Winter 1994

BioOptions

Newsletter of the Center for Alternative Plant and Animal Products
UNIVERSITY OF MINNESOTA

BioOptions Library

This issue of the BioOptions Library features Ginseng. This high-value crop is an oriental staple that is gaining popularity in the United States.

In 1993, the Library featured Canola, Mushrooms, Blueberries and Deer Farming. If you would like more information on these or other topics, contact the Center.

Next time, the BioOptions Library will highlight Amaranth, an ancient crop of the Americas, that is experiencing renewed interest.

Start your own library of alternative agricultural or forest related opportunities by collecting the tear-out topic summary. Your library will grow with each issue of BioOptions and/or by requesting information from the Center.

Marketing Workshops & MFVGA Conference

Marketing workshops will be held on Saturday, February 5, at the Best Western - Kelly Inn in St. Cloud in conjunction with the Minnesota Fruit & Vegetable Growers Association's Annual Conference (MFVGA) February 3-5.

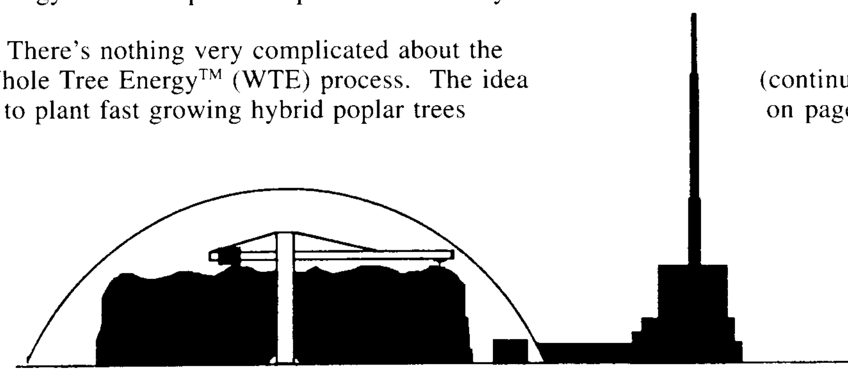
Four concurrent workshops include: Session I: Marketing Cooperatives for Specialty Crops and Products from 8:30 to 4:00 p.m.; Session II: Marketing Directly to Consumers from 8:30 to 12:00 p.m.; Session III: Expanding Farmers Markets in Minnesota from 1:15 p.m. to 3:45 p.m.; Session IV: Ideas For On-Farm Marketers from 1:15 p.m. to 3:45 p.m. Topics are geared for farm (continued on page 3)

Whole Tree Energy™: Coming of Age

Michael W. Ford

Going on the theory that bigger is better, investor L. David Ostlie is out to shake up the electric power industry with tree power. Ostlie and his company, Minneapolis-based Energy Performance Systems (EPS), have come up with a patented technology for using whole trees (everything but the roots and stump) as a utility-scale electric energy source. The technology is called "Whole Tree Energy™", and it's getting increasing attention from power companies looking for ecology-oriented options to produce electricity.

There's nothing very complicated about the Whole Tree Energy™ (WTE) process. The idea is to plant fast growing hybrid poplar trees (continued on page 3)



View of Proposed Whole Tree Energy$_{TM}$ Plant

Alternative Crops - A Banker's Perspective

Timothy Gossman, Root River State Bank

As an agricultural lender, I consider an alternative crop or livestock enterprise to be one that is new, or new to this area. It often lacks established costs, profits, yields and markets. This adds extra risk to both the farmer and lender, so any application for a farm loan of this type will be looked at carefully and perhaps more critically than a traditional farm loan. (continued on page 4)

Development '94

February 18, Detroit Lakes, MN

Congressman Collin Peterson of Minnesota's 7th District is sponsoring a one-day conference on February 18, 1994 titled "Development '94". The purpose of this conference is to stimulate community and economic development in Minnesota.

The conference features over 100 workshops and booths dealing with a wide variety of potential business and community development opportunities. Tourism, service sector businesses, alternative crop and livestock opportunities, marketing, manufacturing, and community development projects (continued on page 2)

Development '94

(continued from page 1) represent the diversity of opportunities that exist for rural Minnesota.

Two mini-conferences, "Telecommunications Technology as a Tool for Economic Development", and "A Road Map to Successful Cooperatives" will bring together experts sharing advice on how these methods will play an important role in the future vitality of rural America.

Congressman Peterson states "the key to prosperity for our district is more jobs, industrial development, value-added processing and community development. We sponsored the first Development conference last year and over 2,200 people attended. We expect Development '94 to be even bigger and better. Development '94 will continue to provide a format that promotes diversification and new opportunities in the area. During the day, you will hear from successful entrepreneurs and business advisors who have years of experience providing technical and financial assistance."

Development '94 will be held February 18, 1994 in Detroit Lakes at the Detroit Lakes Junior High School and Roosevelt Elementary, which are connected buildings. Shuttle services will be available from the parking areas.

Registration for the conference will be from 8-9 a.m. The conference starts at 9 a.m. and runs until 4 p.m. Lunch is included with a $10 pre-registration. Registration at the door is $20. For more information, contact Congressman Peterson's Economic Development Aide, Toni Merdan, 714 Lake Ave., Ste. 107, Detroit Lakes, MN 56501; phone (218) 847-5056.

The Center

The Center for Alternative Plant and Animal Products helps to bring the resources of the University of Minnesota to serve the needs of agriculture and our rural communities. Faculty from the Colleges of Agriculture, Biological Sciences, and Natural Resources make up the Center. Our Advisory Board of farmers, policy makers, business persons, and government officials help keep us on track. We provide service to the public through education, research, and by providing assistance to aid the commercialization of alternative agricultural opportunities. Agricultural economic development is our mission. We need your support and welcome your interest in Center projects.

"The best way to predict the future is to create it."
Peter Drucker

MARKET DEVELOPMENT AND PROMOTION DIVISION

MINNESOTA DEPARTMENT OF AGRICULTURE

Kevin Edberg

Minnesota is a large agricultural state, with a typical farmgate income of $6-7 billion annually. While more diversified than several other states in the region, over 80% of our farm income is accounted for by only six commodities: dairy, beef, hogs, corn, soybeans and wheat. Of these products, the majority leaves the state in non-processed form.

Given this situation, the Market Development and Promotion Division has developed two major areas of emphasis: to encourage greater diversity in production, and to encourage the value-added processing of agricultural products.

To support agricultural diversification, the MDA assists producers in identifying, developing and accessing markets for non-traditional animal products such as aquaculture, buffalo and deer. We also assist producers seeking non-traditional marketing systems such as farmers' markets and pick-your-own farms. Assistance is provided through educational programs, market research, organizational development and referral to other sources of assistance.

To encourage value-added processing, the MDA works with individuals and firms seeking to develop and market new food or industrial uses of agricultural products. We try to focus our programs based on the needs of small and medium sized companies. Assistance is provided through one-on-one consultation, educational workshops, trade show coordination, the linking of buyers and sellers, and referral to appropriate sources of assistance.

Producers and marketers interested in learning more about our services may request a brochure by calling (612) 297-2301 or by writing to Market Development & Promotion Division, Minnesota Department of Agriculture, 90 West Plato Blvd., St. Paul, MN 55107.

Whole Tree Energy (continued from page 1) on farmland close to a WTE™ plant, harvest and dry them seven to ten years later, then burn the trees whole in a special high-efficiency wood furnace. If the plant was near wooded areas, overage and/or declining trees from natural stands would work just as well. A common misconception is that wood doesn't burn hot or clean. Ostlie has found just the opposite: drying the trees (using waste heat from the plant) leads to high temperature combustion; the high temperatures mean rapid, complete combustion much different than home wood stoves and fireplaces. The heat generates high pressure steam, which would drive turbines, producing electricity. The simplicity of the process is a major reason the Electric Power Research Institute considers Whole Tree Energy™ the most promising base load renewable energy technology ready for commercialization.

Ostlie has spent the past decade developing the technology and making believers out of skeptics. In the late 1970s, he started tinkering with the whole tree idea in his spare time, building a small test furnace in his garage. On the job (as an engineering superintendent at Northern States Power) he started pushing the tree plan with utility executives. It was at NSP that initial testing and development got underway in the mid-1980s. In 1987, NSP decided to concentrate on its core coal and nuclear operations, leaving Ostlie's work in limbo. That led him to form his own firm (EPS) and renew the push behind the Whole Tree Energy™ technology, which by now was formally patented. From the start, Ostlie and WTE™ have passed one test after another, the most recent coming in 1992. It was that spring and summer that EPS and EPRI conducted a series of giant-size tests on Minnesota's Iron Range, including the successful stacking of trees to a height of over 100 feet. Every test ever done on Whole Tree Energy™ has exceeded expectations and shows that the technology is not only workable, but very promising.

While traditional agricultural crops took a beating in 1993 from record-setting floods all across the upper Mississippi drainage basin, test energy plantations of hybrid poplars survived and even thrived. Plantations have been a bedrock of the WTE™ plan since the early days. In 1986 through 1988, Ostlie helped initiate planting at various locations in Wisconsin, Minnesota, and the Dakotas. The Department of Energy, the U.S. Forest Service, EPRI and EPS have taken lead roles in maintaining the plantations in the years since 1988. The trees have grown at the predicted rapid place. In fact, many plots could be harvested now if a WTE™ plant was in operation. Ostlie says "these trees have seen drastic weather conditions on both ends of the spectrum, in 1988's drought and now the heavy rains. We continue to get valuable information on which species, which soils, which locations, which everything, are best for Whole Tree Energy™ in the Midwest." Ostlie believes success at the hybrid poplar test plantations is the foundation for WTE™ to build on.

Who will step up and build the first Whole Tree Energy plant? Ostlie and EPS think they will know by the end of 1994 or perhaps sooner. With restrictions on coal-fired plants increasing, WTE™ is drawing serious attention from power companies looking for help. Whole Tree Energy™ offers massive reductions in SO_2 and NO_x emissions relative to coal. It also answers the long-term dilemma of greenhouse gas emissions by soaking up as much or more carbon dioxide (via tree growth) than it gives off. Add to these selling points new government tax credits for earth-friendly electric power generation and Ostlie's Whole Tree Energy™ vision starts to come into focus. "We're close," says Ostlie. "People will be hearing a lot more about us in the next few years."

For more information contact: Energy Performance Systems, Suite 306, 4900 North Highway 169, Minneapolis, MN 55428; (612) 533-0503.

Marketing Workshops (continued from page 1) marketers of all types. Farmers Market managers, traditional growers, and specialty producers interested in learning about the possibilities of marketing cooperatives are welcomed.

The $25 registration fee includes lunch. Contact Kevin Edberg, Minnesota Department of Agriculture, at (612) 296-6382 or MFVGA at (612) 434-5929 for more information.

A Bankers's Perspective (cont. from page 1).

However, a lender looks at alternative livestock and crop enterprises using the same basic criteria as any farm loan:

Cash Flow: Will income from the enterprise exceed expenses, if not immediately, at some point in the future? If large expenses must be overcome before the project will cash flow, what will pay the bills until then?

Repayment Ability: Related to cash flow, but more specifically, will the enterprise make enough money to repay the loan? Repayment does not need to come from the new project if other farm or non-farm income is available to repay the debt.

Security: What items are available as collateral to be sold to pay off the loan if the original repayment plan does not work out? More collateral is usually required for a specialty operation, often $2 of security for each $1 of loan. It is easier to sell a tractor than a blueberry picker or a Christmas tree baler. Machinery designed or modified for a new crop may offer no security value at all. A loan for such an item would require another source of security.

Credit History: How has the loan applicant handled his loans and their repayment in the past? The manner in which a person has taken care of his/her obligations in the past is a good indication of how they will take care of them in the future. If a person has had credit problems previously, it is best to be up front with the lender and to tell them the facts and the circumstances concerning the problem. Chances are, the lender will discover the credit problem anyway, and dealing with it right away gives the loan applicant the opportunity to explain the situation.

Character: The most import credit factor, and listed last here only because it is the most subjective and most difficult to assess. The lender wants to know the loan applicant is honest, trustworthy, and has a thorough knowledge of the farming enterprise he is undertaking.

A lender looks at alternative livestock and crop enterprises using the same basic criteria as any farm loan.

From a banker's perspective, alternative agricultural projects are often best suited to established farmers. In a traditional farming enterprise, there is a well established network of suppliers, buyers and consultants. These are often lacking in an alternative enterprise. Since many of the skills needed for alternative crops or animals are similar to more common crops or animals, a person with a farming background will not have as much learning to do all at once. An established farmer may also have land or buildings available to try an alternative crop or animal project with less added expenses.

I would encourage farmers to try alternative projects on a small scale to learn the techniques involved and to see if it is economically feasible. Hard data from doing the project on their own farm will go a long way in convincing a lender that the enterprise can work for the farmer on a larger scale. This, along with other farming experience, will give the loan applicant more credibility with their lender. If possible, I would recommend that a farmer considering an alternative farming enterprise work with his current lender so that the lender is familiar with the farmer, and can focus on the new livestock or crop.

From a banker's perspective, alternative agricultural projects are often best suited to established farmers.

I do not mean to discourage people new to farming from beginning with an alternative crop or livestock enterprises. Certainly, conventional agriculture is not without problems, and in some cases a fresh outlook without a preconceived notion of how something "has to be done" can serve a new farmer well. New farmers may have an easier time with an alternative farming enterprise if they are employed in a job that would allow them the time to begin farming while continuing the non-farm job to pay for living expenses and the farming start up costs. The farmer could then become full time when the farm income is adequate to cover expenses. The lender is not concerned about the source of the income to cover expenses and replay the loan, as long as it is steady and predictable.

When you approach a lender to finance an alternative crop or livestock enterprise, be aware of the lender's concerns in the areas of Cash Flow, Repayment Ability, Security, Credit History and Character. Be an expert in your farming enterprise, and be prepared to explain it to your lender. Lenders tend to be conservative, and new and unproven alternative crops and livestock increase risk. However, agricultural lenders know that any type of farming involves a substantial risk, and that the conventional ways and types of farming are not always profitable today. I think you will find them willing and anxious to look at ways of helping farmers be successful in the future.

Be an expert in your farming enterprise, and be prepared to explain it to your lender.

Mr. Gossman is Vice President at Root State Bank in Chatfield, MN and a member of the Center's Advisory Board.

Director's Column

by Erv Oelke

Marketing, marketing, marketing!!! Marketing is key to success in agriculture. A workshop to examine new and existing markets, products and production systems was sponsored by the Center, MN and ND Extension, AURI, the Departments of Agriculture in MN and ND, several private agri-business organizations, and farmers that have had success in developing alternative agricultural enterprises.

The opening speaker, Mark Helland, President, Thom Consultants, (the economic development arm of Ottertail Power Company) noted that there is no one answer or appropriate response to economic development except that some initial risk must be taken. Capital is often lacking; however, funds may be obtained from loan pools by banks, state and federal grants, initiative funds and city funds. Mr. Helland indicated that economic development groups are now seriously looking at agricultural projects as a way to economically develop rural communities.

"We need to increase the production and marketing of alternative crops, find alternative uses for existing commodities, and add value, where we can, to farm products before they leave our rural communities" - Elton Redalan Minnesota Commissioner of Agriculture

Steven Edwardson, Crop Management Specialist, Minn-Dak Growers, Ltd. and Gary Fulcher, Professor Food Science Department, observed that opportunities for new crops and for special markets do exist today. We need to market what the end user wants. Therefore, marketing systems need to preserve the identity of varieties that add value to traditional crops.

Donald Wyse, Director, Minnesota Institute for Sustainable Agriculture, encourages producers, commodity groups and rural communities to combine their efforts to help change the present agricultural system. Wyse supports research and education that capitalizes on local human and natural resources. Producers need to have a strong voice in changing the agricultural system for the betterment of rural communities.

Information resources and assistance for farmers diversifying their operations are available from the University through our Center. Contact us for information and to network with other agencies and producers with similar interests. Rudy Radke, Ag Diversification Specialist at NDSU, Kevin Edberg, Marketing Division, MN Department of Agriculture and Gary McVey, AURI also reported on resources available from those organizations to help producers decide what alternatives are right for them.

The luncheon speaker, Elton Redalan, Minnesota Commissioner of Agriculture, supported agricultural diversification, "We need to increase the production and marketing of alternative crops, find alternative uses for existing commodities, and add value where we can to farm products before they leave our rural communities".

1-800-THE-CBOT
The Chicago Board of Trade

Reed Smith, Country Hedging Inc., Harvest States Cooperatives, emphasized that in order to market in today's world, producers need to know their costs, develop a marketing plan and follow through on their plan. Smith noted that producers may contact the Chicago Board of Trade at 1-800-THE CBOT to get the latest markets.

Curt Stern, Field Operations Manger, National Sun Industries, discussed processing and marketing high oleic sunflowers, canola and crambe.

Roger Gussiaas of Carrington, ND, talked about many opportunities to add value to agricultural crops such as the new "Pasta Plant" in Carrington.

Robert Sinner, a farmer from Casselton, ND, and member of the National Soybean Board, said the key to marketing soybeans in the Pacific Rim is commitment, time and patience. Mr. Sinner believes that "Identity Preserved Marketing" will be used more and more in the future.

Hugo Skoppek of the Organic Growers and Buyers Association discussed the philosophy of organic production, its value and current certification requirements.

Dave Kluge, Northern Waxy Corn Growers Association, detailed the benefits of growing and marketing waxy corn. Waxy corn was initially developed as a replacement for tapioca starch but now has found many other uses.

Terry Nennick, Extension Education, Clearwater County, cited successful vegetable production and marketing operations in northern Minnesota and indicated a potentially bright future in vegetable production for the growers in the region.

The Center continues to help develop and sponsor educational opportunities dedicated to enriching the diversity of Minnesota agriculture. Let us know how we may be of assistance to you.

CENTER PROJECTS

Promoting the Benefits of Economic Diversity in Rural America

Update on the Hay Power Project

Northern States Power Company (NSP) has contracted with the University through the Center to determine the feasibility of producing electricity from biomass at the site of its existing power plant in Granite Falls, Minnesota. This is a nine month study that will conclude fall of 1994. If the results indicate that it is feasible, the U.S. Department of Energy, the Electric Power Research Institute, and NSP will consider constructing a cost-shared demonstration of the system at Granite Falls.

The biomass to energy system requires production of over 75,000 acres/year of alfalfa as a herbaceous biomass fuel supply. The alfalfa will be delivered from remote (on-farm) storage sites to the power plant year-round at a pace of over 1000 tons/day. The hay will be separated into leaf and stem fractions. The stem fraction will be gasified, providing energy to run a combustion turbine, that will produce around 50 MWe of electricity (that's about enough to power a city the size of St. Cloud). The leaf meal will be sold as a high protein, low fiber supplement for animal feed. This very efficient use of alfalfa, leaves for livestock feed and stems for biomass energy, creates a large new market for alfalfa.

Alfalfa, when included as an alternative crop in traditional corn/soybean rotations provides many agronomic, economic, and environmental advantages, not only for producers, but also for rural communities and power consumers across the state.

The University and the Minnesota Department of Agriculture are investigating ways that local farmers may wish to be involved in the alfalfa processing and delivery system. A possible scenario that is being considered is a partnership arrangement that brings together the alfalfa producers and NSP in an "Alfalfa Cooperative" for the processing and sales of leaf meal products and electricity.

A summary description of the "Haypower Project" appeared in our Summer 93 issue of BioOptions. Further information on the on-going feasibility study is available from the Center. Public forums and project meetings will take place throughout the course of the study. Your interest and input is encouraged.

Minnesota Oilseed Project

The Minnesota Department of Agriculture, AURI and the Center applied to The Cooperative Foundation as part of the 1994-1995 funding program of the Midwest Cooperative Education, Research and Extension Consortium and was invited to develop a full proposal.

The Center along with the MN Department of Agriculture and AURI will evaluate the potential for increased processing of oil seed crops like soybeans, sunflower, and canola in Minnesota.

The Staples Irrigation Center

The Center is working with two committees of University faculty (programming and finance) to define a role for the future involvement of the University at the Irrigation Center in Staples. The Irrigation Center has in the past been largely sponsored by the State Technical College System. Changes in the State College System programming mean that the Irrigation Center is looking for a new sponsor organization.

The programming committee has arrived at a general consensus that activities at a new Irrigation Center should be broader in scope than just agronomic research. Alternative crops and livestock, soil and water quality, horticultural crop research, as well as providing easy access to existing resources for agricultural economic development are some of the areas that are recommended for inclusion at this central Minnesota site.

Department of Energy & Environmental Protection Agency solicit grant proposals from industry

Does your company have a technology idea that could save energy, prevent pollution, and improve your industry's bottom line? If so, you may be able to apply for financial assistance through a program cosponsored by the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA). This program, known as National Industrial Competitiveness through Energy, Environment, and Economics—or more simply NICE^3—encourages industry to reduce industrial waste at its source or use waste productively. Industry can become more energy efficient and cost competitive through waste minimization efforts. Since the program began in 1991, 17 companies has been selected to receive one-time NICE^3 grants to help offset the start-up risk of their new technologies.

The next solicitation for project proposals begins February 1, 1994 and will run through March 31, 1994. Interested companies must be willing to cost-share at least 50% of the total project cost through state energy or pollution prevention office partnerships. More information about NICE^3 is available through DOE. To request a brochure or a solicitation packet (#DE-PS49-94R90001), contact:
Ron Santoro, DOE Headquarters, Washington, DC;
phone (202) 586-8296. Potential participants should also contact their state energy office.

GINSENG

HISTORY

American ginseng (*Panax quinquefolius*) is a fleshy-rooted, perennial herb native to the mixed hardwood forests of the eastern United States (from the East Coast to Minnesota) and Canada.
The mature plant is about 12-20 inches tall with 3 or 4 compound leaves, clusters of white florets in summer and red berries in the fall. The plant is cultivated and collected for the tuberous, slow-growing, spindle-shaped roots which are valued for medicinal purposes in the Orient and increasingly in the U.S..

Asian ginsengs (*Panax C.A. Moyer*) have a history of collection and cultivation dating back more than 4,000 years. It is considered a potent medicinal herb and is used in a variety of products from candy to toothpaste.

Though there are extensive fields in South Korea, China, and Japan, ginseng is so popular that Asian supplies are insufficient to meet demand. The roots of American and Asian ginseng are similar in appearance but differ greatly in chemical composition.

Ginseng was one of the earliest marketable herbs to be harvested in this country. Wild American ginseng was one of Minnesota's first major exports with over 120 tons of dried roots shipped to China in 1860.

The cultivation of American ginseng began in the late Nineteenth century. Today, Wisconsin grown ginseng accounts for 90% of the U.S. total ginseng production, with 90-95% of that grown in Marathon County. The ideal growth conditions and perseverance of growers has made Marathon County the U.S. ginseng capital producing 10% of the world's supply of ginseng root.

Because of scarcity, due to over-harvesting in the 1970's, the export and harvest of wild ginseng is regulated by federal and state laws. Permits to export cultivated ginseng are not required by most states but are required by federal law.

USES

Chinese doctors claim that ginseng can stimulate the mind and body, increasing resistance to disease. U.S. research studies suggest that certain components of the root may aid in relieving the effects of stress. While the American medical profession recognizes only ginseng's soothing properties, in the Orient ginseng is used to treat a wide variety of illnesses.

Ginseng is considered good for treating anemia, diabetes, insomnia, gastritis, sexual impotence and many other disorders. Ginseng is touted as an aphrodisiac, good luck charm and as a sacred elixir.

Many Orientals consider ginseng to be a tonic, restoring and preserving good health. They believe American ginseng has a cooling affect, reduces stress and helps the body adapt to physical and mental stress while Chinese and Korean ginsengs are thought to warm the body and are more stimulating then American ginseng.

ENVIRONMENTAL CONDITIONS

Ginseng grows best on a fertile, deep (12 inches), well-drained sandy loam soil with a pH of 5.5 to 6. It requires 70-75% natural or artificial shade, 20-60 inches of annual precipitation and an average temperature below 50°F during winter months. This average temperature must include several weeks below freezing to satisfy dormancy requirements. Ginseng cannot tolerate direct summer sunlight. Too little sunlight results in no root growth.

Seeds are planted between September 1 and the first freeze. Since freshly harvested seed cannot be used for starting a crop, most new growers purchase stratified seed. Stratified seed is seed layered in sand and kept at the correct moisture and temperature until the following year. This process fulfills the dormancy requirement.

Seeding rates vary from 100-120 pounds of seed per acre in an open field to 35-50 pounds per acre in the woods, at 75%-90% germination.

CULTIVATION

Ginseng may be harvested from natural stands or cultivated. The methods used today to hunt and dig wild ginseng have changed little from ancient times.

There are two primary ginseng cultivation methods: wild-simulated or woods-grown and as a field crop under shade. Wild-simulated or woods-grown involves planting seed individually throughout the woods and then either leaving the ginseng until is it ready to harvest (wild-simulated) or watching the ginseng, weeding it and protecting it from pests (woods-grown). The longer it grows in its natural environment, the more it will have the characteristic prominent circular root ridges of wild ginseng.

Field cropping of ginseng can be carried out under artificially shaded conditions. Planting ginseng in gardens in the woods (woods-grown) using natural shade limits the cost of inputs, but both methods are labor intensive. Establishing your ginseng crop may require 600 hours or more of labor and may cost $25,000-$30,000 per acre the first year.

Use of artificial shade significantly increases establishment costs. A wood lath or slat shade frame is erected over the beds in an open field. Black cloth shading can also be used. These are supported on a framework of strong poles about 6 feet high to allow for air circulation. The lath or slats are nailed about an inch apart so that about two thirds to three fourths of the direct sunlight is cut off from the growing plants.

When planted under lath sheds or other artificial shade, the roots are heavier in weight, have a smooth skin and mature faster than wild ginseng. The Chinese do not value the artificial shade grown roots as highly as the natural grown wild ginseng.

Disease and pests can destroy or damage crops reducing market value or force an early harvest. Ginseng is susceptible to many fungus diseases, associated with lack of adequate ventilation, overcrowding and excess soil moisture. Mice, moles, and other rodents, along with several insect pests, may require control.

HARVESTING

Ginseng roots should be dug in the fall. Care must be used when digging not to damage the roots. Buyers want whole roots with prongs and fiber attached.

Carefully expose the underground stem (rhizome), at the base of the above-ground portion, following the horizontal length until they join the top of the true root. The taproot is often forked and has many diffusely branched rootlets. Expose the whole root and rhizome intact, carefully removing loose dirt. Do not use a brush or rub them together as this will clean them too much and detract from market value.

Yields vary widely with growing conditions; an average root yield is about 1500 to 2000 pounds of dried root per acre in an open field. Seed yields average about 150 to 250 pounds of seed per acre from 3-year-old plants and 200 to 350 pounds of seed per acre from 4-year-old plants.

MARKETING

After 3 or 4 years of growth, the roots begin to attain a marketable size (three to eight inches long and 1/4 to one inch thick) and weight (one ounce). Ginseng may be harvested after three or four years of growth under artificial shade and from 7-15 years in the woods.

Larger roots, developed during the later growing years, bring a higher price per pound than smaller roots. Sale of ginseng seed that is produced after the third growing season may be an important additional revenue source.

Because of extraordinarily strict quality requirements of Chinese consumers, any root that has the least sign of disease is unacceptable.

Dried root is usually sold to a local buyer or to buyers who come into the area during harvest season and purchase root for export. The price for ginseng may fluctuate widely from year to year; cultivated dried root can average anywhere from $25 to $50 per pound.

As inputs of fertilizers and pesticides, and the level of cultivation increases, the less desirable the crop becomes to Asian buyers. Cultivation changes the appearance and perceived value of the crop. The lower market price, however, may be compensated for by increased security and higher yields. As wild ginseng becomes increasingly scarce, the market for cultivated ginseng will likely increase and woods-grown ginseng may be the wild of the future.

High profits from growing ginseng are possible; however, the number of people cultivating ginseng has remained low for several reasons: (1) high initial capital investment exceeding $25,000 per acre, (2) protecting the crop from theft, (3) susceptibility to fungal diseases and rodent damage, and (4) several years of input and expenses before there is a profit potential. It is advisable before beginning any new enterprise to identify a market.

by B. Davidson[1] , D. Giese[2], and W. Smith[3]

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PO Box 509, Wausau, WI 54402-0509
[3] Minnesota Dept. of Natural Resources

REFERENCES

Harrison, H.C. et al. 1990. Ginseng. Alternative Field Crops Manual. U of WI-Cooperative Extension Service & Univ. of MN-CAPAP & Minnesota Extension Service.

Hill, L.L. 1983. Ginseng. Cooperative Extension Service, Univ. of IL at Urbana-Champaign.

Miller, Richard A. 1988. Native Plants of Commercial Importance. Oak Inc:Grants Pass,OR.

Missouri Dept. of Conservation. 1980. American Ginseng: A Forest Crop. Jefferson City, MO.

Persons, W. Scott. 1987. Farming Ginseng on Your Woodlot. Adapt 2 Conference Proceedings. December 3 and 4, 1987, Kansas City, MO.

For Further Information

A 26-page ginseng information packet is available from the Center for $3.00. This packet contains articles and many additional sources for information on ginseng.

Ginseng Board of Wisconsin, Inc.
16H Menard Plaza, Wausau, WI 54401
(715) 845-7300

Ginseng Broker:
Ron Dobbs
Rt. 4, Box 336, Richland Center, WI 53581
(608) 647-2244

Wild Ginseng: Ask for the free publication
"Preserving Wild Ginseng in Minnesota"
Minnesota Dept. of Natural Resources
(612) 296-6157

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Note from the Editor

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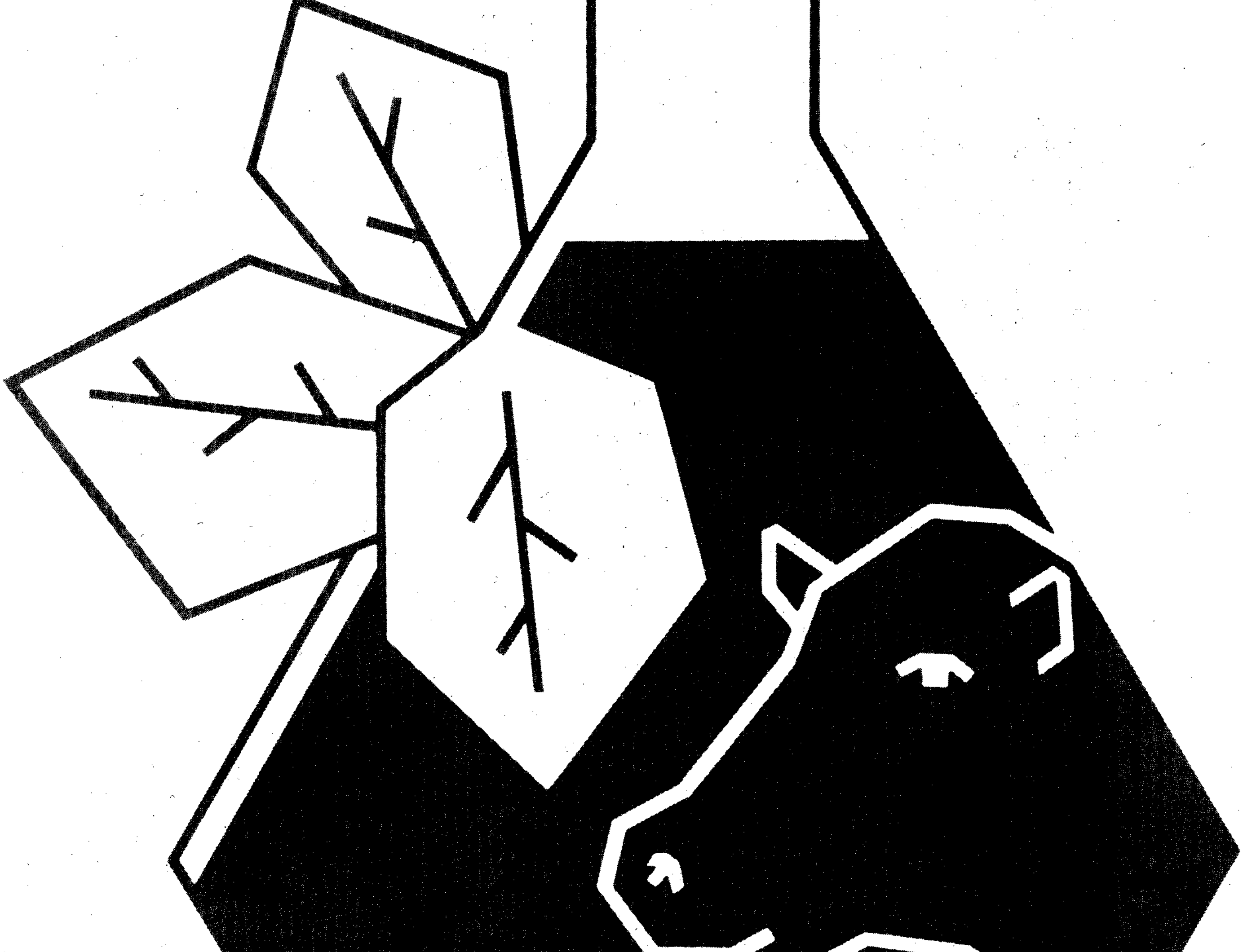

Department Highlight
Agricultural and Applied Economics

Steering Committee Representative - Dr. Richard A. Levins

The Department of Agricultural and Applied Economics is one of the larger departments in the College of Agriculture. Over 40 faculty members cover a wide range of subjects in their teaching, research, and extension programs. Our interest in alternative plant and animal products range from the impacts of international trade agreements on one end of the scale to evaluating the economics of a particular enterprise on the other.

Rather than describe many of these efforts in sketchy detail, I would like to introduce you to a new financial planning tool we have just released. For years, our Center for Farm Financial Management has maintained a financial planning system called FINPACK which has proven very useful in helping over 100,000 farmers and ranchers evaluate farming alternatives. The program, up to now, has been used by extension agents and bankers working with farmers. Now, in the new Version 8.0, the program has been rewritten for use by individuals. Producing alternative crop and livestock products generally demands great attention to management. FINPACK 8.0 is a powerful tool which can help you meet those management demands.

FINPACK

A New Farm Financial Management Program

The program has three parts. The first, named FINLRB, is for long range planning. It can be used to compare your present farming operation with up to 15 alternative farm plans for profitability, debt repayment capacity, and growth in net worth. Alternative plans can involve expansion, new enterprises, different sizes or combinations of enterprises, or changes in debt structure. The goal here is to help you match your operation to your land, labor, and capital resources for maximum financial performance.

The second part, FINFLO, is a complete, easy-to-use tool for cash flow planning. FINFLO projects monthly cash inflows and outflows based on your production, marketing, and financial plans. The results will help you manage your cash flow, project operating loan needs, and determine repayment capacity for a single year or for a period as long as 10 years.

The third program, FINAN, takes an in-depth look at your financial progress over the past year and helps you identify the strengths and weaknesses of your total operation. It will help you monitor the financial direction of your business, document your progress, and develop planning information for the future. You can analyze your business as a whole or look at each operation or phase of your business separately. To learn more about FINPACK, contact:

The Center for Farm Financial Management
University of Minnesota
Room 249 COB, 1994 Buford Avenue, St. Paul, MN 55108
phone: (612) 625-1964 or (800) 234-1111.

To get on our mailing list and receive BioOptions our quarterly newsletter send $8 U.S. or $10 outside U.S. to:

The Center for Alternative Plant and Animal Products (CAPAP), University of Minnesota
340 Alderman Hall, 1970 Folwell Ave., St. Paul, MN 55108 phone: (612) 624-4217 fax: 624-4941

RAISING REINDEER, ANOTHER CERVIDAE ALTERNATIVE

Tom Scheib, Reindeer Owners Association, Inc.

In the last two issues of BioOptions, there have been articles about deer (Cervidae) farming, focusing on red deer with fallow and the hybrid cross of red and elk. Reindeer are an example of an additional type of deer which can be raised on a farm for profit. Our family has been doing so for almost ten years. I became interested in reindeer while serving in the Marines in northern Norway. At the time, I knew that when I retired we would be living in Finland, Minnesota, an area not all that different, in many respects, from the Sami herding areas of Scandinavia. We wanted to raise an animal that had many uses, hence several different options for income. When we got started, reindeer breeding stock and information were difficult to locate, and we were discouraged by several people. That has all changed now, for several reasons. One is the establishment of the Reindeer Owners and Breeders Association (ROBA) which publishes a breeders list and has a goal to help educate and develop those skills required to enhance the abilities of their members to successful tend their herds. Another is a general attitude favorable to alternative agriculture. As with most other segments of the deer farming industry, raising reindeer is growing by leaps and bounds. In late 1991, there were 14 members of ROBA, today more than 90. Almost all have started their herds in 1992/93.

Reindeer are believed by many to be the first domesticated animals but they didn't arrive in North America until September, 1891 at Amaknak Island, Alaska, as part of a purchase from Siberia. "Where Did the Reindeer Come From?" by Alice Postell is an account of the first fifty years of raising reindeer in Alaska. Several Minnesotans played prominent roles in the establishment of Alaska's reindeer industry.

Reindeer, native to northern Europe, weigh between 175 (females) and 300 (males) pounds and stand about three feet tall at the shoulder. They do not require large areas or exotic facilities. Fencing needs are minimal, although one must be aware of and conform to state requirements. They can thrive on commercial feeds and are raised successfully in most parts of the USA. Like other cervidae, reindeer are susceptible to malignant catarrhal fever (MCF). I mention this only in the hope that some deer owner (or prospective deer owner) of any species, not familiar with MCF, will learn the appropriate precautions.

Both male and female reindeer grow antlers, the only species of deer (Rangifer) to do so. Under normal conditions, a female will have a single calf each year within a week of her second birthday. Calves grow fast and may weigh 90 pounds at the end of four months. Reindeer meat is very tasty and a mainstay in many Scandinavian restaurants. Disease and parasite control are managed as with other deer.

Prices for breeding stock have remained steady despite an increase in the number of animals brought down to the lower 48 from Alaska and Canada. The number of farmed reindeer in the lower 48 has almost tripled in the past three years, yet the total number of breeders per state remains extremely limited.

Raising reindeer gives the breeder more than the standard number of options. Some of the reindeer are owned by "cut your own" Christmas tree farmers who use them as a marketing tool and additional drawing card during the competitive tree selling season. Some owners collect the hair and hard antlers and sell it to spinners and felters or others for craft products. Reindeer can also be used as pack and draft animals, an option not available with most cervidae.

Reindeer are relatively easy to domesticate and can be handled with ease by knowledgeable people. We have exhibited ours in various parades, festivals and Christmas exhibitions as a way of earning additional sources of income. Other reindeer owners lease the deer during the Christmas season to various merchants. Niche marketing has been and will continue to be effective for many breeders.

As a member of the three-state cervidae organization, I know that in Minnesota the cervidae industry is fortunate to have the support of the State Legislature, Department of Agriculture, DNR and University, as well as two professional deer breeder/farmer organizations and an equally fine Elk Breeder Association with members knowledgeable in cervidae husbandry.

The cervidae industry is in its infancy and opportunity abounds. Respectability, reliability, honesty and quality need to be the trademarks of our cervidae industry. Maybe raising reindeer can be your cervidae alternative. Happy herding.

For additional information contact:
Tom Scheib, Corresponding Secretary
155 County Road 6, Finland, MN 55603; (218) 353-7772.

"Whatever you can do, or dream you can, begin it. Boldness has genius, power and magic in it!"

Goethe

NEWS BRIEFS

U.S. Mushroom production rose in 1992-93, the eighth consecutive year-after-year increase (Agricultural Outlook, October 1993). Mushrooms are the fourth-highest value vegetable crop after lettuce, tomatoes and potatoes. Grower prices for fresh-market mushrooms, up slightly in 1992-93, have been basically stagnant since 1988. While production of oyster, shiitake and other specialty mushrooms has doubled since 1986/87 they still remain a small share of the total. Agaricus (mostly white button-type) mushrooms amounted to 99 percent while specialty mushrooms accounted for only 1 percent of mushroom output in 1992/93. Specialty producers are planning increases of 6 to 18 percent while Agaricus growers plan to reduce mushroom production by 1 percent in 1993/1994.

Chicken consumption is up for the 13th consecutive year. Americans will eat an average of 71 pounds per person, 50 percent greater than the average amount in the late 1970's and double that in the late 1960's. (Mid-Atlantic Poultry Farmer, August, 1993).

North Dakota has its first commercial rhubarb farmer (AP). North Dakota farmer Eugene Edwardson was looking for a new crop and since nobody was raising rhubarb for commercial use, he decided to learn more about it. He worked with NDSU Extension Service on both the agricultural and economic aspects of the enterprise. He hopes to be in a full commercial production within two years. Edwardson points out that rhubarb is an expensive crop to get started in, yields can fluctuate depending on the type of year you get, intensive labor is required and the key is to find markets before you grow the crop. He concedes the market is not great yet but it is increasing each year. He has been contacted by several major outlets wanting to know if he'll be able to supply an ample amount of rhubarb.

The United Nations Food and Agriculture Organization (FAO) reported in 1992 that treeless paper was produced in 45 countries, accounting for 9 percent of the world's paper supply.

A Purdue University Study predicts major changes ahead for Midwest farming by the year 2000. Based on interviews with 100 grain farmers who took part in Purdue's "Agriculture 2000" project, the predictions included: an increase in farm size of 65 percent, to an average of 2,900 acres (up from 1,760 acres today); an increase in value-added contracted grain production; a big increase in direct purchases of farm inputs; and a substantial increase in obtaining credit needs from suppliers. Participating in the study were farmers representing the top 20-25 percent of Indiana producers.

Farm population is decreasing. Fewer than one in 50 Americans live on farms according to the Census Bureau and the Agriculture Dept. The 1990 count was 4.6 million, half of whom lived in the Midwest, down from 6.1 million a decade earlier. Only 45 percent of farmer dwellers derived their principal income from farming.

1993 was the best year for growing canola (Seed & Crops Industry, November 1993) in southern Michigan since it was first planted in the state in 1988. Michigan State University agronomist Larry Copeland says canola variety trials in East Lansing and Clarksville have produced more than 66 bushels per acre. Current canola market price is more than $5 per bushel. "I remain convinced that canola will eventually become a significant economic crop for Michigan. I think the struggles we have seen with this crop are not unlike the struggles growers experienced when soybeans were introduced to the state in the 1930's," he said.

The Specialty Crop Reference List is available free. Current or potential specialty crop producers will find it useful for locating seed sellers or crops contractors. Covering the upper Midwest as well as portions of Canada, the resource guide contain alphabeticals listings for each state or province. About 25 different specialty crops will be represented in the directory including amaranth, canola, dry edible beans, muster and niger. To obtain a copy, contact the North Dakota State Seed Department at (701) 239-7210 or the NDSU Extension Service in Valley City at (701) 845-8528.

Poplar trees hold promise as a fuel for the future (The Land, December 3, 1993). Twenty farmers in the Alexandria area will participate in the nation's largest single planting of fast growing hybrids (to be completed in the spring of 1994). The U.S. Dept. of Energy, with an array of electric utilities and others is funding the project. The purpose is to try to get a hybrid poplar (biomass) fueled power plant for Minnesota. WesMin RC & D, a rural economic development agency for 14 west central Minnesota counties, is helping coordinate the project. It is hoped that burning whole trees for electricity will create environmentally sound, economically viable alternative crops for farmers.

Crop report confirms 1993 a true disaster (AP). The U.S. Department of Agriculture's final 1993 crop reports for Minnesota and other states hit by floodwaters last year showed some of the worst corn and soybean harvests in the past 30 years. The USDA has provided more than $1 billion in direct emergency assistance to the nine Midwest states hit by the flood. Ruined fields and lower yields of 1993, combined with the higher costs to operate in 1994, will probably drive even more people out of farming.

INFORMATION DESK

One of the Center's most important functions is to provide information. We receive requests daily on a wide variety of subjects. We encourage you to write or call us with questions of your own. We maintain a library on alternative crops and animals and will be happy to send you copies of articles (10 cents/page).

Minnesota is the national leader in compost research. University of Minnesota researchers are studying composting alternatives; many landfills are closing because they have reached capacity or because of more strict pollution control and the difficulty in finding new sites. Researchers are looking at the economic and environmental aspects of composting garbage. In 1992, Minnesota composting costs averaged $69 per ton compared with $64 for incineration and $48 for landfilling.

A 16 page publication, "Municipal Solid Waste Composting:" Is it Right for Your Community?" is available. Cost is $3.95. Contact the Distribution Center, Rm. 20, Coffey Hall, 1420 Eckles Ave., St. Paul, MN 55108-6069.

By the end of the decade, U.S. trade and investment going across the Pacific will be double that going across the Atlantic. If the Pacific markets' economic growth continues, the rise of China will be the most important change in the global economic, political and military balance of the next century. By 2002, China could become the largest economic power in the world, in terms of gross domestic product.
(Nov-Dec issue of Foreign Affairs).

According to the 13th edition of the Statistical Abstract of the United States: 1993, 20.5% of the 3.9 billion pounds of tomatoes eaten in the U.S. were imported. Also imported: 33.7% of cucumbers and 20.6% of peppers.

Did you know: Minnesota is one of the largest producers of wild rice, producing 6.5 million pounds of wild rice in the state in a good year. Of this total, 25,000 pounds are harvested from lakes and rivers in the traditional way, according to the State Department of Agriculture and the rest is grown in paddies and harvested by combines.

The University of Minnesota, including the Minnesota Extension Service, is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

Edible Soybeans

Part of a New Crops Initiative, at Purdue University is to develop soybeans with improved flavor that can compete effectively in the Oriental edible food industry. It has been demonstrated that the removal of certain lipoxygenase enzymes from soybeans causes a substantial decrease in the beany off-flavor associated with soybean products. Subsequent evaluation of low lipoxygenase Century soybeans in the Japanese edible food industry revealed that they produced products that were too yellow and the tofu produced from soy milk extracted from low lipoxygenase Century soybeans were soft.

Extraction and characterization of compounds from soy milk that are responsible for the yellow color have revealed that the offending chemical is an isoflavone. A simple quantitative test has been developed to detect the presence of this compound early in the breeding program to generate new soybean varieties suitable for the Oriental market place. Genetic studies have demonstrated that it is reasonably easy to separate the low lipoxygenase trait from the yellow color that decreases substantially the value of soybeans in the edible food industry of the Orient.

Research has been aimed at developing a simple small-scale experimental method to rapidly produce tofu whose texture is equivalent to that of tofu produced commercially. A method has been perfected that results in the production of tofu from 80 grams of seed and that yields highly reproducible results. The method has been used to evaluate about 200 soybean varieties grown in the Midwest. Among these, a number were identified that could be used as parents in a breeding program. These parents have been hybridized with Japanese lines selected because they are commonly used in the tofu industry. Third and fourth generation selections from these crosses were evaluated in the field and in the laboratory during the summer and fall of 1993. Purdue University Agronomy Farm will grow 10 to 11 acres of specialty beans during summer of 1994.

Excerpt reprinted with permission from the News Crops News, New Crops Center, Purdue University, 1165 Horticulture Bldg., West Lafayette, IN 47907-1165.

PUBLICATIONS

Specialty Cut Flowers: The Production of Annuals, Bulbs, and Woody Plants for Fresh and Dried Cut Flowers is a new 392-page book containing the most recent information on specialty cut flower crops. Cost is $39.95 plus $4 shipping. Contact: Art Wells, Timber Press, 999 S.W. Wilshire, Suite 124, Portland, OR 97225; 1 (800) 327-5680.
Fax (503) 292-6607.

Sweet Sorghum Culture and Syrup Production is a free publication that is part of a project to expand sorghum production and track new technologies of syrup processing. Contact: Paul L. Mask, Extension Hall, Auburn Univ., Auburn, AL 36849; (205) 844-5490.

Herb Gatherings is a bimonthly newsletter. Cost is $15 U.S. - $20 Canada. Contact: Carla J. Nelson, 10949 East 200, South, Lafayette, IN 47905-9453; (317) 296-3211.

Alternative Agricultural Enterprises: Production, Management and Marketing (1993) is a ring-bound handbook of publications for individuals interested in establishing a nontraditional agricultural enterprise. Alternative enterprises include Christmas trees, hybrid poplars, berry production, farm and ranch recreation, special forest products, and specialty flowers. For copies of the complete handbook and single copies of publications, contact: Dept. of Agricultural Economics, College of Ag, Univ. of Idaho, Moscow, ID 83843; (208) 885-6037.

To Market! To Market! is a new promotional reference guide for all farmers' markets - particularly new markets that must attract both customers and vendors. To obtain a copy, send $.98 in stamps (no cash please) to U Mass Coop. Extension
System, 44 Bank Row, Pittsfield, MA 01202; (413) 448-8285.

Beginning Hydroponics by Richard Nicholls. Contact Ward's Natural Science Est. Inc.; 1 (800) 962-2660.
The Fiberfest Magazine is a new quarterly publication devoted to natural fibers and the animals and plants that produce them. Cost is $18 ($25 Canada, U.S. funds). Contact: The Fiberfest Magazine, P.O. Box 112, Hasting, MI 49058.

See What You Sow: The Growers Guide to Successful Produce Marketing by Eric Gibson offers farmers and market gardeners practical how-to-guidance in making a living from the land. Cost is $22.50 plus $2.50 shipping. Contact: New World Publishing, 3701 Clair Drive, Carmichael, CA 95608; (916) 944-7932.

Growing Shiitake Mushrooms in a Continental Climate by Mary Ellen Kozak and Joe Krawczyk is an easy to read book detailing the shiitake process from selecting logs to the finer points of year-round cultivation in challenging climates. Cost is $7.95. Contact: Field & Forest Products, Inc., N 3296 Kozuzck Road, Peshtigo, WI 54157; (715) 582-4997.

Interior Landscape Plants for Indoor Pollution Abatement is the title of a new study by the National Aeronautics and Space Administration (NASA) and detailing how plants clear up office pollution. For a free copy, contact: NASA Lib. Bldg. 1100, 5170A, Stennis Space Center, MS 39529; (601) 688-3244.

Small Farm Today, published 6 times a year, is a magazine featuring articles about alternative crops, high-value vegetable and small fruit crops, aquaculture, exotic and minor breeds of livestock and much more and is geared toward today's small farmer and small acreage landowner. Cost is $18.00 yr. Contact: Small Farm Today, Ridgetop Ranch, 3903 W. Ridge Trail Rd., Clark, MO 65243-9504.

Grow Your Own Trees: A book and Seeds, Secunda and Dyson. 1991. Contact Ward's Natural Science St. Inc. 1 (800) 962-2660.
Free Poster - A large, full color identification chart for fresh herbs, specialty lettuces and edible flowers. Contact: Laura Tomlin, Quail Mountain News, P.O. Box 1049, Watsonville, CA 95077; (408) 722-8456.

A Guide to Logging Aesthetics: Practical Tips for Loggers, Foresters and Landowners by Geoffrey T. Jones. Cost is $6. Contact: Cornell University Media Services, 7 Cornell Business & Technology Park, Ithaca, NY 14850; (607) 255-5830.

Asparagus Production, Management and Marketing is a 25 page bulletin (Bulletin 826) that covers all aspects of production and marketing. Cost is $6. Contact: Carl J. Cantaluppi, Piketon Research and Extension Center, Ohio State Univ., 1864 Shyville Rd., Piketon, OH 45661-9749; (614) 289-2071.

Handy How-to-Booklets: 76 Proven Ways to Make More Money From Your Farm ($2.95), The New Farm's Cover Crop Guide ($2.50), Compost Utilization for Field Crop Production ($6.95), Farmer's Guide to on-Farm Research ($4.95) and Midwest on-Farm Research Results, 1990 ($7.95). Contact New Farm Library, 222 Main St., Emmaus, PA 18098.

The Gardener's Source Guide lists 759 nursery and mail-order companies that send free catalogs. Contact: Bob Armstrong, Gardener's Source Guide, P.O. Box 206, Gowanda, NY 14070-0206.

The Minnesota Aquaculture Report, October 1993, is available free of charge as a service to the industry. The report documents the 1992 aquaculture industry production, employment, resource utilization and much more. Contact the Minnesota Department of Agriculture, Market Development & Promotion Div., 90 West Plato Blvd., St. Paul, MN 55107; (612) 296-4939.

CALENDAR OF EVENTS - Notify the Center of events of interest and we will publish that information for you.

February 5, 1994 - Marketing Workshops St. Cloud, Minnesota. Contact Kevin Edberg at (612) 296-6382 or MFVGA at (612) 434-5929.

February 14-15, 1994 - Sustainable Agriculture Conference: The Quiet Revolution St. Paul, Minnesota. Contact: Kelly Fisher, University of Minnesota, 405 Coffey Hall, 1420 Eckles Ave., St. Paul, MN 55108; (612) 625-8215.

February 18, 1994 - Development '94 Detroit Lakes, Minnesota. Contact Toni Merdan, Congressman Collin C. Peterson, Seventh District, 714 Lake Ave., Ste. 107, Detroit Lakes, MN 56501; (218) 847-5056.

February 18-19, 1994 - Wisconsin Aquaculture '94 (Governor's Conference on Agriculture Stevens Point, Wisconsin. For details call (715) 653-2271

February 19, 1994 - Agricultural Diversity in '94 Appleton, Wisconsin. Contact John Biese at (414) 832-5119.

February 21-23, 1994. Small Fruit Conference Springfield Missouri. Contact: Pat Byers at (417) 926-4105.

February 24-25, 1994 - The 24th National Alfalfa Symposium Springfield, Illinois. For details, call (916) 662-6565.

February 26, 1994 - Agricultural Diversity in '94 Richland Center, Wisconsin. Contact Steven Kohlstedt at (608) 647-6148.

March 4-5, 1994 - Aqua '94, The Eighth Annual Minnesota Aquaculture and Tradeshow Alexandria, Minnesota. Contact Minnnesota Department of Agriculture; (612) 296-4939.

March 5, 1994 - Agricultural Diversity in '94 Shell Lake, Wisconsin. Contact Dan Zinsmeister at (715) 635-3506.

March 13-16, 1994 - Ohio Asparagus (March 13-14), Strawberry (March 14-15), and Small Fruit (March 15-16) Schools Piketon, Ohio. Contact Carl Cantaluppi, OSU-Piketon Research and Ext. Ctr. 1864 Shyville, Rd., Piketon, OH 45661.

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