Biotechnology is key to future plant development

DE KALB, Il. — Any new innovation is only as successful as it is practical. And while achievements of the past decade have produced a dramatic, biological research revolution, the results ultimately will be measured only by practical product improvements.

"With a goal of practical, usable plant varieties and hybrids, Dekalb-Pfizer Genetics is teaming biotechnology with innovative breeding programs," says Dr. Thomas B. Rice, director of plant genetics research, Pfizer Central Research Laboratories.

"Our laboratory research objectives have been established in two primary areas. First, we must develop a better understanding of traits that determine crop performance. Second, we must develop more efficient techniques to speed genetic progress for those traits."

Rice says these objectives incorporate many diverse specialities, including molecular biology, biochemistry, cell biology, tissue culture, cellular genetics and physiology.

"Progress in plant biology is often slowed because the problems do not fit neatly into a single academic specialty," he says.

"Now, by creating a joint group of biotechnical researchers and plant breeders, we have the capability of studying the expression of a trait in the field. We may also examine the contribution of molecular, cellular and physiological factors, and ultimately isolate and manipulate the critical genes," he adds.

Rice says Dekalb-Pfizer Genetics has developed the capability of initiating corn tissue cultures. These can be propagated for several years while maintaining their ability to regenerate whole plants.

"This is a critical step for practical use of the tissue culture process to produce or introduce new traits, such as herbicide resistance," he explains.

Studies have recently shown — as investigators have discovered with other species — corn plants regenerated from tissue cultures exhibit a high rate of new genetic variability.

"This phenomenon should be interpreted cautiously until its cause is understood and its usefulness evaluated," Rice warns.

Other new sources of variability are also being explored. Researchers, including those at Dekalb-Pfizer Genetics, are developing tools that may soon permit foreign genes to be transferred into and function in new crop hosts.

Rice says development of new laboratory screening methods will speed evaluation and development of new varieties. An example of this approach has been a procedure designed to evaluate the performance of soybean lines under conditions that induce iron chlorosis (a yellowing of plant foliage due to iron deficiency).

This new test accurately predicts the field performance of soybean lines faced with iron chlorosis. It was used, for example, to speed development of a new Dekalb-Pfizer Genetics experimental variety known as CX174. As an experimental variety, this soybean line has consistently exhibited a high tolerance to iron chlorosis.

"We are now focusing on other traits, such as drought tolerance," Rice says. "We seek to identify 'new handles' for such traits that would permit more effective manipulation and more rapid breeding progress."

Corn, sorghum and soybean materials generated by these programs are being grown and evaluated in nurseries. And since these lines are like those from more traditional programs, they are affected by their environment. A new variety that does well in one location may do poorly in another location.

"Farmers demand varieties that do well in many locations over many years," says Kent Schulze, vice president, sales and marketing. "The answer is to test, test and test again."

Each year the research department at Dekalb-Pfizer Genetics tests thousands of new hybrids and varieties derived from traditional breeding programs and complemented by new basic research methods. These new lines are tested at 23 research stations and at additional sites surrounding each station, Schulze states.

Each year hybrids are exposed to more than 100 different environments in which they interact with natural factors just like they would in farmer fields. Schulze says this process helps the company select products that will perform well and consistently over a wide area.

Field Analysis Comparison Trials (FACT) are used to determine which hybrids or varieties merit introduction into the company's commercial line.

FACT incorporates the use of tester hybrids or varieties to help correct field variability within the plot, the sales and marketing vice president explains. A consistently yielding, top-of-the-line tester, he says, is planted between each of the experimental hybrids or varieties selected for evaluation. The overall performance of the experimental hybrid or variety is adjusted according to the performance of the tester throughout the FACT plot.

Selection of new commercial hybrid by Dekalb-Pfizer Genetics is based on consistent, reproducible, statistically significant performance in both experimental research tests and on-farm FACT tests, Schulze says. The result is a comprehensive program that combines the systematic approach of marketing with original and inventive research.

Rice says Dekalb-Pfizer Genetics emphasizes a combination of three principles to maximize its plant breeding programs. They are new biology, traditional plant breeding and field testing.

Schulze and Rice agree that all three principles are needed to assure the company it is producing new hybrids and varieties that farmers will find practical, useful and high-performing in their fields.

New Zealand farmer

(Continued from Page D19)

around as far as necessary to finish her milking cycle.

When the teat cups are removed, they're hung up on the bales and pass through a very powerful spray jet to keep them clean, which cuts down on the washing up at the end of the milking.

In the two years, Scott pointed out, "the teat cups have never been scrubbed on the outside. They've always just been hosed very severely."

Scott uses the MOC teat cups, which Nu Pulse distributes in New Zealand. Scott rated the polypropylene plastic cups as "extremely good...remarkably good" for resisting soiling and washing cleanly.

An important benefit the Scotts see is a social one. If the milking can be completed while the wife is doing her early morning housework (if she doesn't actually help with the milking), then the whole family joins together at one time and has the morning meal together. It must make a family unit welded together the way a family unit should be!"

Still it was Mrs. Scott, a dairy farmer's daughter and wife of a third generation dairyman, who put it all in perspective: "Milking is a bit like doing the dishes. It's got to be done. If you make an enjoyable experience out of it for both yourself and the animal, that makes a big difference."

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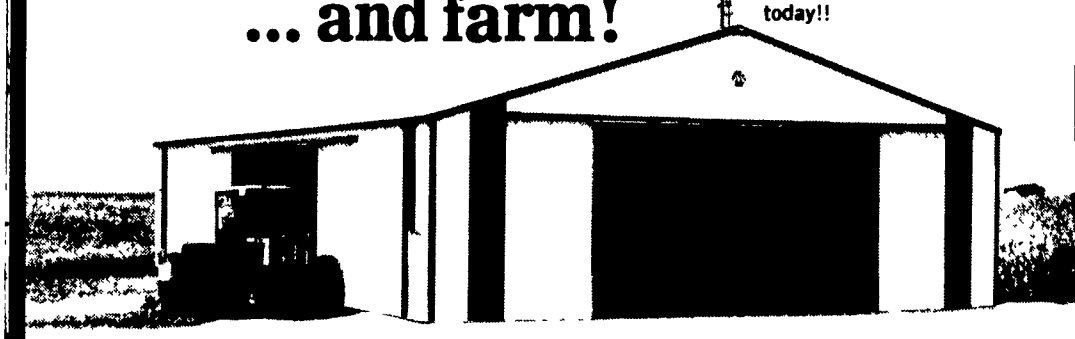

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