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Newsletter of the Center for Alternative Plant and Animal Products Volume 1, Number 3 Winter 1990

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

Lesser Known and Grown Field Crops: A Slide Set

A new slide set will soon be released by the University of Minnesota. During the past few years, U of M scientists have been accumulating photos from their research plots of unusual and minor crops. We have assembled a set of slides which we think others will find useful. A preliminary set has been provided to a small number of people for review. A revised set of slides will be available to the public in November or December.

This copyrighted set now includes 225 slides depicting vegetative and reproductive growth stages, as well as seed photos. Each slide has the common name of the crop superimposed. There is also a slide with the common name, scientific name, and major uses for each crop. The 65-70 crops are organized into grain, pulse, oilseed, forage and miscellaneous categories based on major use. Slides will be provided in plastic slide storage sheets for easy filing and retrieval.

To get on a mailing list to receive cost and ordering information as it becomes available, contact Dr. L.L. Hardman, Dept. of Agronomy and Plant Genetics, 411 Borlaug Hall, Univ. of Minnesota, St. Paul, MN 55108.

Enhancing Development of New Crops Through Policy

UNIVERSITY OF MINNESOTA
DOCUMENTS

FEB 08 2006

Robert L. Myers
Dept. of Agronomy, Univ. of Missouri

Government policies are a critical factor affecting the development and commercialization of any new crop. The focus of many policy makers on just a few major crops, such as corn, wheat, and cotton, has led to government programs and regulations which promote major commodities, and neglect the role that alternative crops might have. This situation is reinforced by the strong political presence of major commodity organizations, and the commodity specific orientation of some Congressional subcommittees.

In spite of the political pressures which concentrate policy discussions on only a few crops, there exists a substantial number of Congressional leaders interested in new crops. Current Congressional interest in this topic has resulted in several alternative crop bill introductions. Some of the legislative language in these bills may find its way into the 1990 Farm Bill, an omnibus farm legislation package scheduled to pass in Congress by this fall. The 1990 Farm Bill and other legislation offer an opportunity for improving the policy environment influencing the development of new crops.

Alternative crop related legislation introduced in this Congress (1989-90) has focused primarily on alternative agricultural products. Although these bills typically include some language on new crops, the emphasis is on finding new agricultural products, whether those

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products come from traditional or nontraditional crops. Some of these bill titles are listed below, along with bill number and sponsor: "Research and Commercialization of Alternative Agriculture (HR 47, Virginia Smith of Nebraska); "National Agricultural Product Technology Act" (HR 2691, Edward Madigan of Illinois); "Agricultural Research Commercialization Act" (S 621, Kent Conrad of North Dakota, and HR 1505, Tim Penny of Minnesota); and, "Alternative Agricultural Research and Commercialization Act" (S 1699, Tom Harkin of Iowa).

None of these bills has moved beyond committee consideration in either the House or the Senate, although all are similar to a bill passed by the House, but not the Senate, in 1988. With several members of the House and Senate Agriculture Committees interested in alternative crops and products, it is likely that some of the ideas in the bills listed above will resurface in this year's Farm Bill. The key elements of the legislation under debate include some type of corporation or other entity which can fund commercialization efforts, and a national research institute or program aimed at increasing the level of research on alternative agricultural products.

Several modifications could be made in (See Policy page 2)



Policy from page 1 national farm programs to improve the chance of success for new crops, including changes which would:

1. Provide export programs which assist export of crops in general, not just a few like wheat.
2. Increase the flexibility of FmHA loan application evaluations, so that farmers trying alternative crops are not discriminated against.
3. Require the Federal Crop Insurance program to offer some type of crop insurance for nontraditional crops, particularly since farmers are required to carry crop insurance to be eligible for federal drought relief payments.
4. Allow new crops to be incorporated, as appropriate, into farm plans that are required for certain federal programs, such as the Conservation Compliance Program.
5. Establish grading standards for promising new crops, in order to improve postharvest marketing and handling.
6. Allow new crops to be grown on set aside acreage, so that farmers can gain experience with the crop while essentially being subsidized for the land cost (farmers are paid a flat fee per acre for handling set aside acreage according to USDA regulations).
7. Include promising new food crops on the list of commodities which can be purchased by the government for surplus food distribution (similar to the cheese distribution program).
8. Extend the one year program which currently allows flexibility in planting alternative crops on permitted base acreage.

This last item on flexibility is the most likely change to occur, since many legislators have been calling for relaxation of base acreage restrictions. The call for flexibility was finally heeded in the summer of 1989 when Congress passed a law allowing oats, sunflower, flax, safflower, rapeseed/canola, meadowfoam, kenaf, guar, yule,

crambe, and milkweed to be planted on permitted base acreage for one year without losing program benefits. Congressman Epsy, author of the legislation, took the approach of listing specific crops to avoid allowing a major crop such as soybeans to be planted. Perhaps a better way to approach this topic in the 1990 Farm Bill would be to have a generic definition of new or alternative crops, such as: "For purposes of this act, an alternative crop shall be considered to be any crop harvested on less than 10,000 acres in the United States during 1989, including but not limited to..."

National agricultural research policy, certainly a key influence on new crop development, will be another important aspect of the Farm Bill for new crop supporters to address. Although the Farm Bill can only include authorizations, and not fiscal appropriations, for new research programs, it is possible to impact national research direction through mandates included in the Farm Bill. For example, the USDA's research agencies, the Agricultural Research Service (ARS) and the Cooperative State Research Service (CSRS), could be instructed to:

1. Conduct production research on nontraditional crops and establish breeding programs for these crops.
2. Diversify the species collected and maintained in the National Plant Germplasm System.
3. Utilize new crops in fundamental research, such as genetics or ecology studies.
4. Increase research on the characterization and utilization of alternative crops.
5. Broaden the mandate of the USDA's Critical Agricultural Materials Office, or replace it with a more comprehensive program to coordinate research across regions.

In addition to mandates on increasing new crops activity in ARS and CSRS, it might be useful to encourage certain new crop related activities in other agencies as well. The Economic Research Service

(ERS) and the National Agricultural Statistics Service could be required to collect statistics on minor acreage alternative crops, instead of just large acreage crops. Since ERS evaluates the benefits of major crops, it might be useful to ask for studies evaluating the full economic and environmental costs of traditional commodities compared to alternative crops. The National (*See Policy, page 3*)

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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Policy from page 2 Agricultural Library has some staff time allocated to information collection on new crops, but the Farm Bill could mandate increased efforts in this area.

Although the 1990 Farm Bill will be broad in scope, certain federal policies that impact new crops would probably have to be addressed in separate legislation. The Census Bureau could broaden its data collection on crops. Pesticide registration procedures for minor acreage crops could be modified. Some have suggested offering farmers tax incentives for alternative agricultural practices, including the use of new crops. The government could require a certain degree of usage for selected agricultural products, some of which might come from nontraditional crops.

The policy options discussed above address just a portion of the barriers to new crop development which may exist. Some of these many barriers are not normally addressed through Congressional action, but might be in the future. The current Farm Bill deliberations do provide, however, an immediate opportunity to positively impact the policy environment affecting new crops. Individuals wishing to contribute to Congressional policy formation should work through a relevant agricultural organization or contact appropriate legislators. To find out the phone number of a Senator's or Representative's office, call Capitol Information at 202/225-3121. Write to Senators at: Senator---, U.S. Senate, Washington, DC, 20510. Write to House members at: Representative ---, U.S. House of Representatives, Washington, DC, 20515.

Note: Dr. Myers was the 1988-89 American Society of Agronomy Congressional Science Fellow, serving as a legislative staffer with the House of Representatives Agricultural Committee.

Psyllium

Chris V. Hanson
University of Minnesota

Psyllium is the common name that has been used for the seed from several members of the genus Plantago. The most commonly cultivated species is P. ovata also known as white or blonde psyllium, Indian Plantago or Isabgol. India currently dominates the world market in the production and export of psyllium (Modi 1974).

Recent interest in psyllium has arisen primarily due to its use in high fiber breakfast cereals and from claims that these high fiber cereals containing psyllium are effective in reducing cholesterol. Although some studies have pointed to a cholesterol reduction attributed to a diet that included psyllium, research in this area has not been conclusive and is continuing.

Psyllium seed is produced mainly for its mucilage content which is highest in P. ovata. The mucilage is obtained by mechanical milling/grinding of the outer layer of the seed. This mucilage layer amounts to 25% or more of the total weight of the seed (Gupta 1982). Plantago seed mucilage is often referred to as husk or psyllium husk. The milled seed mucilage is a white fibrous material that is hydrophilic (water-loving). Upon absorbing water the clear colorless mucilaginous gel that forms may be increased in volume by ten-fold or more (Rubis 1990). As a dietary fiber, which is not digested by action in the small intestine, it absorbs excess water while stimulating normal bowel elimination. Although its main use has been as a laxative, it is more appropriately termed a true dietary fiber (Rubis 1990).

The United States is the world's largest importer of psyllium "husk" with over 60% of total imports going to pharmaceutical firms for use in products such as Metamucil®,

Effersyllium® and Fiberall® (Chan and Wypyszyk 1988). Psyllium mucilage is also used as a natural dietary fiber for animals. For example, it is used in a feed additive for sows prior to farrowing. The "dehusked" seed is rich in starch and fatty acids and is used in India as a bird feed and as cattle feed (Gupta 1982).

Psyllium mucilage possesses several other desirable properties. As a thickener, it has been used in ice cream and frozen deserts. A 1.5% weight/volume ratio of psyllium mucilage exhibits binding properties that are superior to a 10% weight/volume ratio of starch mucilage (Gupta 1982). The viscosity of psyllium mucilage dispersions are relatively unaffected between temperatures of 20-50 C, by pH from 2 to 10 and by sodium chloride concentrations up to 0.15 M (Chan and Whpyszyk 1988). These properties in combination with psyllium's natural fiber characteristic may well lead to an increased use by the food processing industry in such products as puddings, ice cream, yogurt, sauces, bakery products, instant beverages, cereals, snacks, confectioneries, meat products and pet foods. Technical grade psyllium has been used as a hydrocolloidal agent to improve water retention for newly seeded grass areas (Chan and Whpyszyk 1988) and to improve transplanting success with woody plants.

Plantago ovata is an annual herb that grows to a height of 30-45 cm. The root system has a well developed tap root with few fibrous secondary roots. A large number of flowering shoots arise from the base. Plants flower about sixty days after planting (Gupta 1982). In India, P. ovata is cultivated mainly in North (See *Psyllium*, page 4)



Psyllium from page 3 Gujarat as a "Rabi" season crop (October-March). During this season, which follows the monsoons, average temperatures range between 15-30 C and moisture is deficient (Gupta 1982). Isabgol (*P. ovata*), which has a moderate water requirement, is given 5-6 light irrigations (McNeil 1989). A very important environmental requirement of the crop is clear, sunny and dry weather preceding harvest. High night temperature and cloudy wet weather close to harvest have a large negative impact on yield. Rainfall on the mature crop also results in shattering and major field losses (Modi et al. 1974).

Isabgol grows best on light well drained sandy loams. The nutrient requirements of the crop are low (Modi et al. 1974). In North Gujarat, the soil tends to be low in nitrogen and phosphorus and high in potash with a pH between 7.2 and 7.9 (Gupta 1982). Nitrogen trials have shown a maximum seed yield response with the addition of 20 kg/ha (roughly 20 lbs/acre) of nitrogen (Samra and Gill, 1986).

P. ovata has small seeds (1.7g/1000 seeds) (McNeil 1989). The seedbed for Isabgol is brought to a fine tilth, seed is broadcast at 5-7.5 kg/ha (5#/acre) and covered slightly (Gupta 1982). Maximum germination occurs at a seeding depth of 2 mm. Under ideal conditions of adequate moisture and low temperature (10-20 C), 30% of the seed germinates in 5-8 days.

Weed control is achieved by one or two hand weedings early in the growing season (Gupta 1982). Plantago wilt and downy mildew are the major disease problems. White grubs and aphids are the major insect pests.

The flower spikes turn reddish brown at ripening, the lower leaves dry and the upper leaves yellow. The crop is harvested in the morning after the dew is gone to minimize shattering and field loss.

The plants are cut 15 cm. above the ground and then bound, left for a few days to dry, thrashed and winnowed (Gupta 1982).

The contract price for 95% purity psyllium husk set by the Indian Basic Chemical, Pharmaceutical and Cosmetic Export Promotion Council for April of 1988 was \$3.65/kg (\$1.65/pound) F.O.B. This price is up from \$2.50/kg set in 1985 (Chan and Wypyszyk 1988). The average yield of *P. ovata* in India is 1000 lbs. of seed per acre. Net yield of 95% purity husk after milling is 250 lbs. per acre. The average gross revenue from milled product at 1988 prices is \$412/acre. The costs of production and milling needs to be determined before one can analyze the potential profitability of a commercial psyllium venture.

The U.S. currently imports and consumes approximately 8,000 metric tons of psyllium annually. A continued expansion of this market seems likely due to the high level of interest in natural dietary fibers.

No variety has yet been tested in the Upper Midwest but it would seem that the varieties that are grown in India would not be suited to production in this area. The major problem is the shattering characteristic of the mature crop. Some success has been achieved by cross-breeding high yielding Indian varieties with varieties that are more shatter resistant (Rubis, 1990). The question remains whether or not psyllium could be successfully grown in this area.

Literature cited:

Chan, J.K.C. and V. Wypyszyk 1988. A forgotten natural dietary fiber: psyllium mucilloid. *Cereal-Foods-World* 33(11):919,920,922.

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McNeil, D.L. 1989. Factors affecting the field establishment of *Plantago ovata* Forsk. in northern Australia. *Trop. Agric.* 66(1):61-64.

Modi, S.M., K.G. Mehta and R. Gupta 1974. Isabgol, a dollar earner of North Gujarat. *Indian Farming* 23(10):17-19.

Rubis, David D. 1990. Personal communique in regard to Plantago and Psyllium.

Samra, J.S. and B.S. Gill 1986. Seed yield of Isabgol as influenced by doses and sources of nitrogen. *J. Res. Punjab Agric. Univ.* 23(4):557-560.

Alternative Field Crops Manual

This manual provides concise, uniform information on the production of many minor or new field crops that are adapted to the upper Midwest, and that may be considered as alternatives to traditional farm commodities. Crops currently included are adzuki bean, amaranth, buckwheat, canola, lupin, fababean, flax, grain sorghum, popcorn, and triticale. Eventually there will be 30 to 40 crops included.

The "Alternative Field Crops Manual" is a joint project between the Center for Alternative Plant and Animal Products, the Minnesota Extension Service, and the Univ. of Wisconsin Cooperative Extension Service. A limited number of copies are available for purchase at \$35. Make checks payable to University of Wisconsin. The price includes a binder, index tabs, and chapters, as well as a subscription to future chapters. Contact Colleen Jones, Dept. of Agronomy, 1575 Linden Drive, Univ. of Wisconsin, Madison, WI 53706; (608) 262-7702.



Publications

Direct Marketing Resource Notebook, a publication of the Minnesota Extension Service, has recently been revised. It includes information on starting a business, marketing, economics, post harvest care, state regulations, insurance, personnel management, and other topics of interest to those intending to go into direct marketing. It is available for \$19, including shipping and handling, from the Ramsey Co. Extension Service, 2020 White Bear Ave., St. Paul, MN 55109. Make checks payable to: Minnesota Extension Revolving Fund.

International Ag-Sieve, "A sifting of news in regenerative agriculture" is a bi-monthly publication of the Rodale Institute. It focuses on news in the area of sustainable agriculture in developing countries but also includes information on alternative crops and germplasm preservation. The yearly subscription price is \$15. Make checks payable to: Rodale Institute. Their address is 222 Main Street, Emmaus, PA 18098.

Cornucopia is published quarterly by the International Agency for Apiculture Development. It provides information on beekeeping and products from beeswax and honey. Meetings and publications in the area of apiculture are listed. Individual subscriptions are \$12 per year. Make checks payable to IAAD and send to 7011 Spieth Road, Medina, OH 44256-8912.

Farming Alternatives: A Guide to Evaluating the Feasibility of New Farm-Based Enterprises was developed by the Farming Alternatives Project at Cornell University. It is an in-depth guide for farm and rural families who are interested in developing a new enterprise using farm or natural resources. Readers are taken through a step-by-step planning process, complete with worksheets and case studies, which covers goal setting, family and farm inventory,

identifying alternatives, analyzing markets, analyzing profitability and cash flow, and final evaluation. The price is \$5.75 and it is available from NRAES at 152 Riley-Robb Hall, Cornell University, Ithaca, NY 14853.

Actinidia Enthusiasts Newsletter is a yearly publication that promotes cooperation and communication among kiwifruit enthusiasts. The newsletter prints information on propagating, breeding, growing, processing and marketing the fruits of the Actinidia species. The most recent issue of the "newsletter" is 114 pages long. Single copies are \$10.00 each. Make checks to "Friends of the Tree Society" and send your order to them at P.O. Box 1466, Chelan, WA 98816.

Shiitake News: The Information Clearinghouse for Shiitake Mushrooms is produced by the Forest Resource Center. It includes information on shiitake production and marketing as well as upcoming meetings and new publications. It is the most widely read publication of its kind in North America and is indispensable for anyone who's serious about shiitake. It is published three times a year. The initial subscription, including back issues, is \$25. Annual renewal is \$15. Make your check payable to the Forest Resource Center, and send it to them at Route 2, Box 156A, Lanesboro, MN 55949.

Underground Crops: Long Term Trends in Production of Roots and Tubers is the result of collaboration between the International Potato Center and Winrock International. The purpose of the book was to improve the availability of information on root crops in developing countries. The introductory section deals with the characteristics of the five major groups of crops; cassava, edible aroids, potatoes, sweet potatoes, and yams. The rest of the book gives crop by crop and nation by nation

statistics on the area, production and yield, trade and domestic uses of these crops from 1961-1985. It is available from Winrock International for \$12.50.

ADAPT 2 Conference Proceedings includes a brief overview of 100 agricultural diversification ideas. The Conference was held December 3-4, 1987 in Kansas City, Missouri and was sponsored by Successful Farming Magazine. The topics are grouped into nine areas; twists on traditional crops, fruits and vegetables, animal industries, tree products, other specialty crops, aquaculture, cottage industries, marketing, and other topics. The proceedings are available at a cost of \$12.95, including postage. Make checks out to Successful Farming and send to them at 1716 Locust St., Des Moines, IA 50336, Attention: Tammy Sindergard.

Diversity: A News Journal for the International Plant Genetic Resources Community is a quarterly publication. It is a forum for the presentation and discussion of issues pertinent to the plant genetic resources community. The most recent issue contained over 40 pages of information on research programs and political developments in the area of biological diversity. The subscription rate in North America is \$35 for non-profit institutions and individuals. Send check to Diversity, 727 8th Street S.E., Washington, DC 20003.

The Cut Flower Quarterly is the newsletter of the Association of Specialty Cut Flower Growers. It includes production and marketing information on flowers, notices of upcoming meetings, news regarding Association activities, and classified ads relating to flower production and marketing. Association membership, which includes a subscription to the newsletter, costs \$55. Send your check, made out to (See *Publications*, page 6)



News Briefs

Commercializing Promising Technologies: One Answer to U.S. Farm Problems was the title of an article in "Choices". Paul O'Connell, Deputy Administrator, Cooperative State Research Service, USDA, suggested that a partnership among academia, government, and private industry could serve as a catalyst to commercialize ideas for new agricultural products. Several demonstration projects are already underway; two promising ones are kenaf, an annual fiber crop, and hybrid-striped bass (HSB) a cross between the female striped bass and the male white bass.

Ostrich a la king The January 22 Star Tribune (published in Minneapolis) reported on a livestock enterprise that is new to Minnesota. Joe and Sue Doty bought 14 ostriches last year after studying its potential and visiting some ostrich ranches. The skin sells for \$35 per square foot, the meat for \$5 per pound and the feathers for \$300 per pound. For now they are worth much more alive, since breeding stock sells for \$25,000 to \$50,000.

Southwesterners grow emus, other exotic animals was the title of an article in a recent issue of "Feedstuffs" (January 22, 1990). Emus are flightless birds from Australia and may weigh 125-150 pounds when mature. The price of an emu chick begins at \$1000 while a mature bird may sell for \$12,000. The market right now is for breeding stock only but the meat, skin, feathers, claws and backfat can be sold.

A new crop for the popper in the February "New Farm" magazine describes colorful beans called nuñas that puff up and burst like popcorn. They grow on vines in the high elevations of Peru, Bolivia, and Ecuador. They have a nutlike flavor and high fiber content.

Researchers at USDA have grown the beans at lower elevations in greenhouses but they do not pop under these growing conditions.

Economic outlook for herbs and spices in the 1990's was the title of an article in "Rural Enterprise" (Winter, 1990) by Richard Alan Miller. While total gross sales of any individual herb or spice are usually unimportant, in 1987 the United States' imports of selected dried condiments, seasonings and flavoring materials was \$439 million. This does not include those herbs and spices used for cosmetics, drugs, or dried florals. The primary reason we import so much is that most herbs and spices are labor intensive. However, Miller sees potential for increased herb production in the U.S. He lists examples such as psyllium hulls, comfrey, and pyrethrum as examples of crops that have a large potential market, but new technology must be developed to make them viable in the U.S.

Wild chokecherry tamed by Colorado State researchers (Rural Enterprise, Winter 1990) outlined a research project on commercial production of chokecherries. The private sector approached San Juan Basin Research Center about the project because processors couldn't obtain a reliable supply of the wild chokecherries. The first trees were planted in 1987 on a two acre plot. The research will provide information about weed control, fertilization rates, irrigation practices, and pruning techniques. A producer could gross up to \$8,000 per acre according to Al Denham of Colorado State University.

Making biodegradable plastics from potato waste and cheese whey is a project currently underway at the Dept. of Energy's Argonne National Laboratory in Illinois. The rate of decay and whether it will be broken down by bacterial action or from exposure to sunlight can be selected

during the manufacturing process. In the United States, 10 billion pounds of potato waste and 39 billion pounds of cheese whey are produced yearly. The carbohydrates in these products are converted to glucose and then to lactic acid which can be polymerized into plastic sheets. The only major problem to be resolved is finding an efficient method for separating the lactic acid from the other components of the treated waste.

Recommended research priorities developed by the Crop Science Society of America include alternative uses of agronomic crops and development of alternative crops as two of the ten priorities.

Publications from page 5

Assn. of Specialty Cut Flower Growers, to Judy Laushman, Executive Director, 155 Elm Street, Oberlin, OH 44074.

Directory of North American Exotic Animal and Bird Owners 1989 was designed to help bring people in that industry closer together. It lists owners by state as well as alphabetically by name. It also includes a reference section with reproduction and nutrition information on a variety of species. It is a unique and useful publication. For further information, contact Connie Corbett, Safari Country, Skaar Route, Box 4028, Sidney, MT 59270.

We endeavor to find publications that are of interest to our readers, however, inclusion of a publication in "BioOptions" does not constitute an endorsement by the Center for Alternative Plant and Animal Products or the University of Minnesota.



Calendar of Events

April 2-5, 1990 - International Canola Conference Atlanta, Georgia. Sponsored by ASA, CSSA, SSSA, USDA-ARS, Canola Council of Canada, Foundation for Agronomic Research, Nat'l Fertilizer Development Center, Potash and Phosphate Institutes of the U.S. and Canada, and the Univ. of Georgia. Contact Dr. Noble R. Usherwood, Potash and Phosphate Institute, 2801 Buford Highway, Suite 401, Atlanta, GA 30329; (404) 634-4274.

April 4-6, 1990 - Wood Based Economic Development in the Lake States: A Symposium on Specific Forest Product Opportunities St. Paul, Minnesota. Sponsored by the University of Minnesota, USDA Forest Service, Lake States Forestry Alliance, the Wisconsin, Michigan, and Minnesota Assns. of RC&Ds, the Wisconsin, Michigan and Minnesota Depts. of Natural Resources, the Minnesota Dept. of Trade and Economic Development, Michigan Dept. of Commerce, Wisconsin Dept. of Development,

and Michigan Technological University. Contact Nancy Breneman, Extension Special Programs, 405 Coffey Hall, University of Minnesota, St. Paul, MN 55108; (800) 367-5363 or (612) 625-2722.

April 4-6, 1990 - Stand Establishment in Horticultural Crops Minneapolis, Minnesota. Sponsored by the Univ. of Minnesota and the American Society for Horticultural Science. Contact Nancy Breneman, Extension Special Programs, 405 Coffey Hall, University of Minnesota, St. Paul, MN 55108; (800) 367-5363 or (612) 625-2722.

April 20-21, 1990 - Mayhan (a hawthorn): A New Crop Orange, Texas. Sponsored by Project Mayhan and Southern Fruit Fellowship (NAFEX). Contact Herbert Ourand, Route 3, Box 312, Willis, TX 77378; (409) 856-4821.

June 19-20, 1990 - Corn Utilization Conference III St. Louis, Missouri. Sponsored by the National Corn Growers Assn. and Funk Seeds International. Papers, posters and demonstrations on new chemicals from corn and biotechnical applications are being solicited. Contact Ann, National Corn Growers Assn., 1000 Executive Parkway, Suite 105, St. Louis, MO 63141-9938; (314) 275-9915.

July 9-10, 1990 - "Organic" Meat Minneapolis, Minnesota. Sponsored by the Center for Alternative Plant and Animal Products, and the Minnesota Extension Service. Objectives are to 1) discuss federal regulations concerning "organic" meat, 2) review conventional and organic production methods, 3) Present marketing and pricing strategies for organic meat, and 4) serve as a forum for discussion. Contact Laura McCann at 305 Alderman Hall, 1970 Folwell Ave., University of Minnesota, St. Paul, MN 55108; (612) 625-5747.

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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.



August 23-25, 1990 - 4th National Amaranth Symposium.

Minneapolis, Minnesota. Sponsored by the Center for Alternative Plant and Animal Products, Minnesota Extension Service, Rodale Press, Inc., the Amaranth Institute, and the Institute for the Development of Amaranth Products. Papers, posters, and exhibits relating to production, processing, and marketing of amaranth are encouraged. For further information contact Nancy Breneman, 405 Coffey Hall, 1420 Eckles Ave., University of Minnesota, St. Paul, MN 55108; (612) 625-2722 or (800) 367-5363.

September 23-26, 1990 - Specialty Cut Flowers Conference Ventura, California. Sponsored by the Assn. of Specialty Cut Flower Growers. The conference is open to anyone involved in the production or marketing of specialty cut flowers. Contact Abbie Blair, Gilroy Flower Farm, 1090 Denio Ave., Gilroy, CA 95020.

October 1-5, 1990 - International Triticale Symposium Passo Fundo, Rio Grande do Sul, Brazil. Papers are being solicited; abstracts should not exceed 250 words and should be submitted by May 1, 1990 to CNPT/EMBRAPA, P.O. Box 569, 99001 Passo Fundo RS Brazil.

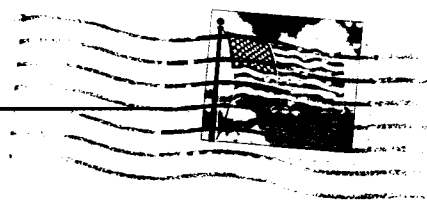
October 8-12, 1990 - First International Conference on Research and Development of New Industrial Crops Riverside, California. Sponsored by the Assn. for the Advancement of Industrial Crops and the Univ. of California, Riverside. Contact Cindi McKernan, Dept. of Botany and Plant Sciences, University of California, Riverside, CA 92521.

January 8-10, 1991 - Southern Biomass Conference Baton Rouge, Louisiana. The theme is "Strategies for Biomass Commercialization". The organizers are soliciting oral and poster presentations. One page abstracts are due by July 1, 1990. Contact Michael Buchart or

Tommie Landry, Louisiana Dept. of Agriculture and Forestry, P.O. Box 3334, Baton Rouge, LA 70821; (504) 922-1280.

February 21-24, 1991 - Sixth National Farmers Direct Marketing Conference Parsippany, New Jersey. Recommendations for topics or speakers to be included in the program are welcomed. Program brochures will be available this fall. For further information, contact Morris Fabian, Rutgers Cooperative Extension, P.O. Box 231, New Brunswick, NJ 08903.

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.



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