AGRICULTURE

POLLEN SUPPRESSORS OPEN NEW OPTIONS FOR HYBRIDS

PHILADELPHIA—Artificial plant hormones that inhibit self-pollination in important crop plants have been synthesized by scientists at two U.S. chemical companies, Rohm and Haas and Shell. These compounds should eventually enable farmers to cross fertilize with natural or genetically engineered pollens to develop superior hybrids.

Rohm and Haas claims that Hybrex, their new artificial hormone, has proven to be effective as a hybridizing agent for new wheat strains. Until now, wheat hybrids have been difficult to develop because each flower on the plant is self-pollinating. Within a closed wheat flower the male stamen produces pollen, which then falls onto the female stigma. After fertilization, the flower opens to release extra pollen. Thomas MacIver, manager of the company's agricultural chemicals division, claims that by blocking pollen formation, Hybrex causes the flower to remain open for introduction of pollen by the plant breeder.

Using Hybrex, an organoheterocyclic related to a grass herbicide, plant breeders will be able to develop new wheat hybrids within a year's time, says MacIver. Rohm and Haas already has developed several new hybrids to demonstrate the hormone's utility. Although details on them are still proprietary, the company says that the new strains produce appreciably higher yields and resist diseases better than conventional strains.

The idea of developing chemical hybridizing agents first came up 12 years ago when Rohm and Haas scientists noticed that some grass herbicides worked by sterilization. Field tests started five years ago, and the company's sales staff is now working with breeders at seed firms to assure them that the compound lives up to its claims. Rohm and Haas plans to make the chemical available to such firms through a licensing agreement under which the company will be paid royalties on the quantity of hybrid seed sold.

The Shell chemical hybridizing agent can be used on a large number of crops, according to company officials. The compound works by causing plants to make non-functional pollen. The end result is reportedly similar to that of Hybrex—inhibition of self-pollination. Shell scientists have been able to use the compound to develop new cereal crop hybrids in the laboratory. They are currently field testing the material with hopes

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REASONS

Pollen suppressors leave wheat flowers open for artificial pollination. Genetic engineering of pollen is now a practical research opportunity for industry.

of large scale use in 1984 or 1985.

The success of these chemical hybridizing agents and others under development at companies such as Eli Lilly and Monsanto may allow scientists to introduce genetically modified pollen into plants. For this purpose, John Sanford, a plant biochemist at Cornell University, has started developing methods for screening tobacco pollen cells for desirable genetic traits, such as herbicide resistance.

"Tobacco pollen is easy to work with, and herbicide resistance is an easy trait to find," says Sanford. "Right now we are trying to develop a protocol for *in vitro* screening for traits in pollen."

Sanford plans to collect pollen and then use a serial dilution technique to look for pollen with a desired trait. Once that pollen particle is selected, Sanford will fertilize one flower with it. The resulting seeds will be used to grow plants from which a larger quantity of seeds can be obtained.

REGULATION

EPA TO IMPLEMENT FIRST BIOTECHNOLOGY RULINGS

WASHINGTON—The Environmental Protection Agency (EPA) will have its first opportunity to test emerging policies for biotechnology products by the end of this year. A little-known pesticide using genetically engineered bacteria will be examined according to a set of criteria which could become standard for all new products of recombinant DNA technology.

EPA's most pressing problem in devising broad regulatory policies for the more sophisticated biotechnolo-

"This gets around the problem of having to grow the pollen in tissue culture, something that no one has been able to do yet," he says.

Scientists at other research organizations, including the International Plant Research Institute, have chosen yet another approach to create hybrid crop plants: the introduction of foreign genes into cultured pollen cells through microinjection. While IPRI officials concede that they are working in this area, they decline to elaborate on their progress on the commercial options which follow.

Pollen suppression and modification techniques may offer the best chance for the development of economic strains of crop plants. "Such approaches," says one industry consultant, "permit DNA to be incorporated into a pollen cell's genome more easily than by conventional methods because of the naturally high recombination activity that occurs in meiotic cells."—Joseph Alper

gies is its lack of a knowledge base for forecasting harmful effects. "We don't know what the potential hazards are," says Richard Hill, science adviser at the EPA's Office of Toxic Substances and Pesticides. "We don't know what it is we don't know."

The agency has conducted dozens of seminars over the past year to educate its staff about widely used industrial microorganisms and their potential hazards. The EPA's Administrator's Toxic Substances Advisory