

Official post of the Committee of Agronomic Sciences at the Second Division of the Polish Academy of Sciences on taking necessary measures to limit negative effects of drought on agricultural production in Poland

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The Committee of Agronomic Sciences postulates undertaking the National Programme for Adaptation of Agriculture to Climate Change, which would take into account a multifaceted approach to combating the effects of drought and global warming in Poland, and would lead to securing the indispensable water resources for agricultural production. From the organisational point of view, this programme should include the Ministry of Agriculture and Rural Development, local government administration and self-government administration, as well as stakeholders, i.e. farmers, associations of agricultural producers, and also agricultural advisory centres, scientific institutions and companies, and organisations acting for the benefit of agriculture. The existing activities in the form of the governmental Plan for Counteracting the Effects of Drought and the Agricultural Drought Monitoring System would be included in the Programme.

The threat of agricultural drought is recorded in Poland for another consecutive year. In 2019, agricultural drought occurred on 60% of agricultural land. The current snowless winter with little precipitation may exacerbate not only agricultural drought, but also hydrological drought. Reports by the Intergovernmental Panel on Climate Change and other publications agree on the expected intensification of soil drought in the 21st century in our part of Europe. Action should already be taken today to implement a system for rational management of water resources in agriculture and to adapt plant growing technology. In order to limit the disruptive effect of drought in agricultural production, the Committee of Agronomic Sciences of the Polish Academy of Sciences has formulated the following postulates:

1. the Drought Plan provides for the construction of new retention reservoirs, which will contribute mainly to mitigating flood events, and to a lesser extent to increasing water retention. In order to increase water resources for agriculture, comprehensive solutions encompassing entire river basins are required to slow down the outflow of water by improving habitat retention and improving the drainage system, and adapting it to collect water in the country. One element of these measures may be to subsidise the modification of municipal spatial development plans to designate floodplains and small water retention facilities and to increase financial support for the restoration of hydrotechnical facilities allowing water to be stored at catchment level.
2. It is advisable to improve the Agricultural Drought Monitoring System, amongst others by using remote sensing methods. This system is an important source of information both for farmers and for state administration. Farmers should have broad access to knowledge about the problems associated with drought and ways of reducing its effects. The system of agricultural insurance against the consequences of agricultural drought also requires modification.
3. Promoting conservation tillage, in its various variants adapted to local environmental conditions and machinery, limiting the use of straw for energy purposes and to reduce evaporation from soil cover in

winter by growing catch crops, increasing the proportion of leguminous and winter crops which are less sensitive to drought.

4. Developing of training materials and carrying out educational activities by organizing training courses for farmers, demonstrating the value of applying agrotechnical measures to prevent the effects of drought and active programmes to support farmers in diversifying agricultural crops. Application of the above recommendations by farmers may be intensified by introducing them into the provisions related to direct payments (Cross Compliance and Greening) and carrying out random control of crops with the use of satellite imaging and drones.

5. It is important for the breeding of new varieties to develop the basis of selection strategies for selected crop species using molecular knowledge, which can be a precise tool to support phenotypic selection. Multidisciplinary research, in which teams with different scientific backgrounds should cooperate, is the foundation of progress in knowledge about plant tolerance to drought. There is a gap between the state of knowledge on the mechanisms of plant tolerance to drought and the practical application of this knowledge in the breeding of new varieties.

6. New varieties with increased tolerance to drought and high temperature stresses are required in agricultural production. Due to the complex nature of this trait, the criterion of wide adaptation of varieties to the environment and stability of their yield is currently gaining importance in the breeding of new varieties. It is desirable to introduce changes in the system of registration of varieties of cultivated plants allowing registration of a variety with an increased level of drought tolerance despite its lower than standard yield under optimal conditions. This, in combination with available agro-meteorological forecasts, will enable the selection of varieties for local conditions. Selecting for this trait requires many years of research under diverse agro-ecological conditions. The role of supporting the selection of varieties adapted to the given regional conditions in Poland and to the water shortage is fulfilled by the Post-registered Varietal Experimentation (PDO), supervised by COBORU. It is advisable to extend the location of PDO experiments, especially in the eastern part of the country, and to conduct these studies in cooperation with scientific institutions. Agricultural producers should also be provided with more information about the features of particular varieties (List of Recommended Varieties).

The Committee of Agronomic Sciences calls for the creation of a cooperation platform including a wide range of stakeholders: scientists from different areas and institutions, breeding companies, producer associations, ecological and consumer organisations. The Ministry of Agriculture and Rural Development should be the natural host for such a platform, as well as the source of its funding.