Super - yield scientists tell their story

CHICAGO, Il. — If you're searching for the secret of 250-bushes-per-acre corn and 80-bushel soybeans, don't gaze over the horizon – look in the mirror. There's the person most likely to achieve those yields ... and probably sooner than you think.

That's the impression you can get after talking to the new breed of "super-yield" scientists. They're developing methods to dramatically increase average yields – and in some cases, they've already done it:

Dr. Roy Flannery, soil specialist at Rutgers University, has been conducting high-yield experiments with corn and soybeans for several years. His average yields the past four years: more than 300 bushels per acre with corn and more than 100 bushels per acre with soybeans.

Dr. Jay Johnson, Extension agronomist at Ohio State University, has averaged more than 210 bushels per acre of corn the past five years.

Basic farm inputs

Flannery and Johnson use different approaches to achieve their results. But in one way their work is alike: Both use the same basic commercial inputs farmers use today – they just apply them in different ways.

"We've been doing some things that are a little far out, as far as today's farmer is concerned," Flannery says. Some examples are:

Plant populations in both corn and soybeans nearly double that which the typical grower is planting today.

Ultra-narrow, 12-inch rows for corn, with plants staggered for equidistant spacing.

Nitrogen rates up to 600 pounds per acre, plus up to 350 pounds per acre of phosphate and potash.

Utilize drip irrigation, commonly used by fruit and vegetable growers, rather than feed grain producers.

Corn hybrids

Another departure from common practice by most growers is Flannery's practice of picking the best performers in the University's annual yield trials. "This makes hybrid selection a bit easier for us than it is for most farmers," Flannery says. "But we're still using strictly commercial corn hybrids and soybean varieties."

Flannery quickly points out that his 8x22-foot test plots make high yields easier for him to achieve. "If he does a good job of managing all his inputs, the farmer still has a great deal of control over what the outcome is going to be," Flannery notes.

That's the critical thing to keep in mind about super-yield scientists' work: managing inputs.

"For a long time, most researchers were interested in very specific aspects of crop yield -- only looking at one or two inputs," Flannery says. "No one seemed very interested in trying to put together a package that included as many of the soil and crop inputs as possible."

Flannery established dozens of test plots to study different combinations of factors which interact to control yields most: hybrid selection, plant population, row width, fertilizer rate and available water. All the factors, with the exception of water, are controlled by the farmer. So from a practical standpoint, Flannery also ran non-irrigated plots.

Flannery's results over the last four years are:

	Corn (Yield, bu./a)	Soybeans (Yield, bu./a)
1980	312	94
1981	285	93
1982	338	109
1983	289	118
Average	306	104

Nitrogen and fertilizer

The top corn yield of 1982 resulted from a full-season hybrid at a final stand of 37,300 plants per acre in a 12-inch row, with 500 pounds of N and 350 pounds each of potash and phosphate. That combination also produced 45 tons of silage.

The best soybean yield – in 1983 -- resulted from a final stand of 261,360 plants per acre in six-inch rows with four-inch spacing between plants. Fertilization: 175 pounds N, 225 pounds P205 and 300 pounds K20, in four separate applications, including three during the growing stage.

Of course, Flannery is pleased with these yields, but he admits most farmers probably are not ready for hand-plant thinning and 12-inch corn heads.

"Some of the things we're doing are going to come into play more and more in the future, as land becomes more scarce and world population continues to increase," Flannery predicts. For the present, however, he has some strong advice for farmers using irrigation:

"Most farmers should use between 30,000 to 35,000 plants per acre, rather than the 20,000 to 24,000 they're now using," he says. "Also, if they're going for high yields, they should use 1.5 to two times as much fertilizer as they now use. If you can count on the water, the extra fertilizer almost always pays off. Extra-high yields can be very profitable," he adds.

Although Flannery has collected reams of data on high-yield research, he is most pleased with his findings about irrigation management. "Water use efficiency has been better across the board, where we're managing the other factors at a higher level," he notes.

Practicality

If Flannery is concerned about the practicality of his research for farmers, then Dr. Jay Johnson at Ohio State University is emphatic about it.

Since 1979, Johnson has conducted high-yield research on corn and soybeans, looking for the best combination of hybrids, fertility and populations, including row spacings.

"We're conducting no research that farmers can't implement immediately," Johnson says. "All high-yield research is done with farm machinery available today."

Even so, Johnson admits farmers may have to hunt for equipment to match the row spacing used to achieve his highest

Dr. Jay Johnson, Ohio State University, has averaged 210 bushels per acre corn the past five years in 20-inch rows.

corn yields: 246 bushels per acre, irrigated on 20-inch rows. Johnson has averaged 210 bushels per acre the last five years; soybeans have averaged nearly 70 bushels per acre.

Irrigation improved corn yields significantly only in 1981 and 1983, he notes.

Key points Johnson has observed in his five-year-research project include:

Although farmer interest in the 20-inch row spacings is keen, Johnson doesn't believe the idea is right for widespread use ... yet. The major hurdle: Not enough corn hybrids have been bred to handle the super-high populations which make narrow row spacing practical.

For example, Johnson's top yield resulted from an upright-leaf hybrid seeded at 40,000 per acre in 20-inch rows, with 400 pounds of nitrogen, 100 pounds phosphorus and 200 pounds of potassium per acre. "I've tested about 40 hybrids in these conditions, and more than 30 of them didn't stand well," Johnson says.

Best steps farmers can implement to boost corn yields: use much higher populations, with heavier fertilizer, in 20- or 30-inch row widths. "Providing you have adequate water, population is the

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