ADAPTATION OF FIELD CROP SPECIES TO CLIMATE CHANGE IMPACTS

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ABSTRACT

Growth and development of field crops are determined by the physical conditions of the habitat. Climatic impacts may influence production patterns, the deterioration of quantitative and qualitative values of crop yields, inducing the hazard of food security and -safety. Agronomic measures may contribute to adaptation issues.

The IPCC's Sixth Assessment Report of 2021 presents five potential future scenarios for the physical science of climate change. These scenarios are based on complex IPCC modelling. The scenarios focus on the main climatic characteristics – the trends in temperature and water availability. An assessment study has been done at the MATE University, Gödöllő to evaluate and identify the main factors of field crop adaptability to climate change processes. VI vulnerability indices (Tarnawa et al 2012) of 12 field crop species were processed with PAI aridity indices (Pálfai 2010) projected to certain geographic sites of Europe modelled by IPCC 2021. In the research Wheat (*Triticum aestivum* L), Maize (*Zea mays* L), Winter and Spring barley (*Hordeum vulgare* L), Rye (*Secale cereale* L), Oats (*Avena sativa* L), Peas (*Pisum sativum* L), Sunflower (*Helianthus annuus* L), Oilseed rape (*Brassica napus* L), Alfalfa (*Medicago sativa* L), Sugar beet (*Beta vulgaris* L) and Potato (*Solanum tuberosum* L) were studied.

The results obtained suggest, that susceptibility of cereal species proved to be the lowest, however maize and potato were highly affected by aridity x vulnerability interactions. The strongest climatic influence could be detected in the case of alfalfa and sugar beet. Regional differences in aridity were detectable. Undesirable effects of climate change may be limited by changes in the cropping structure of crop species and varieties, improved water-management, adapted plant nutrition, protection and tillage practices

Keywords: climate change, field crops, adaptation, regionality

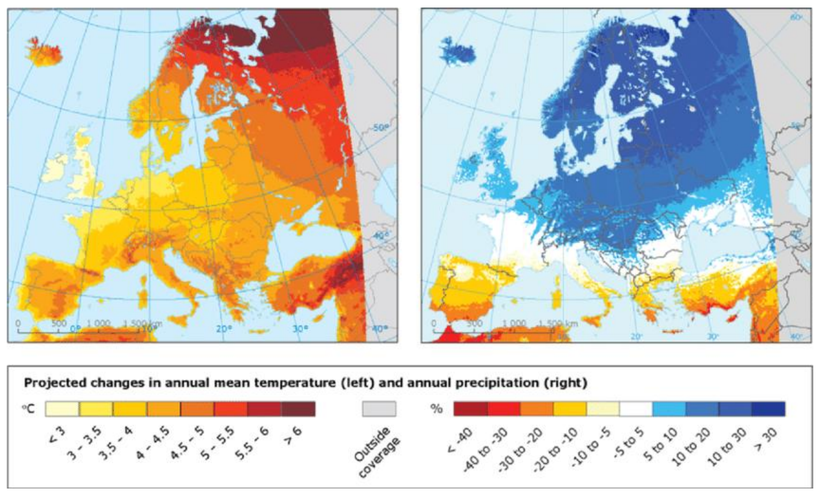

Fig 1 IPCC climate change scenarios for Europe. Source IPCC 2021

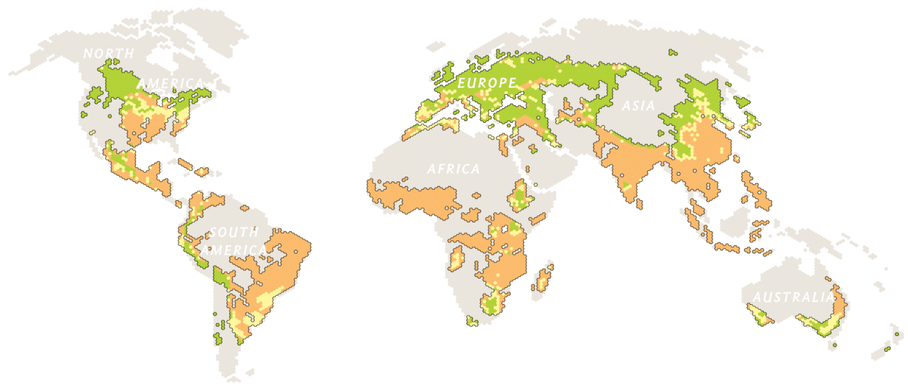

Fig. 2 Climate change impacts on crop production by 2050. Source National Geographic

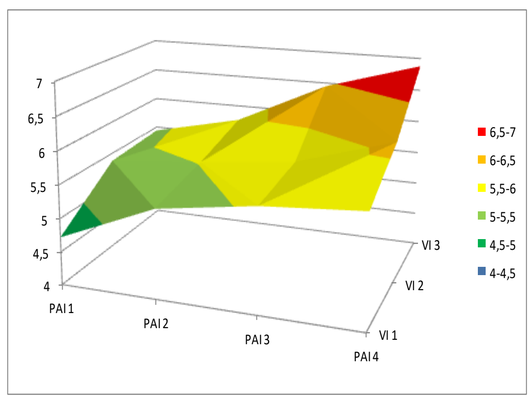

Figure 3 Level of susceptibility based on VI and PAI interactions

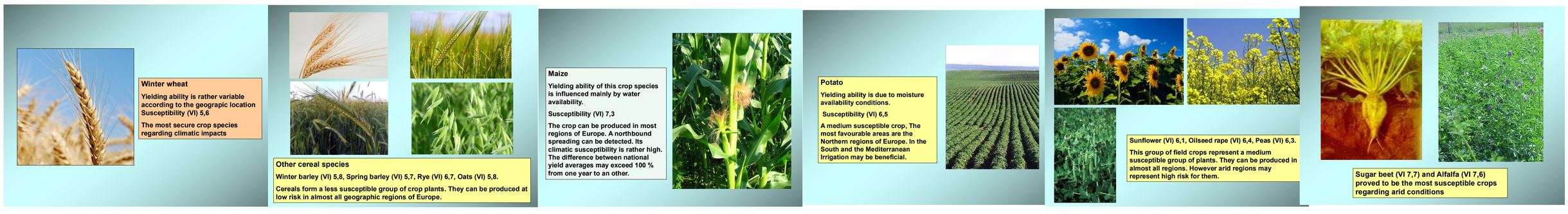

Figure 4 Susceptibility of the examined field crop species

Conclusion

Susceptibility of cereal species proved to be the lowest in this study, however, maize and potato and oil seed crops were highly affected by aridity x vulnerability interactions. The strongest climatic influence could be detected in the case of alfalfa and sugar beet. Regional differences in crop adaptability were detectable. Undesirable effects of climate change may be limited by changes in the cropping structure of crop species and varieties, improved water-management, adapted plant nutrition, protection and tillage practices

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