



**PROCEEDINGS OF
5TH INTERNATIONAL SYMPOSIUM
ON BROOMRAPE IN SUNFLOWER**

1-3 NOVEMBER, 2023

ANTALYA, TURKEY

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**Organized by
Trakya University
International Sunflower Association
International Researchers Association**

**ISBN #:
978-625-00-1676-3**

WELCOME NOTES

The parasitic angiosperm broomrape (*Orobanche cumana* Wallr) causes economic damage in sunflower production in a number of countries around the world, but especially in Central and Eastern Europe, Spain, Turkey, Israel, Iran, Kazakhstan, and China. For almost a century, there has been a constant tug-of-war between sunflower breeders and *Orobanche cumana*, with frequent changes in which side has the upper hand. Almost as soon as the breeders find a source of resistance to the latest race of the pathogen, broomrape responds by evolving into another virulent race. The development of resistant cultivars as well as optimized managing strategies is a high priority in controlling this parasite, over the world.

This is the 5th specific symposium on broomrape in sunflower, after those held in Turkey in 2008, Moldova in 2011, Spain in 2014 and Romania, in 2018.

The symposium is organized by Trakya University and International Researchers Association in cooperation with the International Sunflower Association (ISA). The symposium will be held in Megasaray Westbeach Hotel, Antalya, Turkey, on November 1-3, 2023. The symposium covers all aspects related to broomrape parasitisms in sunflower, including parasite biology, physiology, parasite-host interaction, the racial status of broomrape, genetic resistance, molecular breeding, chemical control using herbicide-tolerant, and integrated management.

The symposium gathered sunflower scientists from around the world, and present their recent achievements. The organizers also invited relevant stakeholders to provide a view on the broomrape situation around the world as well as prospects to overcome the limitation for sunflower production, imposed by this parasitic weed.

There are 18 oral presentations and 8 poster presentations. There will be 146 participants from 18 countries from the world.

We would like to thank all of you for joining this conference and we would like to give also special thanks to our sponsors and collaborators for giving us a big support to organize this event.

Prof Dr Yalcin KAYA
Head of the Organizing Committee

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Dr Mehmet DEMİRCİ	IRSA, TURKEY

INVITED SPEAKERS

Dr Leonardo VELASCO	Broomprae resistance from wild species
Dr. Dragana MILADINOVIĆ	Broomprae resistance utilizing genomic tools
Dr Mehmet DEMİRCİ	CLEARFIELD control Broomrape and weeds.

EDITOR OF THE PROCEEDINGS ABSTRACT BOOK

Prof Dr Yalcin KAYA, Assoc Prof Dr Necmi BESER

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**CLIMATE-RESPONSIVE APPROACHES FOR BUILDING DURABLE
RESISTANCE OF SUNFLOWER TO BROOMRAPE IN EVOLVING
ENVIRONMENTAL CONDITIONS**

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ABSTRACT

The presence of various biotypes of broomrape (*Orobanche cumana* Wallr.), each differing in their virulence towards sunflower (*Helianthus annuus* L.), has been widely documented. Highly virulent races of broomrape (F, G and H) have been observed in numerous sunflower cultivation regions. It is important to note that biotypes of *O. cumana* belonging to the same race can exhibit varying levels of virulence; for instance, race F from Spain may differ significantly from race F in Romania. In light of these variations, conducting systematic multi-environmental testing on available germplasm becomes crucial for identifying stable genetic sources of resistance. The IFVCNS has organized multi-environmental testing to evaluate its breeding material, identifying several resistance genes. Some resistance sources are governed by major genes, while others follow recessive inheritance or exhibit quantitative trait loci (QTL) resistance. Managing broomrape in sunflower production poses challenges due to the parasite's ability to adapt and overcome existing resistance mechanisms. Climate change is considered as a potential factor behind the rapid changes in the racial composition of the parasite. Although resistance to *O. cumana* is frequently breached, utilizing multiple resistance sources is crucial in combating the emergence of new races. While resistance based on a single gene can be easily transferred to elite breeding material and prove effective in the short term, achieving durable resistance necessitates the combination of different resistance genes from diverse sources, including both quantitative and qualitative modes of resistance. Consequently, the incorporation of multiple resistance genes into a single genotype has demonstrated improved resistance durability. Moreover, it is essential to ensure that these genes do not have adverse effects on other desired traits. By capitalizing on the strengths of durable resistance approach, the breeding team at IFVCNS has successfully developed sunflower hybrids with enhanced

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broomrape resistance and increased sustainability. These advances contribute to sunflower production systems' long-term success and stability, ultimately mitigating the challenges posed by broomrape and changing climatic conditions.

Acknowledgment: This work is supported by the Ministry of Education, Science and Technological Development of Republic of Serbia, grant number 451-03-68/2022-14/200032, by the Science Fund of the Republic of Serbia, through IDEAS project “Creating climate smart sunflower for future challenges” (SMARTSUN) grant number 7732457, by Center of Excellence for Innovations in Breeding of Climate-Resilient Crops - Climate Crops, Institute of Field and Vegetable Crops, Novi Sad, Serbia,, and the by the European Commission through Twinning Western Balkans project CROPINNO, grant number 101059784.

Key words: sunflower, broomrape races, genes, resistant hybrids, durability