Growth and Development of Kernza® in the Conditions of the Right-Bank Forest-Steppe of Ukraine (2018)

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SOIL FERTILITY

- High
- Above average
- Average
- Below average
- Low
Characterization of soil

Soil of the experimental field is the typical chernozem

- Humus, dark gray soil
- Plow layer is loose
- Subsurface layer of lumpy structure, slightly consolidated, with moles and wormholes
- Transition is gradual
Precipitation (2017 – 2018)
Humidity (2017 – 2018)
The seeds of Kernza® were cycle 4 KS

The hand sowing was carried out on October 19, 2017- extremely late sowing period for winter crops in region

The seeds were sown after the deep plowing with pre-sowing cultivation
Mineral fertilizers and pesticides have not been applied

Sowing-seedling period: 21 days
Seedlings were not similar and weak

At the beginning of winter the plants were in the tillering stage, were weak and only 2-4 leaves
The root system concentrated in a 0-5 cm layer of soil
Questions of Interest:

1) How does Kernza® react to adverse environmental conditions?

2) Kernza® plants resistance to the diseases in comparison with Winter Wheat.

3) The growth and development stages of Kernza® during the first year in comparison with the similar Winter Wheat stages.
The state of Kernza® Plantings on November 12, 2017

State of Winter Wheat Plantings and Kernza® on November 12, 2017
The State of Kernza® Plantings on April 12, 2018

• Overwintering conditions in 2017-2018 were unfavorable for winter crops
  • Low air temperatures and prolonged snow load in February and March
  • Restoration of spring vegetation was late region, first 10 days of April
• Plants were weakened at the beginning of the spring vegetation
  • Overwintering percentage was high – 95%
• Intense tillering was typical at the beginning of the vegetation restoration- with a slow increase in the vegetative mass
• Growth of the root system occurred much faster than aboveground system
Starting from the after second decade of April 2018 there was a rapid increase in the average daily temperature

Winter crops, in particular Winter Wheat, quickly developed from the spring tillering stage to the leaf-tube formation and the earing stage
• But the same development stages of Kernza® were prolonged
• At the end of May (May 25, 2018), the plants were in the leaf-tube formation
Winter Wheat plantings on May 18, 2018

Kernza® Plants on May 25, 2018
Heading was observed in early July
At that time the Winter Wheat was in the milk-ripe stage
The state of Kernza®

Plantings on August 9, 2018

- July in 2018 was hot, daytime temperature of +37°C
  - There was also soil and air drought
  - The weather conditions were favorable for Septoria spot and root rot of Winter Wheat
    - Lesions of Winter Wheat plants reached 75%
    - The Kernza® plants were resistant
- The flowering stage in 2018 was in the first 10 days of August
Grain Kernza® is obtained in Ukraine.

- The Kernza® plants intensively developed under the hot weather conditions.
- The grain formation was observed in September, and the harvesting began in the second decade of October.
- Yield Indices:
  - Grain yield 0.63 t/ha;
  - Above-ground dry weight yield 0.47 t/ha
  - Thousand-kernel weight 10.2 g
Conclusions:

1) Kernza® showed high plasticity to the adverse environmental conditions.

2) Kernza® plants are resistant to the diseases widespread in the growing area, affecting the Winter Wheat and intermediate wheatgrass.

3) The growth and development stages of Kernza® during the first year of cultivation significantly prevailed in time in comparison with the similar Winter Wheat stages.