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## The Seed That Sprouted a Cover Crop Revolution Annual Ryegrass Digs Deep and Gives Large Returns

Ralph "Junior" Upton began practicing no-till agriculture in the mid 1980s, coupled soon thereafter with winter cover crops. Initiated to reduce erosion on his hilly Springerton, Illinois acres, Upton gradually expanded cover crops to the majority of his 1800 acres. "I haven't got the best soil," he said, "so I've tinkered with how to get rid of compaction and improve my yield, especially in dry years."

At that time, despite the gradual improvement of his farm's soil health and increased harvest production, few paid much heed to Upton. But that's changed. Many Midwest farmers have followed his lead, wanting to improve their soil and increase yields, especially in dry years, or to duplicate what they see happening on a neighbor's farm.

No doubt, innovators like Upton have been a catalyst for cover crop adoption. But Mike Plumer believes three other things have stimulated the growth in cover crop use since 2007. First is the government support for ethanol production. Plumer, an agronomist and former University of Illinois Extension educator said, "It gave farmers some added capital to try new things." Second, the USDA's Environmental Quality Incentives Program (EQIP) encourages the use of cover crops in many states. And third, according to Plumer, is a cover crop marketing effort developed in Oregon by the grower-funded Ryegrass Commission. "For more than 15 years, they've been a consistent factor in research and education about cover crops. We wouldn't be where we are today without that," he said.

Oregon became a major player in cover crops largely because of annual ryegrass. Its growth characteristics include quick germination and extremely deep rooting, a plus for breaking up soil compaction common in the Midwest. "It's not uncommon to see roots grow three to five feet deep over a winter,

creating macro channels that corn roots will follow the next summer," Upton said.

Oregon's Willamette Valley is home to nearly all the annual ryegrass seed grown in the country and it thrives on farmland that grows little else. But until its discovery as a cover crop in the mid 1990s, annual ryegrass seed was used predominantly in lawn mixes and on big acreage in the South during winter months, when perennial grasses are dormant.

"In an effort to increase sales revenue for these seed farms, the Commission began a modest effort to explore new markets in 1995," said commission executive director Bryan Ostlund.

Willamette Valley farmer Don Wirth became a driving force in that effort soon after attending a farm machinery show in Louisville to promote tall fescue seed, also grown in Oregon. "I was talking to a dairyman from Ohio," Wirth said, "and he told me we ought to market the heck out of annual ryegrass in the Midwest. He was using it as forage as well as a cover crop," Wirth added. "At the time, we didn't think annual ryegrass would survive a Midwest winter."

Before long, Wirth was on the Commission. Trips that he, Ostlund and others took to the Midwest produced meet ups with Extension agents, cover crop research at three universities and agreements by a dozen farmers in two states to try annual ryegrass in small plots – activities supported by Oregon growers through the Commission. Funding also promoted cover crops in other ways: brochures, videos, the annual ryegrass website, farm tours and sponsoring regional and national farm conferences.

Dan Towery, national president of the Soil and Water Conservation Society, recalls a disappointing turn with hairy vetch in 1988 that left him vowing he wouldn't bother with cover crops again. "We let it grow in too long in the spring and, in that very dry year, it pulled too much moisture out of the soil before the corn was even planted" he said. The Oregon annual ryegrass initiative brought him back for another look, in the mid 1990s, but it was with a cautious eye. "There is quite a bit of new management involved with cover crops and we've erred on the side of caution. It's better to go slow and succeed than to get burned because you didn't know any better," he said.

When the Oregon ryegrass farmers came east, they found both Plumer and Towery in positions to influence a lot of people. Plumer, at the University of Illinois, headed up a three year replicated study on annual ryegrass varieties...both for winter hardiness and for control with herbicides in the spring. Towery, as the NCRS liaison to the Conservation Technology Information Center, was soon convinced that cover crops accelerated the benefits of no-till practices. He and Plumer saw the value of annual ryegrass and other cover crops, but also saw that they must be managed well to avoid unintended crop losses or weed problems. The two have been featured speakers at national conferences and appeared at more than 90 events last year. Key among the Commission's decisions was to hire both men as consultants and cover crop educators. "These two, besides being well respected throughout the country for their experience, have been crucial for us as allies...and as advisors," Ostlund said.

In some years, the Commission contracted with more than a dozen farm "cooperators," planting annual ryegrass while working closely with Plumer or Towery. Some of those growers have become an important second tier of cover crop experts who are now regular hosts for farm tours or presenters at national conferences like the National No-Till Conference.

The Commission also paid for part of a watershed preservation project conducted by The Nature Conservancy. That work, including the use of annual ryegrass on farmlands adjacent to waterways, has helped protect an endangered species of fresh water mussels. It has also created a union between the larger goals of agriculture and environmentalism. The Tippecanoe (Indiana) watershed project led to other connections and partnerships fostered by Plumer and Towery, which secured important additional advocates from environmental groups, industry associations, state legislatures and federal regulatory agencies. Today, there seems to be no lack of champions broadcasting the benefits of cover crops, except for a handful of weed scientists who worry about poorly managed cover crops becoming a problem.

Towery said that the 15 years of cover crop science, farm trials and massive education has been crucial. "The last thing we want is to have growers

experiencing failure with cover crops. Our approach to education has lessened the number of questions and risks," he said.

Annual ryegrass is now among the most popular cover crops in the Midwest because of its ability to reduce erosion and nutrient runoff, break up soil compaction, sequester nitrogen and then release it to corn in July and increase organic matter in the soil. On the financial end, farmers see the value of cover crops in higher corn and soybean yields in dry summers as well as lower costs for fertilizer and fuel.

Upton's farmland continues to thrive with his continuous use of cover crops, especially in dry weather conditions. During a two-year controlled study conducted by Plumer while still at the University of Illinois, corn yields were compared on plots conventionally tilled to those no-tilled without cover crop and others no-tilled with annual ryegrass.

The first year, with normal rainfall, yields on conventional tillage fields averaged 102 bushels per acre, while yields with an annual ryegrass cover crop averaged close to 156 bushels per acre, more than a 53 bushel/acre increase.

The following year, a very dry year, had similarly stark results. With eight replications across his farm, the average yields were:

- Conventional tillage – 52.5 bushels/acre
- Continuous No-till without cover crop – 79 bushels/acre
- Continuous No-till with annual ryegrass – 121 bushels/acre.

Again, plots with annual ryegrass bested conventional plots by nearly 70 bushels/acre while improvements over straight no-till were 40-plus bushels/acre. Results will vary depending on soil types.

"I have some hillside land where corn would fall apart real quick in dry weather," Upton explained. "Because of the plowpan, corn roots would grow horizontally and after 10 days of no rain, the corn would be burning up. With annual ryegrass, that same land can now go four weeks without water and still not give up much yield," he added.

"This year, Mike (Plumer) came out in August to look at root depth. The soil was bone dry to better than three feet. With an extension on the probe, we

went down another 30 inches...and there were corn roots and moisture," Upton added. "I got 130 bushels to the acre on that ground and it's because corn roots can follow the channels created by annual ryegrass and find water." On some of the surrounding farms, entire fields were mowed down because of the draught. Yields were zero.

"Cover crops are a long term investment," Upton said. "You'll see lots of benefits even in five years. But after 10 years of it (even with a setback year now and again) you're going to be way ahead on soil health and productivity."

Back in Oregon, annual ryegrass seed producers are shipping additional tonnage to the Midwest for cover crops every year. "We're seeing significant growth in usage of cover crops the past 5 years," said Towery. In some previous years, annual ryegrass might be stockpiled in warehouses for more than a year. The past couple of year's seed crop has sold completely out, according to Commission director Bryan Ostlund.

"Some of our producers have spent tremendous amounts of time and personal funding over the years to develop varieties of annual ryegrass that are better adapted to Midwest weather. They've cultivated close ties to a group of Midwest cover crop users. And a few have also hired Midwest staff to distribute seed and educate farmers in the best management practices," Ostlund added. "It's because of that effort that Midwest farmers are trusting the seed."