Larkins Elected to the National Academy of Sciences

Brian Larkins has spent 20 years researching the regulation of seed development and the synthesis of storage proteins in developing seeds. In particular, he has focused on improving the amino acid content in cereal grains and legumes. His research has significant implications for human nutrition, particularly in developing countries.

Larkins, a University of Arizona plant scientist known for his research on the nutritional quality of cereal grains, was elected to the National Academy of Sciences on April 30, 1996. Larkins is a faculty member in the Department of Plant Sciences, and has an adjunct appointment in the Department of Molecular and Cellular Biology.

Election to membership in the Academy is considered one of the highest honors a U.S. scientist or engineer can achieve. Larkins was among 60 new members and 15 foreign associates from eight countries recognized for their distinguished and continuing achievements in original research.

"The award is given for a longstanding record of accomplishment through high quality research, and for commitment to the field of science," says Robert Leonard, head of the Department of Plant Sciences. "Brian exhibits both of these attributes."

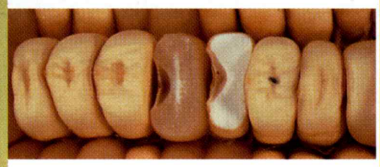
"Brian is one of the nation's leading plant molecular biologists," says Eugene Sander, dean of the College of Agriculture and vice provost of the UA. "His work on protein quality in corn is a real contribution to agriculture on an international scale."

Larkins holds a Ph.D in botany from the University of Nebraska (1974). From 1975 to 1976 he was a postdoctoral research associate in biochemical genetics and plant physiology at Purdue University. He taught and conducted research at Purdue in the Department of Botany and Plant Pathology, where he became professor of biochemical genetics in 1984.

In 1988 Larkins left Purdue and came to The University of Arizona, where he served as head of the Department of Plant Sciences from 1988 to 1994. In 1995, he became the first holder of the Porterfield Chair, an endowed position in that department. The funds generated from this endowment support Larkins' research program on seed storage proteins.

"Seed storage proteins are the most abundant protein in the seed, and as such they are the principal determinants of the protein nutritional quality of the seed," Larkins says.

(left) Three corn cobs show differing amounts of lysine. The cob on the left has a normal amount. The center segregating cob has both normal and high lysine kernels and the cob full of opaque kernels, on the right, has a uniformly higher lysine content than the first two.



(above) Cross sectioned kernels from the segregating ear: the lighter kernel has a higher lysine content.

B. Larkins

Many areas of the world lack the natural and financial resources to grow the variety of crops needed for balanced protein, and thus must rely on grain crops deficient in one or more of the eight amino acids the human body cannot produce. Most cereal grains are deficient in the essential amino acids lysine and tryptophan. Children in developing countries are particularly susceptible to such dietary deficiencies.

In 1994, Larkins and two colleagues were recognized by the Arizona Innovation Network as "Innovators of the Year" in the Medical/Biotechnology Product category. They developed a simple way to estimate the quantity of lysine in corn kernels. This technique can assist plant breeders in developing maize and other cereal grains with a higher content of lysine in the seed. The method will help offset nutritional deficiencies in both human and livestock diets that are based primarily on cereal grains.

"The development of staple cereals with balanced amino acid content will have an enormous impact on human and livestock nutrition," Leonard says.

On a worldwide level, the technique has direct implications for improving the quality of grains grown in areas where people cannot afford to grow multiple crops. Lacking a variety of protein sources, such populations develop deficiencies in amino acids missing from the foods they eat, according to Larkins.

"If you could naturally produce an amino acid balanced grain, the impact on world food problems would be tremendous," Larkins says. "We've developed a very simple assay to give us an indication of the lysine content of the seed. To date, it has been cost prohibitive to use this type of selection for breeding nutritional quality in grains.

"Our method enables a breeder to process several hundred seed samples in a couple of days. The other method can take weeks, and the results are more difficult to reproduce," Larkins says. The simplicity of the method should make it attractive to breeders, who analyze thousands of seed samples annually.

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— Susan McGinley

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