SDSU Winter Wheat Breeding

Sunish K. Sehgal
Department of Agronomy, Horticulture & Plant Science
South Dakota State University
Stakeholder needs

- Increased productivity and stability
- Abiotic stress tolerance
- Resistance against diseases and insect pests
- End-use Quality
Research Approach

GWAS

Germplasm evaluation

High Throughput Genotyping

Genetic mapping

Crossing Block

~800

Selection

Doubled Haploids

Seed Production

Multi-location Advanced & Elite Trials

~150

~10

End-use Quality

Preliminary Yield Trial

~1000

Variety Release

Genomic Selection

High Throughput Genotyping

GWAS

Disease Nurseries

FHB
WSMV
Leaf rust
Stripe rust
Stem rust
SDSU Winter Wheat Breeding and Testing Locations

16 CPT locations
8 Advanced/Elite trial locations, ~10,000 plots/year
  - Completely No-till
  - 3 locations SDSU Research Center
  - 12 locations with farmer-cooperators, mostly certified seed growers
Organic grain producers in South Dakota

Gun Smoke Farm 34,000 acres

Sustainability And Tradition Guide General Mills’ Farming Future

Ariel Knoebel Contributor

The hottest innovations in farming right now are all about slow transitions. Carla Vernón, president of General Mills natural and organic operating unit, discussed her company’s commitment to investing in traditional farming methods at the Fortune Global Forum in Toronto last week. “If we mean to stay in the food business at General Mills, then this problem that we’re facing, that we have been a participant in,” Vernón said, while on a panel discussing climate change, food security, and the food supply; “we realize now, we have to make positive contributions.” So, the company is looking to the past for inspiration on how to reduce their ecological footprint.

General Mills entered an agreement last Spring with Gunsmoke Farms in South Dakota to transition 34,000 acres of farmland into certified organic land by 2020. The company is already the third largest producer of natural and organic foods in the U.S. Once transitioned, this will be one of the largest contiguous stretches of organic agriculture in the country. In addition to expanding organic acreage, they are working to incorporate “throwback” farming methods, such as utilizing cover crops, creating natural pollinator habitats, planting perennial wild grains to restore soil health, and recommitting to other regenerative farming practices.
Organic wheat production in South Dakota

**Bottlenecks:**
1. Weed management
2. Maintaining yield and quality under low nitrogen input
3. Disease pressure

**Traits needed:**
1. Winter hardiness, tillering and early spring growth
2. Nitrogen use efficiency
3. FHB and common bunt resistance
4. Test weight, protein content and baking quality
Breeding HRW for Organic production

SDSU breeding material:
1. Good winter hardiness
2. Taller semi-dwarf, lodging resistance and good tillering capacity
3. Good disease resistance
4. Good end-use quality

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<th>Lodging score</th>
<th>Height</th>
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Sharing advanced and elite lines: NRPN lines needs more discussion