Sunflower hybrids zonation and crop protection measures

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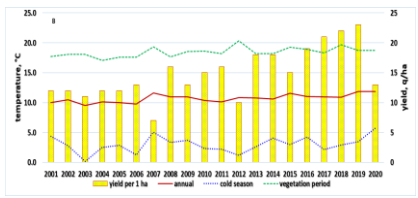
Introduction

Sunflower is the fourth largest oil plant in the world and is a major oilseed crop in the Republic of Moldova. Sunflower occupies, annually, 60% of the technical crops and around 25% of the sown lands. The rapid liberalization of the Moldovan agricultural economy after its independence in 1991 and transition to a market economy has created a more uncertain environment for farmers and for the private sector. Chaotic development of land use, coupled with privatization led to the continuous extension of sunflower occupied surface, failure of the crop rotation system, the soil degraded, increasing the frequency and aggressiveness of various pathogens. Moreover, the inefficiency of long-term strategies in managing insects, diseases and weeds, decreased even further the soil's physical properties (1, 2). Also, the production indices, as well as aggressivity and distribution of specific pathogens are highly influenced by current climate changes, characterized by high temperature and low quantity of precipitation and its ununiform distribution.

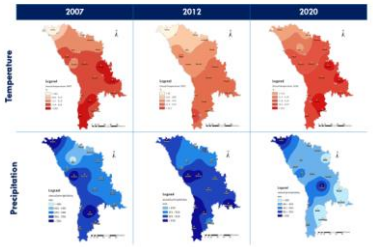
Motivation and Description of Work

Geographic Information Systems (GIS) provide a spatial framework for initiating the analysis of some of these issues and further demonstrate the robustness of the sunflower database as an organic research tool. Agroclimatic diversity remains crucial for developing an efficient sunflower breeding strategy and for the management of agrophytocenosis culture in the Republic of Moldova. In this context, the statistical data, regarding the intensity, frequency and durations of drought in the last 20 years and their impact on global harvest and on productivity at the country level were analyzed and interpreted graphically and cartographically using different softs and GIS technology in order to provide maps of climate variability, degree of climate change adaptation and level of acceptability among the samples sites. Additionally, the data regarding natural infection of sunflower hybrids cultivated in different Moldovan pedoclimatic areas, during 2015-2020, in association with the climate conditions and applied agronomic practices were analyzed.

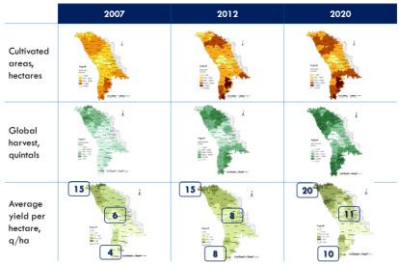
Results



CHARACTERISTICS OF 2007, 2012, 2020 DROUGHTS

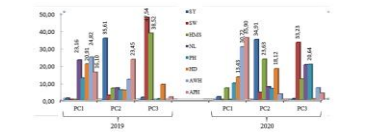


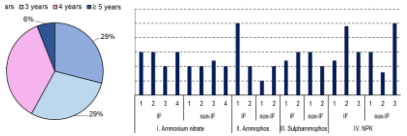
THE IMPACT OF DROUGHTS ON PRODUCTIVITY

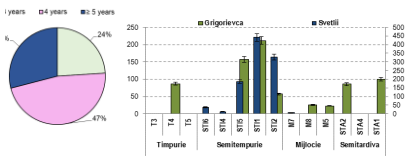


THE IMPACT OF 2020 DROUGHT ON MORFO PHYSIOLOGICAL INDEXES

Components	2019			2020		
	PC1	PC2	PC3	PC1	PC2	PC3
Eigenvalue	2.70	1.76	1.38	2.27	2.11	1.57
Variability (%)	33.76	21.96	17.24	28.43	26.38	19.64
Cumulative %	33.76	55.72	72.97	28.43	54.81	74.45
Traits	**Correlations between variables and factors**					
Seed yield (kg/ha)	0.19	- 0.79	- 0.16	0.22	0.86	0.13
1000 Seed weight (g)	- 0.12	- 0.23	0.81	- 0.11	0.31	0.72
Hectolitre mass of seeds (kg/hl)	- 0.10	- 0.35	- 0.73	0.40	0.71	- 0.44
Number of leaves	0.79	- 0.35	- 0.01	- 0.09	- 0.41	- 0.57
Plant height (cm)	0.59	- 0.32	- 0.11	0.48	0.38	- 0.57
Head diameter (cm)	0.75	- 0.32	0.36	0.55	- 0.62	- 0.12
Achene weight per head (g)	0.82	0.46	- 0.04	0.84	- 0.28	0.34
Number of achene per head	0.66	0.64	- 0.16	0.90	- 0.09	0.26







According to the obtained data, the average sunflower yield per hectare is usually higher in the Northern Region, due to the more favorable climatic and relief conditions.

Analysis of data collected from infected and non-infected fields shown that in the most of the cases the amount of used nitrogen fertilizers was higher in the households where the pathogens were identified than in those where they were absent. It has been established that recommendations regarding crop rotation were respected more often in the fields where pathogens have not been detected than in those where they were absent.

Conclusions

Based on the average harvest per hectare, the most profitable is considered the northern area, so, in order to reduce yield losses determined by unfavorable climate conditions it is recommended to cultivate sunflower especially in the North part of country.

To diminuate the negative impact of sunflower pathogens on productivity the return of sunflower on the same land after 5 or more years and the use of lower amounts of nitrogen containing mineral fertilizers is recommended.

References

[1] Kandakov, A., Havrland, B., Ojog, C., and Ivanova, T. Proceedings of the Conference Engineering for rural development, May 24-25, 2012: Jelgava.

[2] Duca, M., Clapco, S. Management approaches for sustainable growth in Moldova's sunflower sector. Helia. 2021, 44(74), 14 p.