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PRODUCTIVITY OF SUNFLOWER HYBRIDS GROWN UNDER EXTREME DROUGHT IN TWO DIFFERENT ECOLOGICAL REGIONS

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Abstract. The experiment was set up using a block method in 4 replications after a wheat predecessor in the fields of two different ecological regions – Thrace (Plovdiv region) and Dobrudja (Dobrich region), Bulgaria. Six sunflower hybrids were studied – P64LP170, breeded in Corteva, USA as a standart, and Bulgarian hybrids Dalena, Deveda, Enigma, Krasela and Sunny, breeded at the Dobruja Agricultural Institute - General Toshevo. Seed yield (SY), kg/da was determined by indirect method from a harvested plot. Both harvest years were characterized by extremely low rainfall during the critical periods of sunflower vegetation, accompanied by higher average monthly temperatures than the climatic norm. This is typical for both agro-ecological regions - Thrace and Dobrudzha and had an extremely negative impact on the productivity of all tested sunflower hybrids. In the first year of the study, the seed yield of all studied hybrids was higher in the Dobrich region. In both regions, the highest yields were recorded for the control hybrid P64LP170 and the lowest seed yield was recorded for the Krasela. In the second year of the study, the seed yield of all studied hybrids in both agro-ecological regions, the yield in the Plovdiv region was higher than that in Dobruja. In the Plovdiv region, the highest yields were recorded for the Dalena CLP hybrid, and in the Dobrich region for the control hybrid P64LP170. The lowest seed yield was recorded for the Krasela hybrid in Plovdiv, and in Dobrich for the Dalena CLP hybrid, which makes the interaction between the two factors non significant in the second year.

Introduction

Sunflower (Helianthus annuus L.) is the most important oilseed crop in the \bullet temperate climate zone. The largest producers of sunflower in the world are Russia with 7.20 million ha and Ukraine with 5.80 million ha. These two countries provide more than 50% of the total world production of sunflower. Other significant sunflower producers are the European Union with 4.24 million ha and Argentina with 1.82 million ha (JOCIĆ et al., 2015). In Europe, the Balkan countries are some of the largest producers of sunflower, especially Romania (VRÂNCEANU, 2000), Bulgaria (GEORGIEV et al., 2019), Turkey (KAYĂ et al., 2012) and Serbia (SKORIC, 2012). Sunflower is grown worldwide in temperate, subtropical and tropical climates in a very wide range of agroecological environments (DEBAEKE et al., 2021). In arid and semi-arid conditions, sunflower is grown under irrigation, while in temperate regions it is mainly a rainfed crop during the growing season (GARCIA-VILA et al., 2012). In France, for example, where only 5% of the sunflower area receives supplementary irrigation, it requires only limited amounts of water (~50 mm) with good efficiency (CHAMPOLIVIER et al., 2011). As a warm-climate crop with medium water requirements, it can add diversity to crop rotations in arid regions (JOHNSTON et al., 2002). Because it is moderately drought-tolerant, it often performs satisfactorily when other crops are dramatically affected (DEBAEKE and BERTRAND, 2008). With ongoing climate change, sunflower, as a spring-sown rainfed crop, may be more exposed to the direct effects of heat stress at flowering or during seed filling and to different and unpredictable drought scenarios during the growing season, both of which lead to yield reductions, reduced oil content and changes in fatty acid composition (GARAPOVA and KIRCHEV, 2021; MORIONDO and BINDI, 2007; MORIÓNDO et

Results and discussions

table 1 .Seed yield, kg/da

Factor A (Hybrids)	Factor B (Regions)	2023	2024
P64LP170	Thrace	257	152
	Dobruja	294	140
Далена	Thrace	216	177
	Dobruja	226	121
Деведа Table 1 Seed yield, kg/da	Thrace	211	144
	Dobruja	220	136
* Significant effect at P<0.05, ns – non significant effect of the factor	Thrace	203	154
	Dobruja	216	127
Красела	Thrace	195	141
	Dobruja	205	134
Съни	Thrace	233	148
	Dobruja	238	140
ANOVA	А	*	*
	В	*	*
	A×B	*	ns
		110	

al., 2011; DONATELLI et al., 2015; ANDRIANASOLO et al., 2016).

Material and method

- The experiment was set up using a block method in 4 replications after a wheat predecessor in the fields of two different ecological regions Thrace (Plovdiv region) and Dobrudja (Dobrich region), Bulgaria. Six sunflower hybrids were studied P64LP170, breeded in Corteva, USA as a standart, and Bulgarian hybrids Dalena, Deveda, Enigma, Krasela and Sunny, breeded at the Dobruja Agricultural Institute General Toshevo. Seed yield (SY), kg/da was determined by indirect method (ZAPRYANOV and MARINKOV, 1978) from a harvested plot using the formula:
- SY = m.n/1000
- where,
- m mass of seeds in a head (pseudanthium), g
- n number of plants/ da
- There was used two-way ANOVA to define statistically significant differences between the hybrids and regions.

• * Significant effect at P<0.05, ns – non significant effect of the factor

Conclusions

- Both harvest years were characterized by extremely low rainfall during the critical periods of sunflower vegetation, accompanied by higher average monthly temperatures than the climatic norm. This is typical for both agro-ecological regions Thrace and Dobrudzha and had an extremely negative impact on the productivity of all tested sunflower hybrids.
- In the first year of the study, the seed yield of all studied hybrids was higher in the Dobrich region. In both regions, the highest yields were recorded for the control hybrid P64LP170 and the lowest seed yield was recorded for the Krasela.
- In the second year of the study, the seed yield of all studied hybrids in both agro-ecological regions was lower than in the first. Comparing the two regions, the yield in the Plovdiv region was higher than that in Dobruja. In the Plovdiv region, the highest yields were recorded for the Dalena CLP hybrid, and in the Dobrich region for the control hybrid P64LP170. The lowest seed yield was recorded for the Krasela hybrid in Plovdiv, and in Dobrich for the Dalena CLP hybrid, which makes the interaction between the two factors non significant in the second year.