IRRIGATION TECHNOLOGY
Growing High-Yielding Rice with Pivot Irrigation

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Effluent Water Treatment
Growing High-Yielding Rice with Pivot Irrigation

Saving Water with Pivot-Irrigated Rice

Brian Protheroe is a fourth-generation Australian farmer who has been growing flood irrigated rice since 1995. Because of water shortages caused by recent dry years in Australia and the bullish price of rice, Protheroe decided to grow rice with center pivot irrigation.

In addition to rice, Protheroe raises wheat, barley, canola, com, and grain sorghum on his farm near Narrandera, New South Wales, Australia.

Challenge

Protheroe had considerable experience raising traditional flood irrigated rice but had little knowledge of growing rice under pivot irrigation. Working closely with Lindsay's integrated team of rice irrigation experts, Protheroe planted his first rice crop under pivot irrigation in October 2009. He planted two varieties of rice: Quest, a short-season, short-grain variety, and Amarone, a long-season, short-grain variety, on 32 hectares of land known locally as the Glen Ayre Farm.

“I wanted to grow two different varieties so I had two different maturities and tried to establish which variety was more suited to pivot irrigation,” Protheroe says. He adds, “I’ve been in the rice business for 45 years, and the older guys told me not to use water very efficiently because you lose it too fast. But we’ve seen that it’s possible.”

Protheroe says several years of drought taught growers in his area of southeast Australia that water was in short supply. Groundwater is the main source for his four Lindsay center pivot irrigation systems, but Protheroe plans to add more pivots and pump stations to access water from a nearby river.

Protheroe used a large 18.3-meter planter to plant the rice, something he had not previously been able to do because of the dikes and berms that are used in flood irrigated rice fields.

Protheroe was particularly interested in learning about controlling weeds in his pivot irrigated rice and about any tracking issues with his pivot. He also wanted to keep detailed records on potential water, energy, and labor savings, and the overall profitability of growing pivot irrigated rice. Electric weather monitoring stations were installed in the field, and Protheroe used yield monitors and field mapping technology to help document return on investment.

Agronomic Solutions

The Lindsay pivot on Protheroe’s farm is 302 meters long and includes six towers. The new pivot was equipped with a Nelson 3300 Yellow Plated Spinner sprinkler package, which applied fine droplets of water “like a good steady rain,” Protheroe said.

The pivot was outfitted with Lindsay’s 2-TRAX tracking system and three-wheel drive makes for improved traction and flotation. “The tracking systems helped enormously,” he said.

Because pivot irrigated rice can be planted on sloped fields of up to 30 degrees and doesn’t require costly field leveling, dikes, and canals, Protheroe was able to plant his rice on ground that had been in wheat the year before.

“Not having to do dikes was key and really convenient, especially for my operation. We have large equipment, and I was able to go right into the field with our large seeder. With dikes and berms, I couldn’t do that,” Protheroe says.

Fertilizer was applied through the pivot, a tractor spreader, and an airplane. Protheroe used the Lindsay pivot’s chemigation system to apply a small amount of insecticide to control armyworms in late January.

Protheroe was extremely pleased with weed control in the pivot irrigated rice: “Weed management was very simple. I applied all of the weed control products with a ground spray rig and then lightly watered it in with the pivot. It worked great.”

“One of the many benefits of rice production under a pivot is the ability to apply herbicides using existing equipment such as sprayers,” says Ryan Yates, managing director at Flow Smart, Protheroe’s local Lindsay dealer in Australia. “With flood irrigation, this has to be done by airplanes, which is much more expensive.”

Protheroe says neighbors and agronomists were keeping a close eye on his pivot irrigated rice.

“They kept asking, ‘How clean is it?’ They expected to see a lot of weeds but there were hardly any weeds; it was a very clean field.”

Protheroe attributes part of that to the fact that the field, made up of heavy clay soil, had previously been planted to dryland wheat, as well as the advantage of being able to rotate other crops with pivot irrigated rice.

Results

Protheroe’s short-season rice variety yielded 9.84 metric tons dry per hectare, with some sections yielding up to 15 metric tons dry per hectare. The long-season rice variety yielded 5.31 metric tons dry per hectare.

“I planted the short-season rice variety because the nights can get cool in our area around the end of December through mid-January, which can damage yield when the rice is heading. As it turned out, yields on the short-season variety were outstanding. I was very pleased with the yield on the short-season rice,” Protheroe says.

Protheroe conservatively estimates using 40% less water growing pivot irrigated rice compared to flood irrigated rice. He plans to continue to grow pivot irrigated rice, depending on how dry it is in his area and the market price of rice.

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