 3)*

campus wastes, a 2.8 acre expansion is being considered.

Food Systems Education and Outreach

Food and Agricultural Systems Information and Education. The CSANR, in following its mission and responding to requests for information on farming practices and systems, has been working toward the development of efficient ways of brokering information and conducting outreach.

The CSANR initiated a new e-mail listserver, *CSANR-L*, to provide frequent updates on new information and events. CSANR staff also contribute to regional newsletters; develop written educational materials; and actively plan, implement, and speak at meetings and workshops on sustainable food and agricultural systems.

CSANR staff developed and taught a university level composting class in the fall of 1993 and 1994 and collaborated with Whitman County to develop a Master Composter class and Master Gardener Program. The center is also working with the Department of Biological Systems Engineering to explore the possibility of modifying the existing B.S. in Agriculture degree to create a more flexible, systems-based curriculum in food and agricultural systems.

Koppel Educational Farm. The CSANR is proposing a multidisciplinary teaching farm to develop at the Koppel Farm, a 13-acre parcel of land near downtown Pullman. The educational farm would be a place where students, educators, and the community can be actively involved in hands on agricultural education. In partnership with Pullman's Greystone Foundation, the CSANR has sponsored several educational programs at the farm. These include two spring fairs and small gardens developed and maintained by community members.

Networking and Rural Urban Understanding. Rural and urban citizens in the state are increasingly finding themselves in conflict over various resource uses and policy issues. One of the goals of the CSANR is to help resolve these conflicts by finding areas of mutual agreement and engaging in cooperative efforts to solve commonly-held problems.

The CSANR has secured significant new resources to further the development and implementation of more sustainable production systems, largely through cooperative on-farm research. New partnerships between consumers, agribusiness, environmental groups, and growers also have been established.