SOYBEAN FLAVOR DEMONSTRATION

The soybean grain commonly produced by farmers has a grassy or beany flavor. This flavor is not a problem when the grain is used as animal feed, but it can be objectionable to some persons when soybeans are used in food products.

The beany flavor is the result of the action of an enzyme called lipoxygenase. As the name implies, the enzyme is involved in the oxidation of lipids or fat, which results in the beany flavor. There are three forms of the enzyme, commonly referred to as lipoxygenase 1, 2, and 3. The three forms occur in common soybean varieties grown by farmers.

To eliminate the beany flavor, soybean scientists evaluated varieties from throughout the world in an attempt to find those that did not have one or more of the lipoxygenase enzymes. They found a few varieties that lacked 1, 2, or 3, but no variety lacked more than one of the three forms. By hybridization, mutation, and selection, soybean breeders were able to combine the genes that control the three forms of the enzyme. Soybeans are now available that lack the three lipoxygenase enzymes. These soybeans are being used to produce soymilk and other food products that no longer have the beany flavor of common soybeans.

Tasting the soybeans with and without the lipoxygenase enzymes provides a tangible illustration of the action of a gene.

The soybeans needed for the demonstration can be obtained without charge from the Office of Biotechnology, Iowa State University, 1210 Molecular Biology Building, Ames, IA 50011, 515-294-9818 or, toll-free in Iowa 1/800-643-9504 or FAX: 515/294-4629.

Procedure:

1. Distribute to each student a seed of the soybean variety that lacks the lipoxygenase enzymes. It is important to taste the seeds without the enzymes first because those seeds with the enzymes will leave such a strong aftertaste.

   The students should be advised to be careful when chewing on the seeds to avoid damage to their teeth. After they have chewed on the seed, they should record the flavor they perceive.

2. Distribute to each student a seed of the soybean variety that has the lipoxygenase enzymes. The students should chew on the seed and record the flavor they perceive.

Note: The soybeans that lack the beany flavor were developed by traditional plant breeding methods. Biotechnologists are using molecular techniques to modify the flavor of crop products. The FlavrSavr tomato is the first commercial product developed by molecular techniques to have improved flavor.

Prepared by the Office of Biotechnology, Iowa State University

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