



BioOptions

Newsletter of the Center for Alternative Plant and Animal Products

Volume 3, Number 1 Winter, 1992

Sponsored by the Agricultural Utilization Research Institute, the Minnesota Extension Service
and the University of Minnesota Agricultural Experiment Station

Value-Added Meat Products

Producing and marketing value-added meat products will be the focus of an upcoming symposium sponsored by the Center for Alternative Plant and Animal Products. Other sponsoring organizations include Minnesota Extension Service, Dept. of Animal Science at the University of Minnesota, Minnesota Assn. of Meat Processors, Agricultural Utilization Research Institute, Minnesota Beef Council and Minnesota Pork Producers.

The symposium will be held March 26, 1992, prior to the annual meeting of the Minnesota Assn. of Meat Processors. The symposium is intended for small to medium sized meat processors, livestock producers, extension educators, entrepreneurs and other interested persons.

Topics to be presented include: food trends and the changing consumer, marketing specialty meat products, ingredient systems for specialty markets, an update on labeling for processed meat products, technology of restructured meat products and low-fat emulsified sausages, and new technologies for meat products.

For further information, contact June Rhoads or Gerald Wagner, Extension Special Programs, 405 Coffey Hall, Univ. of Minnesota, St. Paul, MN 55108-1030; or call 1-800-367-5363.

Mustard

Mustard (*Brassica spp.*), a native to temperate regions of Europe, was one of the first domesticated crops. This crop's economic value resulted in its wide dispersal and it has been grown as a herb in Asia, North Africa, and Europe for thousands of years. Currently, more than 700 million lbs of mustard are consumed worldwide each year. Yellow mustard is usually used for prepared or table mustard, a condiment, and as dry mustard. Dry mustard is used as a seasoning in mayonnaise, salad dressings, and sauces. Consumption of mustard has been steady and growth of the mustard market is directly related to population growth. This stability of demand is due to the lack of any real substitutes for mustard.

Mustard is currently grown on approximately 250,000 acres annually in the United States. North Dakota has the largest share of domestic production. The Canadian provinces of Alberta, Manitoba, and Saskatchewan currently grow a large share of the world's mustard crop. The French are the largest consumers of mustard (1.5 lbs/person/year), and buy approximately 70% of the annual Canadian production. Three types of mustard, yellow, brown, and oriental, are grown in North America. Yellow mustard (*Brassica hirta*) comprises about 90% of the crop in the Upper Midwest. Brown and oriental mustards (*Brassica juncea*) are grown on limited acres.

Mustard is a cool season crop that can be grown in a short growing season. Varieties of yellow mustard usually mature in 80 to 85 days whereas brown and oriental types require 90 to 95 days. Seedlings are usually somewhat tolerant to mild frosts after emergence, but severe frosts can destroy the crop. Mustard, especially the brown and oriental types, has a partial drought tolerance between that of wheat and rapeseed. The tap roots will grow 5 ft into the soil under dry conditions, which allows for efficient use of stored soil moisture. Moisture stress caused by hot, dry conditions during the flowering period may cause lower yields.

Mustard can be raised on variable soil types with good drainage, but is best adapted to fertile, well-drained, loamy soils. Soils prone to crusting prior to seedling emergence can cause problems. This crop will not tolerate waterlogged soils since growth will be stunted. Dry sand and dry, sandy loam soils should also be avoided. Soils with a pH near neutral (7.0) are desired for this crop. Nevertheless, an alkaline pH and slightly saline soils are tolerated.

A small grain crop following mustard in the rotation will usually yield more than when following continuous small grain. Mustard has several of the same diseases and insect (See *Mustard page 2*)

(*Mustard from page 1*) pests as flax, oilseed rape (canola), sweet clover, soybeans, field peas, lentils, and sunflowers. Therefore, crops from this group should be avoided in the same rotation as mustard. Cereal grains are not very susceptible to the pest and disease problems of mustard and it is often produced in a rotation with small grains.

The seedbed should be firm, fairly level, and free of weeds and previous crop residue. Firm seedbeds with adequate moisture allow shallow planting and encourage rapid, uniform seed germination and emergence of seedlings. The soil temperature should be at least 40 to 45°F at a depth of 1 in. An earlier seeding date allows plants to benefit from the spring moisture in establishing a good canopy before weeds emerge, to avoid heat stress during summer that causes flower or pod abortion and it also reduces the risk of damage from fall frosts that can reduce crop yields and quality. Yellow mustard, which has approximately 100,000 seeds/lb, is solid seeded with a grain drill at a rate of 8 to 14 lbs/acre and a depth of ½ to 1 in.

Varieties of yellow mustard are usually earlier maturing, lower yielding, and shorter in height than brown or oriental varieties. Yield differences among the types of mustard are reflected usually in the prices offered by contracting firms. Contracting firms usually supply growers with the appropriate varieties. Varietal trials for mustard in your area should be consulted for yield and other agronomic characters.

Weeds can greatly reduce mustard yields. Weed seeds, which are difficult to remove, can cause high losses during seed cleaning and lower market grades. This crop is

vulnerable to several diseases, among which the most serious are *Sclerotinia* stalk rot (white mold), downy mildew, white rust, leaf spots, and mosaic virus. Good cultural practices are the most effective control measures for diseases. Growers should monitor fields closely to detect insect problems that can result in significant yield losses. Flea beetles and caterpillars of the diamondback moth have been the most serious pests.

Mustard yields vary due to differences among varieties, cultural practices, and environmental conditions. Minnesota research trial yields have ranged from 868 to 1,861 lbs/acre. A fair estimate for the yield potential of production fields in the Upper Midwest would be 800 to 1,000 lbs/acre.

The cash production costs are less due to lower seed and pesticide costs than for hard red spring wheat. In 1991 the cash costs were estimated at \$67.00 for hard red spring wheat and \$56.00 for mustard for northwestern Minnesota.

Mustard is produced as a specialty grain and should be grown under contract to guarantee a selling price and market for the producer. A contract is made by the grower with the shipper to supply seed of a specified quality for delivery at a future date. Contract prices for mustard seed in the Upper Midwest for 1991 were 10.5 cents/lb (up to a certain poundage/acre, such as 600 lbs) for yellow mustard and 9 cents/lb for brown and oriental mustards (up to 800 lbs/acre). Contract prices for Canadian mustard in 1991 were approximately 11 cents/lb for yellow mustard for the first 500 to 1,000 lbs/acre, 9 cents/lb for brown mustard for the first 700 to 1,200 lbs/acre, and 8 cents/lb for the first 500 to 1,200 lbs/acre of oriental mustard.

This article was excerpted from "Mustard" by E. S. Oplinger, E. A. Oelke, D. M. Putnam, K. A. Kelling, A. R. Kaminski, T. M. Teynor, J. D. Doll, and B. R. Durgan in the "Alternative Field Crops Manual" published by the Univ. of Wisconsin-Extension, the Center for Alternative Plant and Animal Products and the Minnesota Extension Service.

BioOptions

is the quarterly newsletter of the Center for Alternative Plant and Animal Products at the University of Minnesota. The Center was created to aid in the development of new and alternative crop and livestock enterprises.

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Publications

Pests of the Garden and Small Farm - A Growers Guide to Using Less Pesticide is a recent publication by Mary Louise Flint of the University of California. Research-based information from the Univ. of California's Statewide Integrated Pest Management Project has been adapted for use by home gardeners and small-scale farmers. The 286 page book contains over 350 photographs and drawings to enable the diagnosis and control of the most common pest problems. To order send \$25.00 to ANR Publications, University of California, 6701 San Pablo Ave., Oakland, CA 94608-1239, and ask for publication #3332.

Year-round Shiitake Cultivation in the North is the title of a newly published manual on indoor shiitake mushroom production by SHII-GAW, a Wisconsin growers association. It was written as a planning guide for growers who are considering converting existing buildings or constructing new facilities for year-round production. The 34-page manual is available from SHII-GAW, P.O. Box 99, Birchwood, WI 54817 at a cost of \$10.00.

A catalogue of agri-science instructional materials referencing over 800 manuals, teachers guides, slide sets, and videos is available free of charge. Contact: Daryle Foster, Instructional Materials Service, 109 Kennedy Hall, Cornell University, Ithaca, NY 14853 or call (607) 255-9252.

Lupin News is the newsletter of the North American Lupin Association (NALA). It includes articles on lupin production, utilization and marketing as well as information on

the activities of the NALA. Membership in the NALA enables you to receive the newsletter. Annual membership is \$10 and checks should be made payable to the North American Lupin Assn. Send to Dr. Paul Mask, Extension Hall, Auburn University, AL 36849.

New Crops News is the newsletter of the New Crops Center at Purdue University. It summarizes current research projects underway at Purdue and contains information on the activities of the Center. The New Crops Center was the major sponsor of the recent symposium, "New Crops: Exploration, Research and Commercialization" that was held in Indianapolis. For more information, contact Jules Janick, Dept. of Horticulture, 1165 Horticulture Building, Purdue Univ., West Lafayette, Indiana, 47907-1165.

El Guayulero, a publication of the Assn. for the Advancement of Industrial Crops, will revert back to being a newsletter when the "Journal of Industrial Crops and Products" becomes a reality (See "BioOptions", 2:2). Lewrene Glazer of the USDA Economic Research Service will be the editor. The newsletter will contain information on upcoming meetings, reports on legislative developments, AAIC business material, etc. Membership in the AAIC includes a subscription to the newsletter. Annual dues are \$25 and should be sent to Dr. Katrina Cornish, USDA-ARS-WRRC-PBT, 800 Buchanan Street, Albany, CA 94710.

Uncommon Fruits Worthy of Attention: A Gardener's Guide by Lee Reich contains knowledgeable and witty essays on growing and enjoying "exotic" fruits in temperate

climates. Fruits covered include: pawpaw, Nanking cherry, medlar, maypop, persimmon, raisin tree, elaeagnus, kiwi, jujube, asian pear, as well as many types of berries and currants. This 273 page publication is available through agAccess for \$18.95 plus postage. For ordering information call (916) 756-7177.

Growing Saskatoons: A Manual for Orchardists is a new publication by Richard G. St. Pierre of the Dept. of Horticulture Science, University of Saskatchewan. It includes information on cultivars, propagation, orchard establishment and management, pest problems with emphasis on the saskatoon sawfly and the apple curculio, and economic considerations. The publication is available at a cost of \$6.00 (Canadian currency money order). Mail to Dr. Richard St. Pierre, Dept. of Horticulture Science, University of Saskatchewan, Saskatoon, Sask., S7N 0W0 CANADA.

Engineering Aspects of Intensive Aquaculture is the title of the proceedings of a national symposium held at Cornell University in April. Four major topics were covered: closed systems, system design considerations, water quality, and engineering/management considerations. The 350 page publication contains 23 papers and additional information that makes it a valuable resource for those entering the field of aquaculture. The cost is \$25 and checks should be sent to Northeast Regional Agricultural Engineering Service, 152 Riley-Robb Hall, Cooperative Extension, Cornell University, Ithaca, NY 14853-5701.

(See **Publications** page 4)



(Publications from page 3)

A Farmer's Guide to On-Farm Research is designed to help farmers, extension agents, non-profit groups, ag instructors and others find answers to farm production and management questions through meaningful on-farm research efforts. It is available for \$4.95 from Rodale Institute, 222 Main Street, Emmaus, PA 18098; (215) 967-5171.

Sustainable Agriculture in the National Research Initiative is the report of a panel that was convened by the Center for Rural Affairs with support from USDA's Sustainable Agriculture Research and Education Program. The panel was composed of 23 prominent scientists and research administrators from land-grant universities, as well as farmers and representatives of non-profit research and policy organizations. Among the report's principal recommendations: substantially increased support for research on whole plants, animals and ecological systems relative to the support provided for molecular and cellular approaches; greater focus on research that strengthens family farms and rural communities; organizational changes to encourage more interdisciplinary research and research directly relevant to the needs of farmers; and strong incentives for researchers to address sustainable crop and livestock production practices. The report is available for \$5 (\$8 foreign, includes postage) through the Center for Rural Affairs, P.O. Box 405, Walthill, NE 68067.

Scallop Farming and Abalone Farming are two new publications available through agAccess (916 756-7177). **Scallop Farming** by D. Hardy (237 pages, \$75) is a collation of basic principles and

practices developed and used by the industry to date. It covers scallop life cycles, site selection, cultivation, harvesting, and marketing. **Abalone Farming** by R. Fallu (195 pages, \$73) describes the basic biological and physical parameters involved in abalone production but lacks detailed information on production systems due to the newness of the industry.

Agroecology is the topic of three more new books available through agAccess (916 756-7177). They are: **Agroecology** by C. Ronald Carroll et al. (628 pages, \$89.95), **Agricultural Ecology** by Joy Tivy (288 pages, \$36.95) and **Agroecology: Researching the Ecological Basis for Sustainable Agriculture** edited by Stephen R. Gliessman (380 pages, \$89.00).

Hydroponic Food Production: A Definitive Guidebook of Soilless Food Growing Method by H.M. Resh is in its fourth edition. According to agAccess it is the "best reference currently available on hydroponics". It contains information on both small and commercial scale operations. The 462 page book covers plant nutrition, the nutrient solution, the medium, and plant culture and operations. It is available at a cost of \$34.95 from agAccess (916 756-7177).

Brambles is the title of the latest factsheet of the series "A Small-Scale Agricultural Alternative" from the USDA Office for Small-Scale Agriculture. It is FREE! The publication lists several sources of information on cultural practice, marketing, pest control, etc. Contact Bud Kerr, USDA/CSRS, OSSA, Suite 342, Aerospace Building, Washington, DC 20250-2200; (202) 401-4640.

Proceedings of the 1991 Illinois Specialty Growers Convention are now available. The publication is a collection of over 60 papers (249 pages). Make check for \$15 payable to University of Illinois, and send to Jeff Kindhart, Univ. of Illinois, Dixon Springs Agricultural Center, Route 1, Simpson, IL 62985; (618) 695-2444.

Small-Scale Fruit Production is designed for people who grow fruit on an acre or less. The cost is \$7.50. Contact: Publications Distribution Center, The Pennsylvania State University, 112 Agricultural Administration Bldg., University Park, PA 16802; (814) 865-6713.



News Briefs

Comic character, Captain Cornelius, conducts corny crusade to educate third through sixth grade students about the advantages of ethanol fuel ("Agri News", Jan. 2, 1992). The Illinois Corn Marketing Board created a comic book featuring the adventures of the sunglass-wearing ear of corn in a superhero cape. Captain Cornelius battles the evil Farley Choke and his agents from S.M.O.G.

Corn smut continues on its way to becoming a food fad according to a Knight-Ridder Newspapers article. In Mexico it is called Cuitlacoche which translates to "black excrement". Restaurants prefer the term "maize mushroom" or "corn truffles". The appearance and mushroomy, smoky flavor make it exotic enough that restaurateurs are willing to pay up to \$12 a pound for the fungus.

Passion fruit plus weed equals new fruit that is hardy at least as far north as Georgia (Associated Press). Passion fruit will not grow north of Miami. Passion fruit was crossed with maypop, a weedy vine native to the Southeast. The new fruit has been dubbed "passion pop". The fruit is the size of tennis balls with yellow, green or purple skin. A soft white rind surrounds a lemon-yellow pulp with a taste similar to passion fruit. Juice companies are very interested in the new fruit. It also may offer an alternative crop to citrus farmers whose orchards have been hurt by winter freezes.

Corn gluten meal may control weeds while it acts as a fertilizer (Associated Press). Nick Christians, a researcher at Iowa State University, accidentally discovered the weed-killing, fertilizing properties of corn gluten

meal over seven years ago while he was using corn meal as a growth medium for a microorganism. A protein substance extracted during processing interferes with germination in crabgrass and other annual weeds. It is more expensive and less effective than synthetic herbicides but it will offer an alternative. It may be on the market as early as spring of 1993.

Fresh broccoli tops list of 10 foods with the greatest increases in U.S. per capita consumption over the period from 1976-78 to 1986-88, according to a report of the USDA Economic Research Service. Also on the list: low-calorie sweeteners, fresh cauliflower, fresh grapes, rice, yogurt, fresh carrots, frozen broccoli, turkey and cheese. The 10 foods with the greatest declines in per capita consumption were: veal, whole milk, canned green peas, canned peaches, distilled spirits, nonfat dry milk, canned corn, beef, coffee, and lamb.

Soy ink has environmental benefits according to a recent article in "Farmlife", a publication of the USDA Economic Research Service. Soy ink is non-volatile so it does not evaporate and release toxic chemicals into the air as petroleum based inks do. The soy-based inks use a renewable resource. Thirdly, soy inks wash out of paper more easily during the paper recycling process.

Soybeans probed for diesel power potential was the title of an article in the December 5th issue of "Agri News". Researchers at the Univ. of Missouri are using a soy fuel, made from the esterification of alcohol and soy oil, in a pick-up truck. They plan to use the vehicle for a year and then evaluate the performance of the truck and the

soy fuel. There have been no modifications to the engine but a 50 gallon heated tank for the fuel was added since it thickens when the temperature drops into the 30s. The truck has normal horsepower and so far it shows no sign of engine problems. The soy fuel produces 75% less visible pollutants compared to diesel fuel. It may eventually have some potential in agricultural areas or heavily polluted cities. Currently, the soy fuel costs about \$4.50 per gallon.

Exotic animals spark fear regarding the spread of disease and damage to the environment (Agri News, December 5, 1991). There is concern that exotic species may spread exotic diseases to domestic livestock. In states where there are hogs that have escaped to the wild, they have caused considerable environmental and economic damage. In several southern states, park officials have tried to control wild hog populations by hunting and trapping, with little success. Last session the Minnesota legislature approved a bill that gives the Minnesota Dept. of Natural Resources broad power over exotic species. Officials from the DNR and the Minnesota Board of Animal Health are currently developing guidelines for exotic animal control. Many of those currently involved in the breeding and sale of exotic species argue that there is no danger and that the state would be taking away their livelihood if exotic species are banned.

Ostriches and deer classified as agricultural commodities in Oklahoma (Rural Enterprise, Fall 1991). Last session the Oklahoma legislature passed a bill that calls for the Oklahoma Dept. of Agriculture (See *News Briefs page 6*)



(*News Briefs from page 5*) to promulgate rules and regulations regarding the inspection and distribution of exotic livestock and exotic livestock products. The Oklahoma Deer Growers Assn. was very supportive of this legislation since it will enable them to market their product more effectively.

Onions may become anti-cancer food if Texas researchers are successful in developing onion varieties that are high in anti-cancer compounds (Rural Enterprise, Fall 1991). Garlic, onions, and chives have been shown to contain compounds that inhibit certain cancers, especially stomach cancer. The sulfur compounds that have this effect have not been identified in onions. They have been identified in garlic but since garlic does not have flowers, it is hard to breed varieties that have extra high levels of the cancer preventing compounds. Researchers at the Texas Agricultural Experiment Station at College Station and at the Anderson Cancer Center in Houston are working together to identify the anti-cancer compound in onions and then breed for that trait.

Crambe and kenaf are gaining ground according to two articles in the November 1991 issue of "Ag Industrial Materials & Products", a publication of the New Uses Council based in Topeka, Kansas. Crambe, a new oilseed crop that contains high erucic acid (HEA), is becoming commercially successful in North Dakota. HEA is used in clear polymers for coatings, in plasticizers, and in special, high performance lubricants. Crambe was processed in a sunflower crushing facility in Enderlin, N.D. in 1990 and 1991. Processing went well and the company plans to contract for 20,000 acres in 1992. Kenaf, a fibrous annual crop that

can be used to make paper, rope, fiber boards and other composites is being grown commercially in several southern states including Louisiana, Mississippi and Texas. A new pulp mill is being built in McAllen, Texas that will be able to process up to 37,000 acres of kenaf into newsprint.

Handcrafted paper from Minnesota plant fibers is being studied by Dr. Harold Alexander of the Univ. of Minnesota, and his wife Marjorie. Twenty-seven different types of handmade paper made from cattails, stinging nettle, bracken fern, and basswood were evaluated. Cattail emerged as the leading candidate for use in small-scale papermaking. They had previously successfully introduced small-scale papermaking to Jamaica. Economic development organizations are being contacted to explore the feasibility of establishing a regional hand papermaking educational center (R&D Outreach, Univ. of Minnesota, July-Sept. 1991).

Mushroom production up, prices down according to a news brief in "Ag Opportunities", the newsletter of the Missouri Alternatives Center (Nov./Dec. 1991). Total U.S. mushroom production was up 5% during 1990-91, or 756 million pounds. Growers received an average price of 88.8 cents per pound, down 3.7 cents from the previous season. Shiitake production increased 4% to 3.9 million pounds with a value of \$16.3 million or \$4.17 per pound. Shiitake was produced on 315,000 natural logs, 299,000 natural wood indoor logs, and 1.14 million square feet of indoor growing area.

The Native Fruit Development Program has been established at the University of Saskatchewan. Objectives of the program are to: 1) select, develop and propagate superior cultivars of fruit species native to Saskatchewan with emphasis on the saskatoon,

blueberry, lingonberry, highbush cranberry, chokecherry, pincherry, and the various currant species, 2) develop appropriate production and management practices for these species, 3) initiate experimental orchards for variety evaluation and studies of management practices. In general, the activities of the Native Fruit Development Program include germplasm collection, variety evaluation, propagation, experimental studies of native fruit species' biology and culture, problem diagnosis for growers, and information transfer to growers. A production guide for saskatoons has already been developed (see *Publications* section).

Elk farming tantalizes Upper Midwest (The Farmer, November 1991). Demand for venison is increasing in the U.S. and prices for breeding stock are on the rise with prices nearing \$10,000 each for breeding cows. Antler velvet, sold to Asian markets for use in medicines, sold for \$65/pound this summer, which was down 15% from the previous year. Robert Jordan, Univ. of Minnesota professor, says that "Deer and elk farming is a long-term, high-cost venture that certainly has potential, but also some frailties". Prices may eventually tumble.

Compensating indigenous peoples for botanical knowledge has been the topic of much discussion according to an article in "Diversity", vol. 7:3. The loss of plants in tropical areas and the knowledge of how they are used will have a great impact on pharmaceutical research. If satisfactory ways of compensating local people for the knowledge of their plants are developed, the results could include improved economic development, new and better crops, the cure or control of diseases, as well as biological conservation.



Calendar of Events

February 7-9, 1992 - California Farm Conference Santa Rosa, California. For further information contact the Small Farm Center, Univ. of California, Davis, CA 95616-8699; (916) 757-8742.

February 9-12, 1992 - North American Strawberry Growers Assn. Annual Meeting Colonial Williamsburg, Virginia. Contact Ed and Betty Burns, Executive Secretaries, P.O. Box 1245, Tarpon Springs, FL 34688; (813) 937-4109.

February 10, 1992 - Ohio Asparagus School Chillicothe, Ohio. For further info contact: Carl Cantaluppi, OSU-Piketon Research and Extension Center, 1864 Shyville Road, Piketon, OH 45661; (614) 289-2071.

February 13-15, 1992 - Fourth National Conference on Organic/Sustainable Agriculture Policies Bethesda, Maryland. Contact: Roger Blobaum or Michelle Fleming at (202) 332-9110.

February 18-19, 1992 - Leopold Center Annual Conference Ames, Iowa. Contact the Leopold Center for Sustainable Agriculture, 126 Soil Tilth Bldg., Iowa State Univ., Ames, IA 50011.

February 26-28, 1992 - Farming for Profit, Land and Family Montevideo, Minnesota. For further info contact: the Land Stewardship Project, 103 West Nichols Avenue, Montevideo, MN 56265; (612) 269-2105.

March 5-6, 1992 - U.S. Canola Conference: New Opportunities, New Challenges Washington, D.C. Sponsored by the U.S. Canola Assn. For further information contact them at 1150 Connecticut Ave., N.W. Suite 507, Washington, DC 20036; (202) 331-8113.

March 8-12, 1992 - International Conference on Development of New Crops Jerusalem, Israel. For more information, contact Conference Secretariat, ORTRA LTD., P.O.

Box 50432, Tel Aviv 61500, ISRAEL; Fax: 972-3-660952.

March 15-19, 1992 - Second International Symposium on Specialty and Exotic Vegetable Crops Miami, Florida. For further information, contact Office of Conferences, Univ. of Florida, 551 IFAS, Gainesville, FL 32611-0551.

March 26, 1992 - Value-Added Meat Processing Symposium Minneapolis, Minnesota. For registration information contact June Rhoads or Gerald Wagner at 405 Coffey Hall, Univ. of Minnesota, St. Paul, MN 55108-1030 or call 1-800-367-5363.

April 12-16, 1992 - Second International Food Legume Research Conference Cairo, Egypt. Contact Dr. A.E. Slinkard, Crop Development Centre, University of Saskatchewan, Saskatoon, Sask. S7N 0W0 Canada; Phone: (306) 966-4978, Fax: (306) 343-1025. (See *Calendar* page 8)

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Your comments about "BioOptions" would be most helpful to us. Please tell us what you like about our newsletter and how we could improve it. We also encourage you to send us information on upcoming events and new publications.



(Calendar from page 7)

May 17-20, 1992 - Fourth North American Symposium on Society and Resource Management

Madison, Wisconsin. For further information contact Mary Miron, School of Natural Resources, 1450 Linden Drive, Room 146, Madison, WI 53706; (608) 262-6968.

June 4-7, 1992 - Diversity in Food, Agriculture, Environment and Health East Lansing, Michigan.

Proposals for posters, papers and session topics will be accepted through January 31, 1992. For further information contact Prof. Lawrence Busch, Dept. of Sociology, Michigan State Univ., East Lansing, MI 48824-1111.

June 24-26, 1992 - Corn Utilization Conference IV St. Louis, Missouri.

Sponsored by the National Corn Growers Assn. and CIBA-GEIGY Seed Division. Poster presentations are being accepted through April 15th. For more information

contact Ann Beirne, National Corn Growers Assn., 1000 Executive Parkway, Suite 105, St. Louis, MO 63141-9938; (314) 275-9915.

July 14-22, 1992 - International Crop Science Congress Ames, Iowa.

Program topics include: Striving for a Productive and Sustainable Agriculture, Environmental Change: Challenges for Agronomists, Biodiversity, Crop Improvement Beyond the 1990's, and Advances in Physiology and Molecular Biology of Crop Plants. For further information, contact Dr. Kenneth J. Frey, Dept. of Agronomy, Iowa State Univ., Ames, IA 50011-1010; (505) 294-7607, Fax (515) 294-3163.

July 20-24, 1992 - First World Congress on Medicinal and Aromatic Plants for Human Welfare Maastricht, The Netherlands.

Contact Dr. Choldwig Franz, Vorstand des Instituts für Botanik und Lebensmittelkunde der Veterinärmedizinischen Universität Wien, 1030 Vienna, Austria.

July 30 - August 1, 1992 - Participatory On-farm Research and Education for Agricultural Sustainability Champaign, Illinois.

For further information, contact: Dr. John M. Gerber, UI Agricultural Experiment Station, 211 Mumford Hall, 1301 W. Gregory Dr., Urbana, IL 61801.

September 8-10, 1992 - International Sunflower Conference Pisa, Italy.

For more information or to submit a paper, contact Conference Secretariat, c/o Istituto di Agronomia, Via S. Michele, 2, 56100-Pisa ITALY; Phone 050-571565, Fax 050-540633.

December 13-14, 1992 - Alternative Energy Conference: Liquid Fuels from Renewable Resources

Nashville, Tennessee. Sponsored by the American Society of Agricultural Engineers. For symposium information contact: John Cundiff, VPI & SU, Agricultural Engineering Dept., Blacksburg, VA 24061.

Center for Alternative Plant and Animal Products
305 Alderman Hall
1970 Folwell Avenue
University of Minnesota
St. Paul, MN 55108

~~Louise Beirne
Dept. of Ag Econ
232 Classroom Office Bldg.
St. Paul, Minnesota~~