

•PRODUCTIVITY INDICATORS OF “KRASELA” SUNFLOWER HYBRID IN DROUGHT CONDITIONS

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The Earth's climate is in constant change, and so has the crops development conditions. A crop moves from one phase to another in its development, as a result of reaching certain temperature sums. In the recent years we have been constantly speaking of a drastically changing climate, mainly referred to as the Global Warming. The researches from Bulgaria has made an extensive research on the climate changes in the last few decades in Bulgaria. Some conclusions drawn from this research are that the rise of air temperatures during the XX century has been the highest in comparison with previous centuries, as the 1906-2005 year period, the medium air temperature has been 0.74° C higher. The year with the highest temperatures is 2009. From the beginning of XX century, the rain over North Europe has risen with 10 to 40%, while the rain over some regions in South Europe (Bulgaria amongst them) has declined up to 20%. The most notable drought was during the year 2000. In some regions the agrometeorological conditions has caused a decline in the vegetation period up to and below 90 days. Those regions include Dobrudzha and the south regions of northwest Bulgaria. The data from the phenological observations suggests that plants vegetation gets ahead of its normal course with 7-15days in the different climate regions, which without a doubt, proves that the climate has warmed during the last 30 years. The rise of temperature and diminution of rain has greatly affected even the pathogenic composition attacking the crops, sunflower included. Climate change is one of the biggest threats. Plant reactions to stress are increasingly the subject of research, especially if there are several stressors. As climate change intensifies, droughts become longer and longer, and this affects agriculture and, consequently, human food. The breeding programs of DZI - General Toshevo are include to create drought-resistant sunflower hybrids. The purpose of this study is to observe the response of the conventional sunflower hybrid "Krasela" in the particularly dry year 2020 and moderately dry year - 2019, which is a major issue for overcoming the effects of climate change. Hybrid "Krasela" was created in DZI - Gen. Toshevo. The indicators "seed yield", "oil yield" compared to the corresponding standard during the two years of testing were monitored.

MATERIAL AND METHOD

The investigation was carried out in artificial fields of in regions with different climatic conditions in Bulgaria – Selanovci, Brashljin, Radnevo during 2019-2020. These two years are characterized by great drought and very little rainfall. Hybrid "Krasela" was created in DZI - Gen. Toshevo (Fig.1). The indicators "seed yield", "oil yield" compared to the corresponding standard during the two years of testing were monitored.

RESULTS

It is a fact that climate change has direct effects on the plant productivity. Tables 1 and 2 show the results of the seed yield for the two years during which the rainfall is very low and insufficient for the vegetative period (Table 5). During the two drought years, the hybrid Krasela did not show its maximum productive potential, but still gave a steady yield of 320-413 kg. this hybrid can be offered to farmers in dry years such as 2019 and 2020.

The oil content in the seeds of the Krasela hybrid is not affected by drought conditions. This is shown in Tables 3 and 4. For both years the oil content in the seeds is 45.6% and 47.6%. The excess over the average standard is 6.6% for the two years.

In addition to productive indicators, breeders must also create disease- and parasite-resistant varieties and hybrids. Climate change also affects the race composition of pathogens. Plant pathologists have always considered environmental influences in their studies of plant diseases: the classic disease triangle emphasizes on the interactions between plant hosts, pathogens and the environment.

The Krasela hybrid is resistant to the Orobanche - race H. This is the only Bulgarian hybrid resistant to this race and can grow to areas that are highly infected with the Orobanche pathogen. Radnevo is a region in Bulgaria where the soils are most infected with the most aggressive races Orobanche. These data show that even in drought the hybrid has given stable yields close to the standarts.

CONCLUSION

Climate changes mostly affect agricultural production. Research on the climate change impact on plant disease has led to a new aim: to create a drought-resistant sunflower, highly productive hybrid with genes that control diseases, conducive to high temperatures and low soil moisture.

The Krasela hybrid is a conventional hybrid. It has a stable yield during the dry years and the content the oil in the seeds is 47%. It is resistant to Orobanche race H.

This year, seed production has been done on an area of 50 da and we will be able to offer farmers seeds for sowing.

Table 1. Seed yield kg/da- 2019

Hybrid	Selanovci		Brashljin		Radnevo		Average	
	kg/da	%	kg/da	%	kg/da	%	kg/da	%
Standard (NK, Brn+Lc:562)	485	100.0	425	100.0	357	100.0	423	100.0
NK Brn	482	99.4	473	111.3	389	109.0	448	106.0
Lc:562	488	100.6	278	65.0	325	91.0	397	94.0
Krasela	483	99.8	441	103.6	376	105.0	413	97.8
SE	10	2.1	10	2.4	10	2.8	10	2.4
CV	2.1	0.4	2.4	0.6	2.8	0.8	2.4	0.6
DF	100	20.0	100	24.0	100	28.0	100	24.0

Table 2. Seed yield kg/da- 2020

Hybrid	Selanovci		Brashljin		Radnevo		Average	
	kg/da	%	kg/da	%	kg/da	%	kg/da	%
Standard (NK, Brn+Lc:562)	392	100.0	345	100.0	302	100.0	343	100.0
NK Brn	383	97.8	391	107.1	257	85.0	343	97.0
Lc:562	401	102.3	339	98.0	248	82.0	342	99.7
Krasela	383	97.8	353	101.0	246	81.2	330	96.0
SE	10	2.6	10	2.9	10	3.3	10	2.9
CV	2.6	0.7	2.9	0.8	3.3	1.1	2.9	0.8
DF	100	25.0	100	27.0	100	26.0	100	26.0

Table 3. Oil content, % - 2019

Hybrid	Selanovci		Brashljin		Radnevo		Average	
	%	SE	%	SE	%	SE	%	SE
Standard (NK, Brn+Lc:562)	44.0	0.20	44.0	0.20	44.0	0.20	44.0	0.20
Krasela	45.6	0.20	45.6	0.20	45.6	0.20	45.6	0.20
SE	0.20	0.05	0.20	0.05	0.20	0.05	0.20	0.05
CV	0.45	0.05	0.45	0.05	0.45	0.05	0.45	0.05
DF	100	25.0	100	25.0	100	25.0	100	25.0

Table 4. Oil content, % - 2020

Hybrid	Selanovci		Brashljin		Radnevo		Average	
	%	SE	%	SE	%	SE	%	SE
Standard (NK, Brn+Lc:562)	45.0	0.20	45.0	0.20	45.0	0.20	45.0	0.20
Krasela	47.6	0.20	47.6	0.20	47.6	0.20	47.6	0.20
SE	0.20	0.05	0.20	0.05	0.20	0.05	0.20	0.05
CV	0.45	0.05	0.45	0.05	0.45	0.05	0.45	0.05
DF	100	25.0	100	25.0	100	25.0	100	25.0

Table 5. Climatic characteristics for 2019 and 2020 for the period March - September

Month	Year	Place	precipitation, mm/m
March-September	2019	Selanovci	233.4
		Brashljin	279.2
		Radnevo	263.6
Average			264.7
March-September	2020	Selanovci	319.6
		Brashljin	252.2
		Radnevo	209.3
Average			260.0

Fig.1 Hybrid "Krasela"

