

## Perennial Wheat On-Farm Research - 2008

Snapp Lab – Michigan State University, W.K. Kellogg Biological Station

### Why grow perennial crops for grain production?

Environmental benefits provided by perennial cropping systems include:

- Natural systems contain diverse mixtures of perennial plants
- Erosion prevention
- Carbon sequestration
- Efficient nutrient recycling
- Resilience to pests, diseases and abiotic stresses

On farm benefits include:

- Lower input costs (fertilizers, planting, weeding)
- Additional grazing / hay benefit
- Less need to battle cold, wet spring and fall conditions for planting

### What have we learned about perennial wheat in MI?

- Unfertilized perennial wheat yields are equal to or less than soft white annual winter wheat (20-35 bushels per acre).
- A large amount of variation exists between plants (timing of flowering and plant characteristics)
- Perennial wheat plants survive dry summer and cold winter conditions, exhibiting substantial regrowth in the fall after harvest
- Some plants flower two times in one year
- Increasing the density of perennial grasses dramatically decreases the amount of seed produced by each plant
- Most plants require vernalization for seed production
- Perennial wheat flour can be used to make pastry products, and tastes similar, but slightly different than annual wheat. Some taste-testers reported a “stronger” flavor from perennial wheat
- Perennial wheat plants mature later in the summer than annual wheat
- Nutrient content of perennial wheat is higher than that of annual wheat
- Gluten content is not currently high enough to use perennial wheat for yeast bread baking

### What is Perennial Wheat?



Perennial wheat is not a naturally occurring plant, but a cross between annual wheat and any of several perennial relatives, most commonly with intermediate wheatgrass (*Thinopyrum intermedium*). Perennial wheat plants live for multiple years (2-5), producing seed each summer of its life span. Seed contains more protein and micro-nutrients than annual wheat, and produces a seed that is similar in quality to annual wheat.

### Goals for Perennial Wheat On-Farm Research

- Evaluate biology and ecology of perennial wheat
  - Make selections for improved varieties
  - Evaluate perennial wheat over broad geographic ranges
  - Examine environmental benefits provided by perennial wheat cropping systems, such as soil health, erosion control, biodiversity and nutrient recycling
- Socioeconomic Evaluation
  - Explore agronomic strategies and potential
  - Examine marketing potential and grain quality
  - Farmer assessment of perennial wheat and management approaches



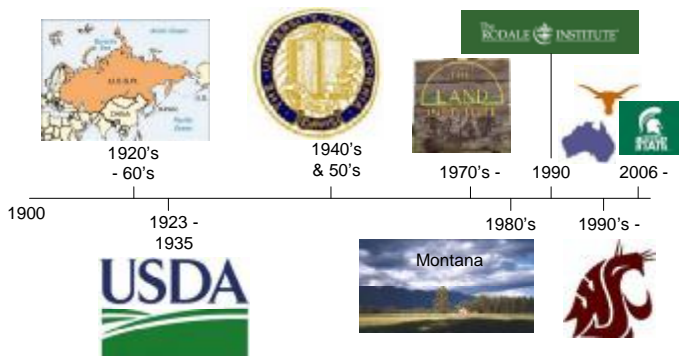
## What are the next important perennial wheat research steps?

- Measure 2nd, 3rd, 4th, and 5th year yields
- Test 11 different perennial wheat populations from Kansas and Washington
- Evaluate perennial wheat in field scale plots
- Select for adaptability, survivability, ease of cropping, disease resistance, yield potential, threshability
- Selection for winter and spring varieties
- Understand how to maintain fertility in perennial wheat organic systems (Legume intercrops, compost, etc..)
- Evaluate perennial wheat potential as a forage

## Perennial Wheat History

Perennial wheat breeding has been occurring since the early 1900's, when USDA scientists began making crosses. Subsequently, scientists from the USSR, the University of California – Davis, Montana State and the Rodale Institute have worked with perennial wheat, but none could compete economically with annual wheat. First year yields of perennial wheat reached 70-80% of annual wheat, but yields quickly declined in subsequent years.

Perennial wheat currently has new life, as environmental and sociological factors are being given more weight. At present, The Land Institute in Kansas and Washington State University have perennial wheat breeding programs. At Michigan State, we've obtained perennial wheat populations from both organizations, and are currently evaluating 11 different populations at the W.K. Kellogg Biological Station. Our first evaluation was conducted on a population from Washington State that contains genetics from annual wheat cultivars 'Chinese Spring' and 'Madsen,' and the perennial intermediate wheatgrass. These plants produced abundant grain in 2007, regrew in the fall of 2007, and are alive and growing in the spring of 2008.



## Expectations of farmers: what can you do to enhance perennial wheat research activities?

- Complete a short survey, including information about perennial wheat on your farm
- Allow Snapp lab researchers to evaluate yield, regrowth, threshability and grain quality on your farm.
- Provide overall thoughts about perennial wheat as a crop on your farm
- If interested, select for improved varieties
- Host field day for area farmers if interest exists
- Follow the perennial wheat crop for at least 4 years

## What can you expect from MSU researchers?

- Provide seed
- Visit farm trial twice per year
- Communicate with farmers

## Baking with Perennial Wheat

Preliminary blind taste tests at KBS have found that people like perennial wheat in cookies and quick breads, most often choosing perennial over annual wheat. When detected, tasters noted slight differences in texture and taste between annual and perennial wheat.

## Contact Information

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