Science Update

Dietary Carbs and Eye Health

Loss of central vision is an early sign of age-related macular degeneration (AMD)—which is one of the leading causes of blindness among the elderly. Another kind of vision loss, sometimes occurring in people with diabetes, has been associated with consumption of diets high in "fast" carbs. These carbohydrates are quickly digested and absorbed, resulting in a rapid rise and fall in blood sugar levels. Fast-carb foods include white bread, rice, potatoes, pastas, sugars, and syrups. But whole-grain versions of bread and pasta, and brown rice are considered "slow" carbs and are digested more slowly.

Researchers analyzed data taken from more than 4,000 men and women, aged 55 to 80, who are participating in the Age-Related Eye Disease Study. They want to know whether the type of damage to eye tissue produced by fast carbs is similar in both AMD and diabetic eye disease. The goal is to find modifiable risk factors that can help prevent or reduce the effects of aging on eye health. *Allen Taylor, USDA-ARS Laboratory for Nutrition and Vision Research, Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, Boston, Massachusetts; phone (617) 556-3156, e-mail allen.taylor@tufts.edu.*

Rising CO_2 Spikes Long-Leaf Pines

Plants' responses to rising levels of carbon dioxide (CO_2) are known to be quite different, so scientists must study them one by one to predict how they'll be affected by rising CO_2. Some scientists expect CO_2 levels to double within this century. A recent project compared the growth rates of longleaf pine and four southeastern plant species that often grow in the same environment, after 3 years of exposure to either ambient or doubled CO_2 levels. Surprisingly, researchers observed that longleaf pines grown with twice the ambient CO_2 (about 720 ppm) produced 70 percent more total aboveground biomass and 49 percent more underground biomass than a control group. They shot up about 2 feet taller than the controls, while wiregrass, rattlebox, and butterfly weed decreased in biomass, and sand post oak experienced no change.

This suggests that a doubling of CO_2 could quite quickly alter a plant community's composition—perhaps even result in gradual elimination of some species currently thriving there. Longleaf pine savannas comprise 3.7 million acres in the Southeast and are an influential part of the landscape, highly resistant to many insects and diseases. They also support several endangered species, including red cockaded woodpeckers and gopher tortoises. *G. Brett Runion and Stephen A. Prior, USDA-ARS Soil Dynamics Research Unit, Auburn, Alabama; phone (334) 844-4517 [Runion], (334) 844-4741 [Prior], e-mail brett.runion@ars.usda.gov, stephen.prior@ars.usda.gov.*

What Does DHA Really Do for Us?

The polyunsaturated fatty acid DHA—short for docosahexaenoic acid—is found naturally in oil-rich fish, such as salmon and mackerel, along with another natural fatty acid, eicosapentanoic acid. DHA is often promoted as a dietary supplement to improve cardiovascular health. So researchers recently ran a study with high-triglyceride male volunteers, aged 39 to 66, to see the effect of DHA on both fasting and postmeal triglycerides and on the quantities and sizes of HDL, LDL, and VLDL cholesterol particles. High trigylcerides, high total cholesterol, and a high number of small particles of LDL cholesterol in the blood increase risk of cardiovascular disease.

For 90 days, half of the 34 volunteers consumed about one-half teaspoon of DHA daily, in addition to regular meals, while the other half consumed the same amount of olive oil. Blood samples showed that DHA reduced by 22 percent the number of small LDL particles—the size most harmful to the cardiovascular system. It also decreased triglyceride levels by 24 percent in both fasting and postmeal samples, while increasing the number of large LDL particles by 127 percent. Conducted by federal and university co-investigators, this is one of only about a dozen studies that have been done in humans to assess the effects of DHA by itself. *Darshan S. Kelley, USDA-ARS Western Human Nutrition Research Center, Davis, California; phone (530) 752-5138, e-mail darshan.kelley@ars.usda.gov.*

Scrutinizing Soybeans' Secrets

Soon, soybean breeders will have access to an invaluable new tool for improving this key oilseed crop's yield and pest resistance, the quantity and quality of its protein and oil, and other desirable traits. That's because scientists are at work cataloging roughly 50,000 single nucleotide polymorphisms, or SNPs—the variations in DNA that make soybean varieties different from each other—occurring in over 19,000 unique lines, or accessions, that make up the extensive USDA soybean germplasm collection. Maintained by ARS on the University of Illinois campus at Urbana-Champaign, the collection comprises accessions gathered from sites all over the world and includes wild soybeans, soybeans grown by ancient farmers, and modern cultivars.

By using SNP marker technology, breeders will be able to more quickly identify plants that carry traits important to soybean growers and processors. The 3-year, $2.9 million project is being funded through the United Soybean Board's soybean checkoff program. This will be the first time that a SNP catalog of this magnitude will be made available for any crop species.

The wealth of shared data will accelerate the quest of breeders and researchers to understand the genetic variation that controls key features of this widely grown crop. *David L. Hyten and Perry B. Cregan, USDA-ARS Soybean Genomics and Improvement Research Unit, Beltsville, Maryland; phone (301) 504-5932, e-mail david.hyten@ars.usda.gov, perry.cregan@ars.usda.gov.*