

The technological solutions were developed with the financial support of the National research "Healthy Foods for a Strong Bio-Economy and Quality of Life" at the Ministry of Education and Science, Resolution of the Council of Ministers No 577/17.08.2018

Sustainable production of common winter wheat under climate risk

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National Research Programme
"Healthy Foods for a Strong Bio-Economy
and Quality of Life"

Climate changes and identified risk factors of high frequency

- Permanent droughts during the summer months which cause poor pre-sowing soil tillage
- Higher mean daily temperatures during autumn and winter
- Higher minimal temperatures in winter
- Higher number of snowless days
- Low moisture reserves in soil
- Considerable temperature amplitudes during the resumed vegetative growth of plants
- Late spring frosts
- Permanent soil and air droughts during different stages of the phenological development
- Uneven distribution of rainfalls
- Mass occurrence of diseases, weeds and pests of high frequency



Good agricultural practices for sustainable production under stress

Use of certified seeds Growing of different cultivars in the farm Adequate varietal structure

Principles:

- Agro-climatic and soil specificity of the region;
- Size of the production areas;
- Probability of occurrence of stress (frost, drought, diseases);
- Choice of production technology;
- Productivity and/or grain quality.



Solutions of regional breeding programs:

- *Cultivars tolerant to drought:*
 - Dragana, Enola, Katarzhina, Kiara, Kristalina, Lazarka, Nikodim, Rada, Fani (DAI – General Toshevo, <https://dai-gt.org>)
 - Nadita, Sashets, Yailzla, Ginra, Diamant, Blan, Tsarevets, Gines (IPGR – Sadovo, <https://ipgrbg.com>)
- *Cultivars with high level of frost resistance:*
 - Bozhana, Goritsa, Katarzhina, Lazarka, Merilin, Pchelina (DAI– General Toshevo, <https://dai-gt.org>)
 - Pobeda, Fermer, Gizda, Nadita (IPGR – Sadovo, <https://ipgrbg.com>)



Good agricultural practices for sustainable production under stress

> Choice of field and previous crops:

Suitable: legumes and early to medium late winter and spring crops.

Risky: plowed perennial grasses and monoculture.

> Sowing:

Depth: 3-5 cm. Shallow sowing constitutes a risk of damages during the winter period and of underdeveloped roots. Deep sowing is also risky for the normal crop density.

Sowing norm for regional breeding- 500-600 germinating seeds/m².

Key factors are the biological specificity of the cultivar and the sowing conditions.



Sowing dates: 1-15 October for North Bulgaria and 15-30 October for South Bulgaria.

Tendencies: Later sowing dates with about 10 - 15 days.

Reasons: Summer droughts and poor pre-sowing soil tillage; autumn months with high temperatures, a cause for mass occurrence of pests and inefficient control; danger of overgrowing of the crops, poor hardening, damages by unfavorable factors during the winter months and the resumed vegetative growth of plants.

Good agricultural practices for sustainable production under stress

> Fertilization:

Facts: For 100 kg of grain~ 2.5-3.5 active matter of nitrogen are necessary.

Requirements of regional breeding: nitrogen: phosphorus ratio (N:P) - 1:0.6-0.8.

Dates: Spring nutrition – priority in „poor“ soils, not suitable previous crop, crop of low density, late cultivars, low number of tillers.



> Fertilization:

Risks: The high fertilization norm under stress has a negative effect on productivity; risk of soil and water pollution.

Solutions: Leaf spraying partially compensates for the insufficient main fertilization and has a positive effect in stress situations; suitable dates are simultaneous with the treatment for weeds or at heading stage.

Good agricultural practices for sustainable production under stress

➤ Plant protection

Problems: high frequency and mass occurrence of diseases, weeds and pests; significantly higher dependence on pesticides; a prohibition on the use of a wide range of active substances.



Solutions: choice of a resistant cultivar; observance of proper crop rotation; proper soil tillage; date and depth of sowing, sowing norm, fertilization; use of certified sowing material.

Measures: integrated control, including observations for the purpose of diagnosis, prognostication and signalling, adequate choice of a method for chemical control, choice of a proper pesticide and efficiency reporting.

