The ancient wheats

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Outline

• What are the ancient wheats?
• Why grow, bake, cook with, eat the ancient wheats?
• Producing the grain
• Processing the grain
• New Project!!!
• Baking with ancient wheats
• Tasting
Ancient wheats (hulled wheats):

• Einkorn:
  – *Triticum monococcum*
  – Domesticated ~10,000 years ago

• Emmer:
  – *Triticum turgidum ssp. Dicoccon* (same species as durum wheat)
  – Domesticated ~10,000 years ago

• Spelt:
  – *Triticum aestivum ssp. Spelta* (same species as common wheat)
  – Domesticated ? (in dispute)
The essential small grains: wheat, barley, oats, rye

Rye roots
Weaver, *Root Development Of Field Crops*, 1926
Reasons to grow ancient wheats

• They are small grains and provide multiple benefits to the agroecosystem
• Low input requirements
• More tolerant to environmental stress, e.g., cold, wet soils, drought, weeds
• Sources of genetic diversity—e.g., emmer a source for wheat disease resistance traits
• Fetch high prices!
Current prices for organic, locally grown ancient wheats

Organic berries:
Einkorn: $4-$7/lb
Emmer: $3-$7/lb
Spelt: $1.30-$4/lb

Wholesale Emmer/einkorn
Baseline of $0.40/lb
Can go much higher
Spelt: boom/bust
Basic grain quality standards for any market

• Fully mature grain
• Moisture content below 14%
• Free of dirt, stones, insects, feces, mold, dust, chaff, and other debris
Specific market requirements

• Food-grade and milling quality
  • DON ≤ 1 ppm
  • Acceptable falling number (sprouting in the head)
  • Acceptable grain protein (for better price, higher the better)

• Malting quality
  • DON ≤ 1 ppm
  • Preharvest sprout damage (Rapid Visco Analysis)
  • 95% or higher germination
  • Kernel plumpness
  • Acceptable protein (9.5-12.5%)

• Distilling quality

• Feed quality

Fusarium graminearum
Why the strong consumer demand?

• Nutritional benefits (as compared to common wheat)
  • Higher lipid content (spelt, einkorn)
  • Usually higher in minerals (spelt, einkorn, emmer)
  • Usually higher in lutein (einkorn)
  • Lower glycemic index (emmer)
  • Often higher antioxidants (emmer)
• Caveats:
  • Considerable variation between varieties/landraces (e.g., in terms of protein, lutein)
  • Contain gluten: not safe for those with celiac disease
Why the strong consumer demand?

- Market cachet of “ancient”
- Flavor and texture

“...chefs at New York’s high-end restaurants have [been] seduced by the same nutty, rich and earthy flavors ...that lured our ancestors away from their millennia-old diet of foraged berries and the occasional antelope.”
NYT 3/15/15

Best management practices for all small grains

- Grow in diversified rotation: do not precede with a small grain crop
- Good seed bed preparation
- Timely planting (e.g., spring crops asap)
- Timely harvest:
  \[\textbf{Small grains are like tomatoes, not field corn!}\]
Specific management of ancient wheats

Avoid excessive N fertility
(risk of lodging)
Specific management of ancient wheats

• Plant einkorn and emmer in the hull (spelt can be planted in or out of the hull)
• Lower planting rate than modern wheat recommended for emmer and einkorn (tiller extensively)
• Spring einkorn and emmer: 100 lb/A
• Winter einkorn and emmer: Farmers recommend ~50 lb/A
• Winter spelt planting rate: 150 lb/A (in the hull); 120 lb/A (dehulled)
How do ancient grains perform in our region (yield potential in the hull)?

• Einkorn: need more data. Farmer results with winter einkorn: 2,000 lb/A

• Spring emmers Lucille and ND Common in project trials:
  Finger Lakes 2000 lb/A  Northern NY  2700 lb/A

• Spelt considered by farmers to have a yield potential close to wheat:
  – Winter spelts in project trials
    Finger Lakes  2500 lb/A  Northern NY  3600 lb/A
Essential equipment: Processing

Air-screen cleaner
Dehuller John Stutzman, Homerville, OH; powered and mounted by Lamar and Henry Stauffer, New Holland, PA

Preliminary testing
Throughput: 3000 lb/hr for spelt
Efficiency:
  2015 Sungold spelt: 66% dehulled
  2015 Oberkulmer spelt: 53% dehulled
Works with winter einkorn, less well with spring emmer

Cost for version 2.0: ~$1500
Burr mill converted to dehuller by Henry Beiler/Lamar and Henry Stauffer

- Cheap: price of used burr mill ($200-$300)
- Reduced cracking of grain
Nigel Tudor designed/ Henry Beiler modified dehullers

Tudor: ~$13,000

Beiler: ~$4,000
Developing an affordable gravity table
Unseparated grain from the dehuller (dehulled + undehulled kernels)

Milling grade grain: smaller and split kernels

One pass through the gravity table leads to marketable products

Large, whole kernel grain to be sold as berries
Essential equipment: Processing

Oat Roller
New Project: Farmer-generated training and equipment solutions for producing and processing value-added grains

• Collaborators with OGRIN: NOFA-NJ, Center for Agricultural Development and Entrepreneurship (CADE), Joseph Heckman (Rutgers)

• Goal: Increase sustainability of value-added grain enterprises by helping farmers
  1) develop expertise in best management practices for food-grade grain production and
  2) access and efficiently use affordable, scale-appropriate production and processing equipment.
Intensive training program

• Best field practices
• Setting and operating the combine
• Essential grain-quality standards
• Low-cost drying/storage options and pest management strategies for grain storage
• Innovative marketing and distribution strategies
Farmer-generated solutions to the affordable equipment conundrum

- Buying used equipment (how to source, refurbish, maintain, and operate it for optimal results)
- Modifying existing equipment to serve new functions (e.g., transforming feed grinders into dehullers)
- Building your own equipment
- Buying new, low-cost equipment from local/regional small-scale manufacturing enterprises
- Custom combining, cleaning, and processing options
- Equipment-sharing options
Research on dehullers

• Advisory committee made up farmer equipment experts and innovators
• Will test 8 dehuller types (commercial and farmer-made)
• Efficiency, throughput, product quality
• To learn more about or participate in the project
  • Sign up sheet
  • Contact Elizabeth Dyck
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