From the flat, fertile farm fields of Indiana comes the latest innovation in alpine skiing—a soybean-based ski wax that’s kinder to the ski slopes because it’s petroleum free.

Invented by two Purdue University sophomores from Indianapolis, Soy Ski Wax replaces the paraffin in ski wax with soybean and canola oils. The wax earned food process engineering students Faye Mulvaney and Ryan Howard $2,500 each as part of an innovative uses for soybeans competition sponsored by Purdue’s agronomy department and the Indiana Soybean Board.

As part of the competition, the students were required to do a product search to make sure their idea was original, create the product formulation and then test the wax to ensure it was comparable to existing products. They also had to create a marketing plan.

“We picked ski wax because of the tremendous growth in recreational skiing and snowboarding,” Howard says. “We thought people who like being outdoors also would like a product that doesn’t harm the hill or end up in the water. You look at the resorts around (Lake) Tahoe, and you know whatever is left on the hill is going to end up in the lake.”

Coming up with the ski wax idea was the easy part, according to the inventors. The difficulty was finding the exact formulation that would give the wax the necessary consistency, would work in cold temperatures and would reduce friction. An additional challenge was developing testing equipment and procedures that they could use to prove they had developed a superior product.

“If you don’t have the data, no one will think you’re serious,” Mulvaney says. “I learned a lot about proper laboratory techniques and testing to make sure we could defend our conclusions. It was a good experience.”

Once they had a promising mixture, they built a complicated wheel with small skis that would run the wax on a surface over and over again, testing friction and durability.

Designing the test equipment was as demanding as making the wax, says Bernie Tao, associate professor in agricultural and biological engineering, who, along with assistant professor Anton Sumali, mentored the students.

“There is no existing equipment or procedures to test the friction coefficients of skis,” Tao says. “I think their equipment could end up being adopted by the ski industry.”

Ski wax was an unusual choice for the two students, because neither actually skis. However, both say they needed to know more about wax properties and friction coefficients than about skiing to create a viable product.

While Soy Ski Wax may not dramatically improve the domestic demand for soybeans, Indiana Soybean Board President Bill Peters says the invention demonstrates soybeans’ potential.

“Soybeans could replace all kinds of things we can’t even dream of today. This is just one more example,” says Peters, a soybean farmer from Sharpsville, Ind.
A gene that has a large effect on the aggressive stinging behavior in Africanized honey bees—the so-called killer bees—has been identified by a group of scientists at three institutions.

Greg Hunt, a bee specialist with the Purdue University Department of Entomology and principal investigator on the research project, says finding the mean gene in honey bees “may help us understand what makes Africanized bees so aggressive.”

Keeping the gene in check is important for much of U.S. agriculture, and not just for honey producers, because one-third of the food produced in the United States comes from plants pollinated by honey bees. Already, many beekeepers in Mexico have stopped keeping bee hives because of the eager stingers.

Although Africanized honey bees are rarely the “killer bees” of 1970s Movie-of-the-Week fame, they are decidedly more aggressive than their European cousins. Research conducted in Venezuela in 1982 found that Africanized honey bees will attack a visual stimulus 20 times faster than European honey bees and that when they attack, they deposit about eight times as many stingers in the first 30 seconds.

According to entomologists, though, Africanized honey bees aren’t bad, just misunderstood: “It seems like aggression when a bee stings you, but we call it defensive behavior,” Hunt says. “Different insects use various methods to protect themselves from predators. Bee stings are a response to predation by mammals—bee venom is specialized for causing pain in vertebrates.”

Africanized bees are just one of several subspecies of honey bees. They were introduced to the Western Hemisphere by an accidental release from a Brazilian geneticist in 1956 and spread rapidly through South and Central America. The Africanized bees reached the United States in 1991 and are now found in parts of Texas, New Mexico, Arizona and southern California.

Hunt and colleagues Robert E. Page of the University of California-Davis and Ernesto Guzman-Novoa of Mexico’s agricultural research service located the mean gene by measuring the speed and intensity of stinging behavior in 162 colonies of hybrid bees. They then located gene markers on the chromosomes of the aggressive hybrid bees and compared the genes with those of non-aggressive hybrid bees.

Hunt says the finding will lead to markers for the aggressiveness trait. “We are developing specific genetic markers that could predict the probability of queens having the African version of stinging genes so it will be easier for breeders to avoid using these queen bees,” he says. “Ultimately, it might be possible to clone the gene through map-based cloning so that we can better understand how this gene affects stinging behavior.

“We made a genetic map of the honey bee using the same techniques used in crop genetics, a technique called quantitative trait locus mapping,” Hunt says. “This process hasn’t been used much in insects. But if you have markers for the genes, we can do what the crop geneticists are doing and selectively breed for gentle bees.”

The research was published in the March issue of the scientific journal *Genetics* and was funded by the U.S. Department of Agriculture, the National Institutes of Health, and the California Department of Food and Agriculture.
A zero tolerance public attitude toward rape, community awareness and education are at the core of a statewide initiative to reduce sexual assault and rape in Indiana, particularly among young people.

Nearly 2,000 rapes were reported to Indiana law enforcement agencies in 1996, according to the Federal Bureau of Investigation Uniform Crime Report. But with fewer than one-third of Indiana law enforcement agencies submitting reports, and many other rapes going unreported, the actual number is believed to be much higher. “Some estimates place rape numbers at 10,000 per year for Indiana,” says Mary Pilat, a Purdue University 4-H Youth specialist who also heads Communities Against Rape (CARe), a coalition of Indiana organizations.

In addition, some 4,500 cases of substantiated sexual abuse of children are reported annually to the Indiana’s Division of Families and Children. Estimates indicate that these cases, too, are seriously under-reported.

“Sexual assault and rape were identified as serious youth problems by our Community Systemwide Response (CSR) sites,” says Pilat. (Sponsored by the Cooperative Extension Service, CSR brings people together to work on youth development and juvenile justice issues that address the needs of high-risk youth.)

The 4-H youth department responded by applying for an Indiana State Department of Health grant, which was made available by the Crime Bill Amendment. Pilat attended an information session, as did representatives from other interested organizations.

“We were encouraged by the health department to work together in groups,” Pilat says. As a result, 4-H leads a grant partnership that also includes Purdue University’s Center for Families and Student Health Center, Indiana State University, the Indiana Coalition Against Sexual Assault and Indiana Youth Institute.

The large number of agencies involved in CARe allows work to occur simultaneously on a number of fronts:

• To determine prevailing social attitudes toward rape, a CARe youth advisory council talked to teenagers around the state.

  “Rape is a learned behavior and community standards can send an unmistakable message to men on what the community finds objectionable or understandable,” says Sue Hancock, CARe coordinator. For example, one 15-year-old girl thought girls get raped only because of what they wear; a 17-year-old boy said girls who flirt owed boys.

• A white paper on the status of sexual assault in Indiana was presented to Gov. Frank O’Bannon on June 15. The 50-page report shows the social and financial costs of rape and sexual assault and the number and types of programs in place to help victims and treat offenders.

  • Educational programs for use both in and out of school have been developed; teams of teachers currently are being trained for the in-school curriculum. The out-of-school curriculum will be available for use with 4-H and other programs in the spring.

  • The Purdue Center for Families is developing a sexual assault database for Indiana, the first centralized, statewide reporting system.

  “A survey—available on paper, the World Wide Web and in Spanish—is being sent to some 800 sites throughout the state to collect data on incidents of rape, sexual assault and sexual abuse,” Hancock says.

  • Colleges and universities are conducting sexual assault prevention activities on Indiana campuses.

  • A statewide public awareness media campaign is under way.

  • Indiana communities are receiving mini-grants to establish local programs.

  “We have notified all county Extension offices and in-state rape crisis centers about the availability of funds,” Hancock says. “Our long-term goal is to support the growth of sexual assault preventive programs in as many Indiana communities as possible.”

Teens Who Act with CARe, a youth theater group in Clinton County, performs skits about relationship issues. This volunteer group is just one example of CARe programming throughout the state.
For Mickey Latour, reality exists in the Chick Zone. The cyberspace home of Latour’s Incubators in the Classroom project, the Chick Zone describes the work he is doing and includes movie clips—one of a morphing embryo—and pictures of his visits to Indiana schools, as well as letters he receives from students expressing delight in their classrooms’ newly hatched chicks.

The classroom visits and the letters are a big part of the payoff for Latour. They also give testimony to the program’s popularity. “The chicks are a natural magnet,” he says.

From tiny chicks, many lessons grow

A 4-H Classroom Chicken Embryology program in Lake County that started as a pilot project a decade ago is now in every school corporation in the county—both public and private—and reaches some 10,000 students each year.

“It took off like wildfire,” says Corinne Powell, Extension youth educator in Lake County, who offers the program twice a year and includes in-service training for teachers. “We’re mainly an urban county, so many of our students don’t have an opportunity to see live farm animals.”

Teachers purchase their own incubators and Powell provides the eggs and classroom support materials. Starting this school year, she will be able to get eggs through Purdue’s new Incubators in the Classroom project.

“It is our most popular 4-H classroom program, and it has opened doors in the schools for other 4-H programs,” Powell says. Teachers use the project to teach everything from life sciences to math and reading to group cooperation.

However, last spring it also taught teachers a lesson in ingenuity.

“The eggs are pre-incubated to hatch on a Monday so the students can enjoy the chicks for a week,” Powell says. But on hatch day last March, there was an unwelcome surprise. A spring snowstorm paralyzed northwestern Indiana, closing schools and leaving most of Lake County without electricity for more than a week.

Teachers who could get to their schools rescued incubators and hatched contingency plans that ranged from using margarine tubs of boiling water to hot pancakes to keep the eggs warm. A school principal’s son even used the back-up battery of his personal computer to power an incubator.

“Many eggs didn’t hatch, but we were able to hatch about 800 chicks,” Powell says. “We could have lost them all.”

CD-ROM, which Latour developed. The first of its kind, the CD-ROM captures what happens inside the egg—including a video clip of the embryo’s beating heart—before it hatches.

Enter the Chick Zone at http://ag.ansc.purdue.edu/poultry
William R. “Randy” Woodson has been named associate dean and director of Agricultural Research Programs for the Purdue University School of Agriculture.

An internationally renowned researcher on the physiology of flowering plants and a popular teacher, he formerly was head of Purdue’s Department of Horticulture and Landscape Architecture since 1996.

“Randy represents the next generation of research directors,” says Victor L. Lechtenberg, dean of the School of Agriculture. “He understands and has used the most modern tools of molecular biology and biotechnology, and he also understands the application of science and technology in the field. He has the scientific credibility and reputation to succeed as leader of a preeminent agricultural research institution.”

As administrator of all research programs in Purdue Agriculture, Woodson oversees 295 faculty who devote about 40 percent of their time to research with annual outlays of $47 million. He views the position as an advocate for the faculty and for science.

“Ten years ago, we didn’t know E. coli O157 would become a household word after an epidemic food safety threat to children and the elderly. Five years ago, no one could expect animal waste to be front-page news,” Woodson says. “We need to be able to find solutions to the problems that affect all of us.”

Woodson says the convergence of technology and biology will both benefit and challenge agriculture.

“For instance, the plant soon will be the entire package. Through biotechnology, the plant will have built-in pest resistance, will be customized for specific soils and climates, and will have specific characteristics for use in specific products,” he says. “Producers will expect better yields from hardier crops that command premium prices. At the same time, they’ll also have to know enough to make the right decisions to select and grow those crops.”

“No longer will farmers follow a cookbook that we provide them. Instead of one procedure, they’ll have to decide which one of several to use.”

Woodson has lectured worldwide on his research into floral senescence. He has published more than 60 articles in scientific journals, and he received the 1994 Agricultural Research Award from the School of Agriculture for research excellence and contributions to Indiana agriculture.

Woodson was the first to show that plants deliberately killed off their flowers once they had achieved pollination. Scientists previously had thought that flowers wilted of old age, but Woodson showed an invisible gaseous hormone called ethylene was released by the plant and signaled the flower cells to shut down. The work has important implications for prolonging the life of cut flowers and—because all plants have flowers—for helping control pollination in food crops. Woodson plans to continue some of his own research activities.

A native of Fordyce, Ark., Woodson joined the Purdue faculty in 1985. He succeeds Bill Baumgardt, who retired in January after 17 years as director of agricultural research.
The view from The Hill:  
Legislative interns on the inside looking out

From gaining an insider’s view of the legislative process to seeing the sights of Washington, D.C., and from conducting congressional research to attending seminars and luncheons, four Purdue Agriculture students had a summer they will never forget.

Elizabeth Bender, Alan Goings, Justin Schneider and Heather Towle participated in a legislative internship program in the nation’s capital. The program selects from three to six students each year for assignments with the Senate Agriculture Committee and members of Congress from Indiana.

“It’s everything from the dirty work to meeting with constituents—an all-around experience,” says Goings, a junior in agricultural economics from New Richmond, Ind., who worked for Rep. Edward Pease.

Although the interns’ responsibilities varied, in general they ranged from giving constituent tours to researching bill topics to answering constituent mail. But the program also provided the flexibility to meet students’ interests.

“Because my major is environmental science, I worked with the legislative assistant who handles agricultural and environmental issues,” says Bender, a junior from West Lafayette who interned in Sen. Dan Coats’ office. “If the assistants were busy, I sometimes went to committee hearings and took notes.”

Schneider, a May ’98 graduate who started law school this fall, also took advantage of the opportunity to individualize his experience.

“All graduate, I was fortunate to be able to do a lot of extra things,” says Schneider, an intern for the Senate Agriculture Committee staff.

“I spent a lot of time at hearings and briefings taking notes. Then, I wrote memos about the meetings to distribute to the staff. I also worked on a large project concerning the cooperative system—analyzing mergers and forecasting an outlook for it.”

Despite the heavy workload, the four still found time for fun.

“There are special activities planned for interns, like conventions and dinners,” says Towle, a sophomore in pre-veterinary medicine from Elwood, Ind., who worked in Rep. David McIntosh’s office. “In fact, I even went to an internship lecture series featuring Trent Lott and Colin Powell. It was really great to have a chance to listen to individuals like them.”

Aside from the excitement and prestige of living and working around Washington, the program also fosters an appreciation for the American legislative process.

“Being involved in this program is a preparation for what follows college—being an active and involved citizen,” says Allan Goecker, assistant dean and associate director of academic programs, who coordinates the program for the School of Agriculture. “Students participating in programs like this are more likely to want to be involved in public policy decisions, especially as they relate to agriculture and natural resources.”

The students all agreed one of the most valuable lessons of the summer was a new understanding of the legislative process.

“I saw firsthand how the legislative process works,” says Goings. “It seems so disorganized, but it’s one of the most efficient governments in the world. I saw how laws are made. Being right in the middle of it for two months was great.”

“It really opens you up to how things work,” adds Schneider. “It’s an immense amount of pressure. But if you can handle the pressure here, you can do anything.”

Agricultures
Summer was an exceptionally busy time for the Purdue Department of Food Science as faculty and staff moved into their new home—the $22 million Food Science Building. The 120,000-square-foot, four-story facility houses 36 research and teaching labs, a 9,000-square-foot pilot plant, a teaching lab with 60 computer stations and a computer-integrated manufacturing lab. All told, the building will house $6 million worth of equipment.

The first benefit of the new building is well-prepared students for the food industry,” says Philip Nelson, food science department head. “The number one food science student in the country is our ‘new and improved’ product. The building’s expanded research facilities and equipment also will allow us the opportunity to work directly with companies to develop new technologies for the food industry.”