

# LEGACY

*The Official Newsletter of the Amaranth Institute*

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## **The 1998 Meeting**

Plan to attend the 1998 Amaranth Institute Meeting in amaranth production country, Sidney, Nebraska, USA, on the 7th and 8th of August. The indoor sessions will be on Friday the 7th, and farm tours will take place on the 8th. Contact Jane Sooby for more information at 308-254-3918, e-mail <PHRC031@unlvm.unl.edu>. Session topics will include marketing, production, breeding, food, and industrial uses of amaranth. Everyone is invited to present a paper on amaranth. Please submit paper topics to Jane by Feb. 15, 1998.

## **Amaranth List-Serve**

An amaranth list serve was started by Amaranth Institute member and list-master volunteer Byron Sleugh. The list-serve automatically copies email messages to everyone on the list. It is a good way to circulate information and requests throughout the amaranth community. If you would like to participate, send an email message directly to Byron at <bsleugh@iastate.edu>. The list is not automated, so you will need to wait a couple of days for him to add your name to the list.

## **A New Editor for Legacy**

The new editor for Legacy will be Larry A. Walters of Nu-World Amaranth, Inc. He will start with the 1998 issue. Any material for publication in Legacy should be sent to him at: Larry A. Walters, Nu-World Amaranth, Inc., PO Box 2202, Naperville, IL 60567. His phone number is: 630-369-6819, his fax number is 630-369-6851.

## **Legacy is On-Line**

Legacy is now available on-line through the Internet. The URL is <<http://www.ars-grin.gov/ars/MidWest/Ames/>>. This URL brings you to the welcome page for the North Central Regional Plant Introduction Station in Ames, Iowa. To reach Legacy, click on "crops", then "amaranth", then scroll down to Legacy. To read Legacy you will need the Adobe Acrobat Reader, which can be downloaded free from a link on the same web page adjacent to Legacy. The set-up of Legacy on-line was done by web-master and Amaranth Institute member Richard L. Wilson, he can be reached by email at <[rlwilson@iastate.edu](mailto:rlwilson@iastate.edu)>.

**The Sustainable Agriculture Research and Education Program (SARE).**

This program supports several categories of projects including research, education, on-farm research, and matching grants. Visit the SAN/SARE web site at <<http://www.ces.ncsu.edu/san/>>. Or contact the Office of Sustainable Agriculture Programs, U.S. Department of Agriculture, 1400 Independence Ave., SW, Stop 2223, Washington, D.C. 20250-2223 phone (202)720-5203.

**Fund for Rural America**

This is a new program with its first funding cycle in 1997. Information is available from Dr. Patrick O'Brien, Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, STOP 2240, Washington, D.C. 20250-2240, phone (202)401-1761, email: <[psb@reeusda.gov](mailto:psb@reeusda.gov)>.

**AMAMEX**

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Thanks to the new prospects opened by NAFTA between Mexico-USA, AMAMEX, (Amaranto Mexicano S.A.) is a Mexican private company ready to open its doors to American joint ventures with entrepreneurs who are searching and ready to develop the great Amaranth American, Mexican and Global market in its varieties and different products including Amaranth beer and oil. Growers and industrial investors are welcome to share and to put forward ideas and suggestions to ROMAN MILLAN e.mail: <[romillan@economia01.economia.unam.mx](mailto:romillan@economia01.economia.unam.mx)>.

***Amaranthus viridis* nectar**

The only species of *Amaranthus* that I have observed to have any nectar is *Amaranthus viridis*, which exudes nectar from the styles. The nectar is sweet tasting, with 60% sugar as measured by a refractometer on greenhouse grown plants. This nectar is too concentrated for use by honeybees, but might be used by flies or ants. I am looking for collaborators that live in the tropics or sub-tropics where this *Amaranthus* grows in the wild, to observe which animals use the nectar. I would also like to find a collaborator who can analyze the nectar for chemical make-up, especially which sugars are present. David Brenner (address under board members)

**Amaranth Industry and Research Connections meeting summary**

This Amaranth Institute meeting was held August 8, 1997, at the North Central Regional Plant Introduction Station in Ames, Iowa. Thirty-eight people attended from nine countries. One of the topics under discussion was the availability of 20 million pounds of Chinese grown amaranth grain to become available after the 1997 harvest. The following is a list of presentations.

David Brenner, Richard L. Wilson, and Lawrence L. Lockhart, Tour of the North Central Regional Plant Introduction Station

Harold Corke (speaker), and Huaixiang Wu, "Starch Quality and its Role in the Development of *Amaranthus* in China"

Fernando Guillen, "Effect of a Wide Range of Population Density on Yield and Agronomic Traits in Grain Amaranth"

Fernando Guillen, "Variability in *Amaranthus* spp. Cultivar Plainsman"

Jim Lehmann, "Amaranth Brainstorming"

Phil Sanders, "Growers Coop"

Jane Sooby, "Amaranth Production Guide"

Luis O. Turriza-Escalante, "The Amaranth Crop in the Mexican Tropic of Campeche"

Larry Walters, "Food Applications for Amaranth"

Miroslav Zima, "Amaranth Research in Slovakia"

At the Amaranth Institute Business meeting three new officers were elected, and it was agreed that Legacy should be put on the world wide web for free distribution.

#### **World-Wide Amaranth Meetings of 1997**

In addition to our Amaranth Institute meeting in Ames, Iowa on August 8, 1997, at least four other significant amaranth meetings were held in 1997. The Ninth International Congress on Andean Cultigens was held April 22 through 25 in Cusco, Peru. The Second International Symposium on New and Nontraditional Plants and Their Future for Practical Utilization was held June 16 through 20 in the Puschino, Moscow area of Russia. The Beijing International Meeting on Amaranth was held September 10 through 12. The Second National Seminar on Amaranth was held in Torreón, Coahuila, Mexico from October 30 through November 1.

#### **Obituary**

Mr. Guillermo Covas passed away on August 31, 1995. He lived in Santa Rosa, La Pampa, Argentina. He was active with amaranth since at least 1939, when he published an article on the genera of *Amaranthaceae* in Argentina. His

contributions included editing a newsletter on amaranths, publishing many articles, and developing new grain cultivars. He was also a prolific writer of letters. His absence is felt world-wide.

#### **AMARANTH INSTITUTE BOARD OF DIRECTORS 1995-96**

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## Recent Amaranth Publications

compiled and annotated by David M.. Brenner

**Evaluation of fungicides for control of *Choanephora cucurbitarum* on *Amaranthus cruentus* in western Nigeria.** 1995. Fola Adebajo and Tunde Ikotun. Tests of Agrochemicals and Cultivars 16:30-31

[Mixtures of benomyl and captafol were the most effective.]

**Physiological investigations on grain and green amaranths (*Amaranthus* spp.) In relation to productivity under mid hill conditions.** 1996. G.L. Bansal. 47 pages. Final Progress Report of PL-480/ICAR (US-India Rupee Fund) Project No. FG-IN-770 IN-ARS 341.

[Dr. G.L. Bansal is in the Department of Plant Physiology, at Himachal Pradesh Krishi Vishvavidyalaya, Palampur-176 062 (India). He compared the performance of grain lines and also leafy vegetable lines. The grain cultivar Plainsman performed very well under his

conditions. The report is illustrated with beautiful color photographs.]

**Molecular characterization of some amylopectins.** 1996. L.A. Bello-Pérez, O. Paredes-López, P. Roger, and P. Colonna. Cereal Chemistry. 73:12-17.

[The amylopectin from amaranth seeds had the most branched structure of those studied.]

**Field evaluation of grain amaranth in Chile.** 1996. Marisol Berti, Humberto Serri, Rosemarie Wilkens, and Inés Figueroa. p. 223-226 In Jules Janick (ed.) Progress in new crops. ASHS Press. Alexandria, VA.

[Dr. Berti evaluated 48 lines for grain yield at her location (36° 36' S). Two of the lines had very high yields, over 6000 kg/ha.]

**'Kerala Red' ornamental amaranth.** 1997. David M. Brenner, and D.J. Makus. HortScience 32:749-750.

[A vegetable variety of *Amaranthus cruentus* is an attractive red color, mild flavored, and is well adapted in the United States. It is from Kerala, India.]

**Popping and cleaning of amaranth seeds in a fluidized bed.** 1995. E. Brito-De La Fuente and L.R. Tovar. Food and Bioproducts Processing 73(C4):183-188.

[One advantage of this popping method is that it preserves nutrients because it is cooler than conductive heat transfer methods.]

**Some compositional properties of seeds and oils of eight *Amaranthus* species.** 1996. John T. Budin, William M. Breene, and Daniel H. Putnam. Journal of the American Oil Chemists Society 73:475-481.

[Grain samples of 21 *Amaranthus* accessions were analyzed for crude fat, fatty acid

profiles, and vitamin E. They were virtually devoid of tocotrienols, so any hypocholesterolemic effect of dietary amaranth is apparently due to other substances.]

**The isolation and characterization of mutants of the C<sub>4</sub> photosynthetic pathway.** 1995. L.V. Dever, R.D. Blackwell, N.J. Fullwood, M. Lacuesta, R.C. Leegood, L.A. Onek, M. Pearson, and P.J. Lea. *Journal of Experimental Botany*. 46:1363-1376.

[The mutant plants require elevated CO<sub>2</sub> to thrive.]

**Decision rules for postemergence control of pigweed (*Amaranthus* spp.) In soybean (*Glycine max*).** 1996. Anita Dieleman, Allan S. Hamill, Glenn C. Fox, and Clarence J. Swanton. *Weed Science*. 44:126-132.

[The threshold weed density for economically justifying additional spray treatments in Ontario changes during the growing season. The label herbicide dose was higher than the most cost efficient dose, however the higher dose might be needed for weeds other than *Amaranthus* in the same field.]

**Relationships in the Caryophyllales as suggested by phylogenetic analyses of partial chloroplast DNA ORF2280 homolog sequences.** 1997. Stephen R. Downie, Deborah S. Katz-Downie, and Kyung-Jin Cho. *American Journal of Botany*. 84(2):253-273.

[Based on the evidence presented in this paper, the genus *Amaranthus* is more closely related to *Beta* (beets), and *Spinacia* (spinach) in the family *Chenopodiaceae* than to *Celosia* and *Froelichia* which are traditionally in the *Amaranthaceae* family.]

**Grain amaranth harvest timeliness in eastern North Dakota.** 1996. S.A. Fitterer, B.L. Johnson, A.A. Schneiter. p. 220-223. *In* Jules

Janick (ed.) *Progress in new crops*. ASHS Press. Alexandria, VA.

[The value of harvesting shortly after frost is demonstrated by periodic harvests of the cultivar Plainsman. The losses in later harvests are attributed to seed shattering.]

**Meiotic studies of spontaneous hybrids of *Amaranthus*: genome analysis.** 1995. E.J. Greizerstein, and L. Poggio. *Plant Breeding* 114:448-450.

[The meiotic behavior of 13 interspecies hybrids was studied. Pollen of the hybrids was stained to detect genomic incompatibility. Most of the hybrids had low frequencies of viable pollen, less than 55%. The authors believe that most amaranths are allotetraploids, and the basic number for the genus is  $x=8$ . Most of the species studied had  $n=16$  or  $n=17$ .]

**A phytochemical study of *Amaranthus cruentus* Linn.** 1994. David Scott Grill. PhD dissertation, Rutgers the State University of New Jersey. pp: 165. *Dissertation Abstracts # AAC* 9511475.

[An investigation of saponins of the seedhead.]

**Compendio del Amaranto (in Spanish).** 1992. Renate Kietz. Instituto Latinoamericano de Investigaciones Sociales, ILDIS. 175 pp.

[A book about history, production, and the nutrition value of amaranths in Bolivia.]

**Case history of grain amaranth as an alternative crop.** 1996 J.W. Lehmann. *Cereal Foods World* 41(5):399-403, 406-411.

[A new review of the grain amaranth situation in the United States. It has an extensive bibliography.]

**Tissue-specific and light-mediated expression of the C<sub>4</sub> photosynthetic NAD-dependent**

**malic enzyme of amaranth mitochondria.**

1996. John L. Long and James O. Berry. *Plant Physiology* 112:473-482.

[This C<sub>4</sub> photosynthetic enzyme is preferentially expressed in leaves and cotyledons, within bundle sheath cells]

**Amaranth Biomass** (in Slovakian). 1996. Jozef Húska (ed.). Slovakian Association for Biomass. Nitra, Slovakia

[A book with 219 pages and 53 papers. The editor is on the faculty at the Slovak Agricultural University, Trieda A. Hlinku 2, 949 76 NITRA, Slovak Republic.]

**Ethnobotany of quintonil: knowledge, use, and management of edible greens *Amaranthus* spp. (Amaranthaceae) in the Sierra Norte de Puebla, Mexico.** 1997. Christina Mapes, Francisco Basurto, and Robert Bye. *Economic Botany*. 51(3):293-306.

[This presents original data on timing, yields, and methods of vegetable amaranth production.]

**C<sub>4</sub> gene expression in photosynthetic and nonphotosynthetic leaf regions of *Amaranthus tricolor*.** 1997. Dennis McCormac, Joseph J. Boinski, Vincent C. Ramsperger, and James O. Berry. *Plant Physiology*. 114:801-815.

[Some ornamental *Amaranthus tricolor* populations have brightly colored chlorophyll deficient regions on the leaf blades. The lack of chlorophyll is an opportunity for studies of metabolism.]

**Proximate composition and mineral content of selected Tanzanian vegetables and the effect of traditional processing on the retention of ascorbic acid, riboflavin and thiamine.** 1995. T.C. Mosha, R.D. Pace, S. Adeyeye, K. Mtebe, and H. Laswai. *Plant Foods for Human Nutrition* 48:235-245.

[A traditional method of preserving amaranth foliage by drying is harmful to the ascorbic acid content. The nutrients can be conserved with a short steam cooking before eating or drying for later use. Air-tight storage of the dried leaves is also recommended.]

**New infrageneric taxa and combinations in *Amaranthus* (Amaranthaceae).** 1996. Sergi L. Mosyakin and Kenneth R. Robertson. *Annales Botanici Fennici* 33:275-281.

[The genus *Amaranthus* is divided into three subgenera, and eight sections, including three subsections.]

**Amaranth: New crop opportunity.** 1996. Robert L. Myers. p. 207-220. *In* Jules Janick (ed.) *Progress in new crops*. ASHS Press. Alexandria, VA.

[A review of agronomy and marketing progress and problems. It summarizes Dr. Myers' years of research in Missouri.]

**Photosynthetic gene expression in meristems and during initial leaf development in a C<sub>4</sub> dicotyledonous plant.** 1996. Vincent C. Ramsperger, Robert G. Summers, and James O. Berry. *Plant Physiology*. 111:999-1010.

[The C<sub>4</sub> photosynthetic mechanism is not active in the newest growing tissues, but becomes active at about the time when a new leaf can be detected by microscopic examination.]

**Quality of spaghetti containing buckwheat, amaranth, and lupin flours.** 1996. P. Rayas-Duarte, C.M. Mock, and L.D. Satterlee. *Cereal Chemistry*. 73:381-387.

[An acceptable pasta with improved lysine levels can be prepared with up to 25% amaranth flour in combination with wheat flour.]

**Effects of fertilizer salts on the germination of corn, winter wheat, and their common weed species.** 1996. K. Sardi, and I. Beres. *Communications in Soil Science and Plant Analysis* 27:1227-1235.

[Germination of *Amaranthus* weed seeds was inhibited at 1000 ppm of ammonium nitrate, and enhanced at 10 ppm. Other patterns were detected for seven additional fertilizers. The authors suggest that these fertilizers could serve as a means of integrated weed control.]

**Amaranth tissue culture for the production of natural food colorants (*Amaranthus hypochondriacus*).** 1993. Mark Alan Trail. PhD dissertation, Oklahoma State University. pp: 252. *Dissertation Abstracts # AAC 9418745*.

[Efficient betalain producing growth conditions were determined.]

**Management methods for producing vegetable amaranth.** 1996. Bharat P. Singh and Wayne F. Whitehead. p. 511-515. *In* Jules Janick (ed.) *Progress in new crops*. ASHS Press. Alexandria, VA.

[Vegetable amaranths are a potential vegetable for the summer season in Georgia, USA. Nine germplasm lines are compared for yield and fertilizer response. Nitrogen fertilization at the rate of 90 kg/ha produced the highest yields.]

**Bench-scale processing of amaranth seed for oil.** 1995. H. Sun, D. Wiesenborn, P. Rayas-Duarte, A. Mohamed, and K. Hagen. *Journal of the American Oil Chemists Society* 72:1551-1555.

[This improved method separates the bran from the perisperm, before extracting oil from the bran.]

**Market compendium of Asian vegetables.** Grant Vinning. 1995. *Rural Industries Research*

and Development Corporation, Barton, A.C.T., Australia

[This book has five pages on vegetable amaranths, including information on local names, prices, and cultivars. Amaranth is one of the ten most popular vegetables in Asia. The wholesale price of vegetable foliage is about AUS \$1.00/kg.]

#### **AMARANTH INSTITUTE MEMBERSHIP**

The membership dues are \$10 per year. Write to: Amaranth Institute, c/o James Lehmann, PO Box 248, Bricelyn, MN 56014.

#### **PUBLICATIONS FOR SALE**

- \*1988 Legacy, Vol. 1, (amaranth carbohydrates)
- \*1989 Legacy, Vol. 2, (amaranth proteins)
- \*1990 Legacy, Vol. 3, (amaranth pigments, and seed shattering)
- \*1991 Legacy, Vol. 4, (amaranth lipids, and release of the variety "Plainsman")
- \*1992 Legacy, Vol. 5, (anti-nutritional factors in amaranth grain, and tarnished plant bugs)
- \*1993 Legacy, Vol. 6, (rotations, tissue culture, hybrid seeds, and planting black seeds)
- \*1994 Legacy, Vol. 7, (iron availability, and variety tests)
- \*1995 Legacy, Vol. 8(1), (includes Nebraska research, progress in India, and rapid cycling)
- \*1995 Legacy, Vol. 8(2), Amaranth Directory Special Issue
- \*1996 Legacy, Vol. 9 ("Plainsman" variability, blister beetles, China tour)
- \*Bumper-sticker "Amaranth is coming..."

Back issues of Legacy are \$3 each for members and \$5 each for non-members. Bumper stickers are \$2 each.

\*1990 Amaranth Grain Production Guide, 36 pp. is OUT OF PRINT A revision is planned for 1998.

The next issue of *Legacy* (1998) will be edited  
by Larry Walters, Nu-World Amaranth, Inc.,  
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Manuscripts and information for publication in  
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