Field Crop Studies (2018) XI(1): 211-216
http://fcs.dai-gt.org/bg/
ISSN: 2535-1133 (Online)
ISSN: 1312-3882 (Print)

ORIGINAL PAPER

Identifying of sunflower genotype resistant/tolerant to races of broomrape present in Braila area, Romania

Florin Gabriel Anton[2] • Maria Păcureanu Joiţa[1] • Luxiţa Rîşnoveanu[3,4] • Elisabeta Sava[5]

[1]National Agricultural Research and Development Institute, Fundulea, 1 Nicolae Titulescu, Fundulea, Calarasi County, Romania
[2]Faculty of Biotehnology, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăşti Blvd, District 1, Bucharest, Romania
[3]Agricultural Research Development Station Braila, Viziru km. 9 street, Braila, Braila County, Romania
[4]„Dunarea de Jos" University of Galati, Engineering and Agronomy Faculty of Braila-Agronomy Center for Research and Consultancy and Environment „Lunca", 29 Calarasi, Braila, Braila County, Romania,
[5]The State Institute for Variety Testing and Registration, Bucharest, Romania

Corresponding Autor: Florin Gabriel Anton; E-mail: gabi22mai@yahoo.com

Received: October 2018 / Accepted: October 2018 /

Published: December 2018

Abstract

Anton, F.G., Păcureanu-Joiţa, M., Rîşnoveanu, L. & Sava, E.. (2018). Identifying of sunflower genotype resistant/tolerant to races of broomrape present in Braila area, Romania. Field Crops Studies, XI(2), 211-216.

It's very dificult to control the parasite broomrape who is present in sunflower crop in south–east of Romania with the most virulent races. Races of broomrape (*Orobanche cumana* Wallr) is changes virulence from one year to another and that causes problems to sunflower breeder in created new hybryds who metained the resistance/tolerance. For identifying the new genotype of sunflower resistant more than races F (G, H, I....), we tested many sunflower genotypes in artificial condition at Fundulea in years 2017 and 2018 from area Braila infested with broomrape, colected in years 2016 and 2017. Two genotype of sunflower with free polination and one interspecific population derived from crosses of *Helianthus maximilianis* with cultivated sunflower from NARDI Fundulea, was resistant to all races of broomrape present in area Braila in both years. Throuht finding new resources for resitance to broomrape, help us to increase the genetic variability of sunflower and to obtained simple hybrids with hygh seed yield and oil content.

Key words: Races, Sunflower, Broomrape, Resistance, Genotypes

Introduction

Sunflower is the crop third in importance after wheat and maize in Romanian agriculture and is cultivated on one milion hectares. Broomrape is present in the south, south-east and east of Romania, but the most virulent races are in Braila county, folowed by Tulcea county and Constanta county (Joiţa-Păcureanu, 2014; Risnoveanu et al., 2016; Anton et al., 2018). The countries situated around the Black Sea have presence of broomrape races G and H (Makliak et al., 2018; Encheva, 2018; Guchetl et al., 2018; Kaya et al., 2018).

Materials and methods

Our experiments were carried out in two years, 2017 and 2018, under the artificial infection conditions, with broomrape seeds, which were collected from fields infested with broomrape in Braila area, during 2016 and 2017 years.

We evaluating 6 populations, derived from crosses of the wild perennial species *Helianthus maximiliani* with cultivated sunflower and 3 genotype of sunflower with free pollination.

The experiments under artificial infestation conditions were carried out in the green house, using some pots of 10 l capacity, with a mixture of soil and sand (50% each) as well as broomrape seeds (2 g/pot). The broomrape attack was observed on the sunflower plants roots, taking out the plants from soil, 40 days after the sunflower emergence, in the pots also, at flowering stage (Figure 1).

Figure 1. Greenhouse, Fundulea 2017 and 2018

ISSN: 2535-1133 (Online)
ISSN: 1312-3882 (Print)

Results

At NARDI Fundulea 6 interspecific population of sunflower were obtained, which were derived from crosses of the wild perrennial specie *Helianthus maximiliani* and cultivated sunflower and 5 genotype of sunflower with free polination collected from Fundulea area.

In Table 1 we present phenotypic data of interspecific population and of genotype with free pollination, which we tested for resistance to broomrape under artificial conditions.

Table 1. Agronomic traits of genotype of sunflower studied

No.	Interspecific hybrid / genotype with free polination	Height of plants (cm)	Head diameter (cm)	Seed yield/ plant (g)	Branching/ Non branching
Pop3	ANT10B x *H. maximiliani*	171cm	22 cm	27.47g	non branching
Pop7	ANT68C x *H. maximiliani*	130 cm	11 cm	12.69g	branching
Pop 11	ANT85C x *H. maximiliani*	144 cm	22 cm	55.86g	non branching
Pop 15	ANT95C x *H. maximiliani*	119 cm	13 cm	14.02g	branching
Pop 19	ANT98C x *H. maximiliani*	142 cm	10 cm	4.71g	branching anthocianin coloration
Pop 23	ANT99C x *H. maximiliani*	104 cm	15 cm	0.29g	branching anthocianin coloration
PL12	genotype with free pollination	130 cm	11 cm	16 g	non branching
PL17	genotype with free pollination	175 cm	8 cm	17 g	branching
PL21	genotype with free pollination	145 cm	7 cm	15 g	branching

In Figures 2 and 3 we present data of sunflower genotypes tested for resistance to broomrape during 2017 and 2018 collected from populations in 2016 and 2017 from Braila area.

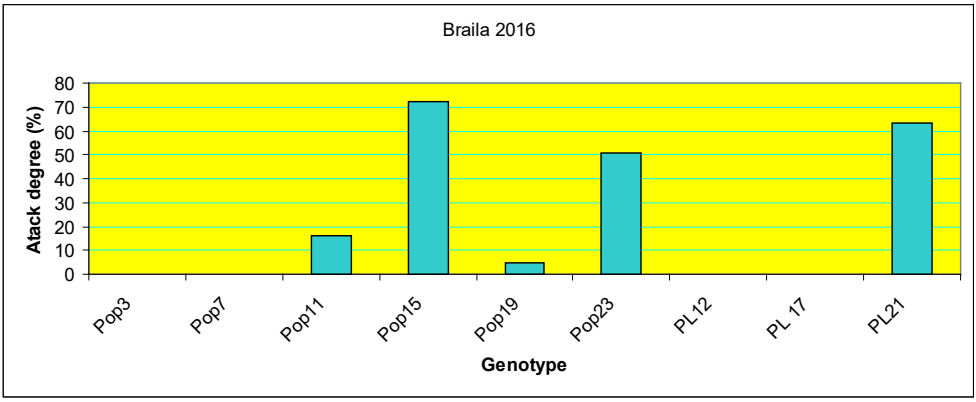

Figure 2. Attacking rate of *Orobanche cumana,* on sunflower genotypes tested in 2017 under artificial conditions (population of broomrape from Braila area in2016)

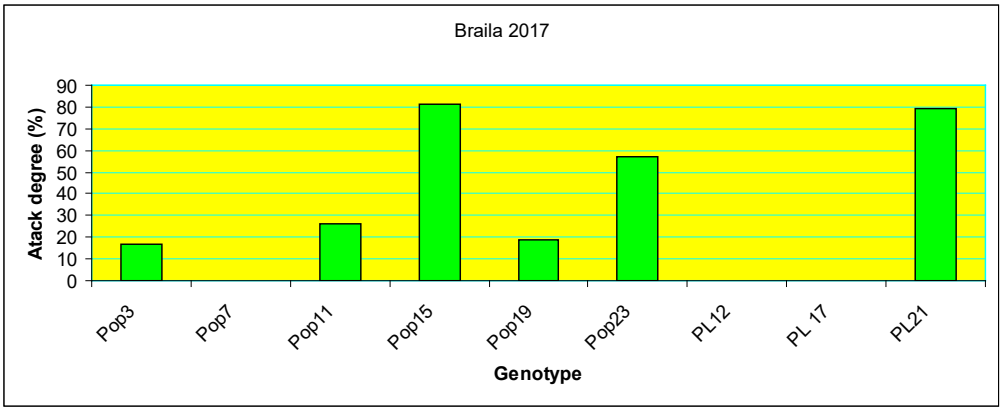

Figure 3. Attacking rate of *Orobanche cumana* on sunflower genotypes tested in 2018 under artificial conditions (population of broomrape from Braila area in 2017)

The broomrape attack was read 40 days after sunflower emergence and at flowering stage. In the case of the broomrape population from Braila area in 2016, the results of the experiment showed that two interspecific populations of sunflower (Pop 3 and Pop 7) and two genotypes with free pollination (PL12, PL17) were resistant. Some interspecific populations of sunflower had broomrape attached to the root (Pop 11, Pop 15, Pop 19 and Pop 23).

The situation changed in the case of the broomrape population from Braila area in 2017 when only one interspecific population of sunflower (Pop 7) and also two genotype of sunflower with free polination ((PL12, PL17) were resistant (Figure 4).

ISSN: 2535-1133 (Online)
ISSN: 1312-3882 (Print)

Figure 4. Resistant and susceptible genotypes to broomrape attack

Conclusions

One interspecific population of sunflower (Pop 7) derived from crosses of wild perennial species *Helianthus maximiliani* with cultivated sunflower had a good resistance to broomrape attack in both years tested (2017 and 2018).

The attack of broomrape in 2017 in Braila area was more virulent than in 2016. In Braila area race H or higher was present, and genotypes Pop 7, PL12, Pl17 can be used as sources for resistance to *Orobanche Cumana* to race H in the sunflower breeding program.

References

Joiţa-Păcureanu, M. (2014). Current situation of sunflower broomrape in Romania. In: Proc. 3rd Int. Symp. on Broomrape (*Orobanche* spp.) in Sunflower, Córdoba, Spain. Int. Sunflower Assoc., Paris, France, 39-43.

Anton, F.G., Joiţa-Păcureanu, M., Rîşnoveanu, L., Bran, A. & Sava, E. (2018). Using wild sunflower to improve resistance of cultivated species to the parasite broomrape (*Orobanche cumana* Wallr.) In: Abstract book of 4th Int. Symp. on Broomrape (*Orobanche* spp.) in Sunflower, Bucharest, Romania, 89.

Risnoveanu, L., Joita-Pacureanu, M. & Anton, F.G. (2016). The Virulence of broomrape (Orobanche cumana Wallr.) in Sunflower Crop in Braila Area, in Romania, Helia, Vol. 65, 189-196.

Makliak, E., Kyrychenko, V. & Joiţa-Păcureanu, M., (2018). Race composition and phenology of sunflower broomrape *(Orobanche Cumana* Wallr.) in Ukraine. In: Abstract book of 4th Int. Symp. on Broomrape (*Orobanche* spp.) in Sunflower, Bucharest, Romania, 47.

Encheva,V. (2018). Distribution and race composition of broomrape (*Orobanche cumana* Wallr.) In Bulgaria during 2008-2017. In: Abstract book of 4th Int. Symp. on Broomrape (*Orobanche* spp.) in Sunflower, Bucharest, Romania, 37.

Guchetl, S., Antonova, T., Araslanova, N. & Tchelyustnikova, T. (2018). Sunflower resistance to race G of broomrape: The development of the lines and the study of inheritance. In: Abstract book of 4th Int. Symp. on Broomrape (*Orobanche* spp.) in Sunflower, Bucharest, Romania, 83.

Kaya, Y. & Beşer, N. (2018). IMI herbicide resistance studies in sunflower in Turkey. In: Abstract book of 4th Int. Symp. on Broomrape (*Orobanche* spp.) in Sunflower, Bucharest, Romania. p.107.