like a coach adding sprints to build endurance, Jerry Schillinger uses pulse crops to diversify and whip fields and profits into peak condition.

"One of the first things I noticed when I tried pulse crops was the following wheat crop was healthier, more vigorous, and had fewer disease issues," says Schillinger, who started experimenting with the crops on his Circle Mont grain farm 20 years ago. "Those benefits have not only continued, but increased over the years." Producers in Montana and North Dakota have consistently reported a 6- to 7-bushel increase for spring wheat after a pulse crop, says Perry Miller, Montana State University cropping systems specialist.

"When that's 26 bushels per acre versus 18 bushels, it makes a big difference," he says.

High wheat prices make those yield bumps enticing enough, but pulse crops aren't a throw-away rotation holder. Pulse crops such as peas, lentils, and chickpeas (garbanzo beans) are important, high-value food legumes.

"They present some challenges, but when we cashed the check that first year we saw good incentive to keep growing pulses," Schillinger says.

Fitting in. Hailing from semiarid corners of the globe, pulse crops are deliberate users of valuable moisture. It's an attribute that makes them a great replacement for summer fallow.

"Summer fallow acres are in a free-fall in the dryland acres of the northern Great Plains," Miller says.

The point of summer fallow is to conserve moisture. But, Miller says, soil water content in light soils of the region usually peaks in mid June. After that, 2 or more inches of moisture are thrown away to evaporation.

"Pulse crops have shallow, wimpy root systems. They only use water to a 3-foot depth as compared to a 2.5-foot depth with wheat," Miller says. "The question farmers must ask is: 'Should I use that 2 inches of moisture that would otherwise be lost to evaporation to produce a crop, or just throw the moisture away in case I can't recharge it with rain later?"

Schillinger and his father reduced tillage and went to chem fallow in the 1970s, bringing to light the fact that they had the moisture availability to grow a crop every year. Initially, they experimented with continuous wheat. But that approach quickly created problems with grassy weeds, insect pests, and a number of diseases.

"We learned the hard way that we needed to diversify," says Schillinger, who now farms with his wife, Carol; his son, Brett; and Brett's wife, Haley; as well as his son, Alex.

"Now, when we plant a third to half of our acres to pulse crops—depending on the market and agronomic factors," Schillinger points out.

As the Canadians and others started ramping up pulse production, the Schillingers focused more heavily on less common pulses, such as green peas, red lentils, and chickpeas.

"Where Austrian winter peas have a feed market, green peas are primarily used for human consumption. They're a higher dollar crop without being more expensive to raise," he explains. "We just have to handle them a little more carefully at harvest."

Golden roots. Covered in nitrogen-fixing nodules, pulse crop roots may provide just as much value as the harvested crop. Peas yield a 10- to 15-pound-per-acre nitrogen credit while lentils kick in around 10 pounds per acre, Miller says. These aren't huge numbers. But after 30 years of pulse and spring wheat rotation, Saskatchewan researchers accidently created a system with too much nitrogen.

"Especially in fields with a long-term history of pulse crops, there are changes in soil quality and the way soils release nitrogen beyond the nitrogen produced by the plant," Miller says. "We don't fully understand it, but we know it's happening. That effect is a testament to the power pulse crops have to change soil nitrogen over time."

Leaky roots may hold the secret to the added benefits, scientists say.

"Root exudates are likely stimulating soil microbes, which promote soil aggregation and nutrient mineralization from the soil," Miller says.

Soil tillage is visibly improved following pulse crops as well, with the most significant benefits coming after...