

Partnership Matters

ISU Research and Extension

PARTNER
IOWA STATE UNIVERSITY
CORN AND SOYBEAN
INITIATIVE

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CURRENT ISSUE —

There's oil in those beans—and it's special!

What's new. Iowa soybean producers will be key players in healthier diets for Americans. An evolving dietary concern with food-grade vegetable oils centers on hydrogenation—a chemical process that stabilizes oils and allows for longer product shelf life and fryer life. However, hydrogenation also generates trans-fatty acids, which are implicated with adverse vascular and cardiac health effects. Because of this concern, on January 1, 2006, the U.S. Food and Drug Administration began requiring food processors to declare the amount of trans fats in food-product labeling. For stability and shelf life, high-linolenic oils are partially hydrogenated, leading to the generation of objectionable trans fats.

Two major entities in the U.S. food industry have adopted widespread use of low-linolenic oils. In 2005, Kellogg's North America company announced shifting to low-linolenic soybean oil in manufacturing some of their food products. This change came in response to increasing consumer health concerns. And on October 30, 2006, Kentucky Fried Chicken, Inc. announced that they would switch frying oils in their U.S. restaurants to low-linolenic soybean oil.

How do low-linolenic varieties yield in comparison with conventional varieties?

When the low-linolenic varieties first came out, there was some yield drag reported, but more recently, yields have been comparable with conventional varieties. Although a few low-linolenic varieties have been entered in the public Iowa yield tests, direct comparisons of all available low-linolenic varieties are not available. However, low-linolenic soybean yields in 2006 public trials yield well in comparison with conventional soybean varieties. Grower contracts can provide premiums in the range of 40¢ per bushel for 3 percent linolenic varieties to around one dollar per bushel for the ultra-low linolenic (1 percent) beans.



Some foods using low-linolenic soybean oil.

Are there different low-linolenic varieties available? Yes, there are both Roundup Ready® and non-Roundup Ready® low-linolenic varieties. Among these are varieties that average slightly under 3 percent linolenic acid and others that produce “ultra-low lin” oils, averaging around 1 percent linolenic acid. By comparison, conventional soybeans contain around 7 percent linolenic acid. A limited choice of low-linolenic varieties with soybean cyst nematode resistance also is available.

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RESEARCH BRIEF —

Glyphosate—losing effectiveness?

What's new. Glyphosate was introduced to Iowa agriculture in the mid-1970s as a nonselective weed control tool for use in conservation tillage crop systems. Acreage treated with glyphosate in Iowa exploded upon the development and adoption of transgenic crop varieties, namely the Roundup Ready® and related technologies. Glyphosate-tolerant soybean varieties were commercially introduced in 1996 and became immediately popular as an economically effective weed management tactic in reduced tillage systems and in managing weeds that have developed resistance to acetolactate synthase (ALS)-inhibitor herbicides. Currently, more than 90 percent of soybeans planted in Iowa are glyphosate resistant.

Whenever a crop management system changes, there are likely changes to pest populations. The prevalence of glyphosate use likely will, in time, change the populations of weeds we manage in fields. Development of glyphosate-resistant weed populations of several species has been reported from soybean production areas, and it is likely that there are glyphosate-resistant weeds present in Iowa.

A list of known populations of glyphosate-resistant weeds in the U.S. Midwest by state and date of discovery follows:

Marestail: Tennessee (2001), Kentucky (2001), Missouri (2002), Arkansas (2003), Nebraska (2006)

Common ragweed: Arkansas (2004), Missouri (2004)

Common waterhemp: Missouri (2005)

ISU research. As glyphosate-resistant weed populations become economically significant, glyphosate may become a less effective tool. To that end, Mike Owen and other ISU weed scientists have undertaken several long-term research studies to evaluate the impact of glyphosate-based crop production systems on weed communities and specific research on the evolved glyphosate resistance in common waterhemp and horseweed. The long-term studies are conducted on ISU research farms and on grower fields. At this point, no changes in weed populations have been observed in the experimental areas. However, anecdotal information suggests that common waterhemp, common lambsquarters, giant ragweed and Asiatic dayflower problems are escalating in Iowa, possibly due in part to the glyphosate-based crop production systems. Research will continue to investigate changes in weed communities and the impact of the glyphosate-based crop systems.

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There's oil in those beans . . . ! *continued*—

What requirements are there for producers contracting to grow low-linolenic soybeans?

Three factors are generally required but may vary from contract to contract:

- The low-linolenic crop must be grown in a field that was not in soybeans the previous year.
- The field must be planted, harvested, and transported with equipment that has been thoroughly cleaned.
- Harvested soybeans must be stored separately from conventional soybeans.

Additionally, contracts may require meeting identity preservation standards including limited buffer distances from conventional soybean fields.

ISU research. Iowa State researchers are recognized as pioneers in the development of specialty oil soybean varieties, with research beginning in 1968. Research will continue in breeding and developing soybean varieties with specialized traits. One trait being researched is elevated oleic acid levels in low-linolenic soybean varieties, which will provide additional stability to the oil from these beans. This effort was partially funded by the Iowa Soybean Association and the United Soybean Board.

Learn more. A good starting point for agronomic information about low-linolenic soybean oil is the ISU website www.notrans.iastate.edu. Note that the ISU effort focuses largely on the ultra low-linolenic (1 percent) soybeans.

There is a research report on low-linolenic soybeans available from the 2005 ISU Northeastern Research and Demonstration Farm annual report online at www.ag.iastate.edu/farms/05reports/ne/FoodGradeSoybean.pdf.

For specific questions about specialty oil soybean production and marketing, contact Jim Jensen, extension management field specialist at jensenjh@iastate.edu.

Glyphosate—losing effectiveness? *continued*—

What's next. Iowa producers should monitor for glyphosate-resistant weed populations in fields. Remember that weed escapes in glyphosate-treated fields are often due to use of low glyphosate rates for the size of weeds or because of exposure to doses of glyphosate due to physical constraints (dust on leaves, poor spray patterns) or rain immediately following application, washing the herbicide off the leaves. Development of resistance can be delayed or avoided by rotating other chemistries with glyphosate in lieu of multiple applications.

ISU Extension weed scientists are monitoring for resistant weed species in Iowa. In addition, several studies are ongoing that examine weed control efficacy that employ combinations of tillage, planting date, and crop rotations.

Learn more. Two ISU Extension publications address this topic: *Issues in Weed Management for 2006*, PM 1898, www.extension.iastate.edu/Publications/PM1898.pdf, and the 2006 *Herbicide Guide for Iowa Corn and Soybean Production*, www.extension.iastate.edu/Publications/WC94.pdf.

ISU PROFILE —

Mark Hanna

- Extension agricultural engineer
- Registered professional engineer

Origin

Grew up on a crop and livestock farm near Monmouth in western Illinois

Training

- Ph.D., Agricultural Engineering, Iowa State University, 1991
- M.S., Agricultural Engineering, Iowa State University, 1975
- B.S., Agricultural Engineering, Iowa State University, 1973

At ISU

- ISU Extension agricultural engineer, 1987–present
- ISU Extension area agricultural engineer, southwest Iowa, 1975–1987

Notable achievements

- Engineering Concept of the Year, American Society of Agricultural Engineers, 2006
- Professional and Scientific Excellence Award, Iowa State University, 2006
- Engineer of the Year, American Society of Agricultural Engineers, Iowa Section, 2006
- Superior Engineering Extension Award, 2004
- Mission Award for Extension (Gamma Sigma Delta), 1998

Personal

- Married to Michele
- Sea-kayaked in high arctic at 79°N (closer to pole than arctic circle)



ISU BY THE NUMBERS —

ISU Soybean Research and Extension Project

(Mid-April to mid-October 2006)

Number of soybean varieties used in 2006 studies	34
Number of research locations in Iowa	25
Total number of research plots	7,760
Acres of research plots	82
Paper sampling bags used (plant materials/specimens)	14,646
Plot marking stakes used	18,750
Miles driven to and from plots	29,100
Soil-probe samples taken	38,560
Gallons of coffee consumed by research team	97.5

For more information, see www.soybeanmanagement.info.

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. . . and justice for all

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