Dr. Santosh Rajput, Dryland Genetics' lead plant breeder, making selections in the field.

New Millet Offers Higher Yields

Dryland Genetics' new proso millet hybrids are pushing yields by as much as 40 percent without more water or fertilizer. The dryland crop is known for its water efficiency, but yield increases have severely lagged that of corn and soybeans.

"Before we introduced our new varieties, most in use had been developed in the early 1990s," says James Schnable, Dryland Genetics. "We introduced our first variety 3 years ago. It's now on tens of thousands of acres."

The new, high-yielding, non-GMO varieties are finding a home as an alternative to leaving the ground fallow between wheat crops. In other cases, wheat growers go to a wheat-fallow-millet rotation to harvest a crop two years out of three instead of two out of four.

Schnable sees even greater potential for proso millet as a profitable alternative crop in the Midwest. He suggests rotating it with winter annuals such as winter canola, camelina, or winter peas.

"With a short growing season of only 60 to 90 days, proso millet can be planted as late as the end of June, later than most would try to plant soybeans," says Schnable. "It can be rotated with other small grains and legumes for more diversity in a cropping system while still obtaining high performance and profitable yields. Harvested before corn or soybeans, it spreads out the harvest season."

Schnable, a genetics professor at the University of Nebraska, co-founded Dryland Genetics with his father, Patrick Schnabel, the director of the Plant Sciences Institute at Iowa State University. The two researchers focus on proso millet as a sustainable alternative to dryland corn and soybeans.

Schnable points out that proso millet already produces twice as much grain from a single gallon of water as corn, sorghum, and other grain crops. Unlike corn, it doesn't require supplemental nitrogen, reducing production costs. It's already grown on half a million acres in the U.S., mainly in Colorado and Nebraska.

"Proso millet has already overcome most barriers to a new crop," says Schnable. "Farmers don't have to be educated on how to produce or market it; they already have the equipment to plant and harvest it. It's already water and nutrient-efficient. We just need to focus on producing more grain from each plant."

Dryland Genetics also works to improve standability and reduce shattering. Along the way, another beneficial feature developed.

"The first two varieties we developed had thicker stalks than existing varieties," says Schnable. "Farmers like the strong stems, as they capture more winter snow, preserving the moisture for the coming year."

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Extended Life Chopping Knives

Kondex Corp. identified a need and filled it with laser cladding and tungsten carbide additive on a through-hardened chopping knife. Traditional stalk chopping knives weren't meeting customer expectations, suggests Diane Riley, Kondex Corp. The company applied technologies it's been fine-tuning since 2010 to the problem and introduced Stalk Claw.

"Our patented process controls the material wear pattern and induces serrations to the knife edge," says Riley. "This extends product performance, reduces chipping and blade damage, and significantly outlasts traditional high-wear knives."

Using a laser to metallurgically bond tungsten carbide to the chopping knives' base material is key to the extended edge life of Stalk Claw. The laser creates a shallow melt pool of the base material. When the carbide powder is simultaneously introduced to the melt pool, it's infused as part of the base metal.

Traditional hardface welding uses larger carbide particles but produces a larger volume of filler material versus carbides for lower total wear protection. A laser produces an edge with smaller carbides in a higher density and more even distribution.

Another negative aspect of hardface welding is the production of large heat-affected zones. These result in inconsistent hardness values, leaving the underlying edge susceptible to cracking and breakage when the hard facing is gone.

Kondex reports that their laser cladding and heat treatment produce no heat-affected zones.

Voids or empty cavities due to imprecise application are another concern with hardface welding. Once the voids are revealed, filler material and carbides are often lost because nothing secures them to the base metal.

Laser cladding improves impact and wear-resistant properties, offering greater carbide distribution in the knife edge with the longer retained leading edge. The result is two to four times longer life.

"Sharper and more durable knives with a longer lasting edge require less horsepower to cut the crop," says Riley. "This equates to greater efficiency and less fuel used."

"Sharper and more durable knives with a longer lasting edge require less horsepower to cut the crop," says Riley. "This equates to greater efficiency and less fuel used."

Riley advises that Kondex uses the same process on its Straw Claw chopper blades. The company sells both products and other products developed for agriculture through distributors and their online store.

"Prices for the Stalk Claw knives range from $70 to $82 for a two-piece kit, dependent on make and model," she says.

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4-ft by 3 1/2-ft. ground protection panels float over uneven and soft ground and lock together to support heavy vehicles.

Multi-Use Ground Protection Panels

Workhorse high-density polyethylene (HDPE) panels can be walked on, driven on with heavy equipment, or used in countless ways to protect the ground. The permeable plates float over uneven and soft ground and can handle up to 47,500 lbs. pressure per sq. ft. The panels were the brainchild of Gerry Hawkes more than 30 years ago as a way to encourage bike use.

"We started out producing 1-ft. square panels that locked together without tools for bike paths, but we couldn't compete with federally funded asphalt and concrete," says Hawkes. "The military picked up on the concept for rapid deployment tent flooring and other uses. We modified the design to make 4-ft. by 3 1/2-ft. panels."

Since 2000, Hawkes has sold more than 4 million sq. ft. of flooring for military use and more for disaster relief. Now available for civilian and municipal markets, the panels are used for all types of temporary and long-term use, from field and turf protection to garage and storage areas and pedestrian and vehicle pathways.

"Our heavy-duty ground protection panels protect the ground from your stuff and your stuff from the ground," says Hawkes. "Applications include landscaping, construction, and tree service, as well as residential and commercial uses."

The 14-sq. ft. panels are designed to replace plywood. The HDPE sheets are easily cleaned, stored on pallets, weatherproof, and UV-degradation resistant. With the removal of two pins, each panel can be split into two 4-ft. by 21-in. sections for even more flexible layouts.

The individual panels lock together with self-aligning, friction-fit, molded U-channels on each edge. They're available in thicknesses of 1 in. (27 lbs.) and 2 in. (34 lbs.). The thinner panels are designed for use on relatively level ground surfaces.

The thicker panels are recommended for soft, uneven, or even wet and muddy ground. With a solid subsurface, they can even support heavy vehicles. The 2-in. panels are also available with integrated channels for electrical cables. The heavier-duty panels can be equipped with a 6-in. wide, tapered-edge ramp for easy access.

"The 21 in. widths are also available in 15, 30, and 45-degree curved sections," says Hawkes. "They're equally great as walking surfaces or for wheeled tools. Water passes through, and snow and ice are easily removed."

The 1-in. thick panels are priced at $150.25, the 2-in. thick panels at $174.32, and the 2-in. thick integrated cable management panels at $210 each. Quantity discounts are available.

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