New use for soy-based product

By Jan Suszkiw, ARS–USDA

Agricultural scientists have added yet another invention to an already long list of oleochemical accomplishments that includes petroleum-free newspaper ink, industrial lubricants, hydraulic fluids, and aircraft deicers.

Their latest addition is a 'hydrogel'. Made from soybean oil, it's a squishy but durable polymer that expands and contracts in response to changes in temperature or acidity levels. These characteristics make it "suitable for use in the hair-care and drug-delivery areas," says USDA Agricultural Research Service chemist Sevim Erhan. Another potential use is in wound dressings.

Sevim and ARS chemist Zengshe Liu developed the hydrogel in studies at ARS's National Center for Agricultural Utilization Research in Peoria, Illinois.

"Today's hydrogels are mainly made of synthetic polymers, like polyacrylic acid, polyacrylamide, and so on," notes Sevim, who leads the center's Food and Industrial Oil Research Unit. Soybean oil offers the advantage of being a locally-grown polymer resource – one that need not be imported or mined from the Earth.

There are environmental benefits, too. Vegetable-oil-based polymers like the soy hydrogels are biodegradable, notes Sevim. "The only disadvantage," she adds, "is that their water-absorbing capacity is lower than that of petroleum-based hydrogels."

One area where this may not pose a problem is drug delivery. In collaboration with Sevim and Zengshe, University of Toronto professor Xiao Yu Wu has formulated the new hydrogel into minuscule particles that effectively deliver controlled doses of the breast-cancer drug doxorubicin.

Soy proteins are known allergens. But Sevim doesn't anticipate this being an impediment to the hydrogel's potential use as a drug-delivery agent, because soybean oil's chemical structure is completely changed by the two-step manufacturing process. ■

Soy-based hydrogel mixed with water (left) and in powder form (right). The polymer has great potential as a drug-delivery agent.

Early rust spark fears of epidemic

Early rust samples analysed by the Cereal Rust Laboratory have sparked concerns that stripe rust, and possibly leaf rust, may hit for wheat crops across southern Queensland and northern and central western NSW this season.

Colin Wellings, University of Sydney plant pathologist said rust detection so early in the 2008 season should raise industry-wide concern and warned growers to plan for control strategies.

"One sample from Marombi wheat at Dunedoo, NSW was infected with leaf rust, and a sample of stripe rust was taken from Tobruk triticale at Young, NSW," Colin said.

"This is a notably early occurrence for rust diseases in commercial fields."

Growers support the Australian Cereal Rust Control Program through the Grains Research and Development Corporation (GRDC).

GRDC Manager Crop Protection Dr Rohan Rainbow says current GRDC-supported trials show using fungicides at seeding for main season and late planted wheat provides early crop protection.

"Selection of rust-resistant varieties, teamed with control of the green bridge of volunteer plants over summer and, strategic fungicide use are the three clear strategies we need growers to take on board," Rohan said.

"GRDC is a major investor in the fight against cereal rust and we are carefully monitoring rust threats both here and overseas.

"This issue should not be taken lightly as it has the potential to devastate the Australian grains industry."

Colin said a wet summer contributed to survival of rust pathogens and, depending on seasonal conditions for crop growth in 2008, he expects rusts will be widespread and potentially damaging.

"Crops now well established from early seeding will need to be inspected immediately."

He says foliar fungicides combined with strategic grazing should be considered, with due attention paid to withholding periods.

"Varieties known to be vulnerable to rust will need to be monitored carefully throughout the season.

"While the WA Yr17 pathotype has not been detected in the current season, we expect it to survive and reemerge.

"Varieties now vulnerable to this pathotype should be carefully monitored and foliar fungicides employed when appropriate."

To have plant samples analysed, mail your samples in paper envelopes (without plastic wrapping or plastic-lined packages) to: Australian Cereal Rust Survey, Plant Breeding Institute, Private Bag 11, Camden NSW 2570 or phone 02 9351 8800.

For more information, visit www.grdc.com.au/rustlinks ■

Reports of cereal rust early in the growing season have sparked fears of a epidemic across southern Queensland and NSW.