

## The 4<sup>th</sup> International Symposium on Sunflower Broomrape, Bucharest, 2-4 July 2018



# **INHERITANCE OF RESISTANCE TO BROOMRAPE IN SUNFLOWER INBRED LINE LIV-17**

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# DISTRIBUTION

- eight races (A – H) have been reported thus far
- five known races A, B, C, D, E
- appearance of new races F, G, H....
- populations of *O. cumana* from different countries classified under the same race can vary in their level of virulence towards differential lines



# RESISTANCE

- resistance is controlled by *Or* genes
- resistance to broomrape is in most cases vertical, *i.e.* complete, race specific and controlled by single dominant genes
- five single dominant genes ( $Or_1$ ,  $Or_2$ ,  $Or_3$ ,  $Or_4$  and  $Or_5$ ) for resistance to five races (A-E) of broomrape and set five sunflower differential lines
- resistance to race F - various modes of inheritance were reported (single dominant gene  $Or_6$ , two recessive genes or two partially dominant genes)- added differential lines LC1093 and P96
- preliminary studies for races over F - objectives



# SOURCES OF RESISTANCE

- were mostly found in certain wild species and incorporated into cultivated sunflower genotypes by interspecific hybridization



**IFVC large wild sunflower collection: 447 populations of 21 perennial and 7 annual species of the genus *Helianthus***

# INBRED LINES IN GENE BANK (over 7000)



Testing is performed in Serbia (E) in the greenhouse and field conditions

**LIV 1-20**

originate from population developed from interspecies hybridization with *Helianthus tuberosus*

# SCREENING

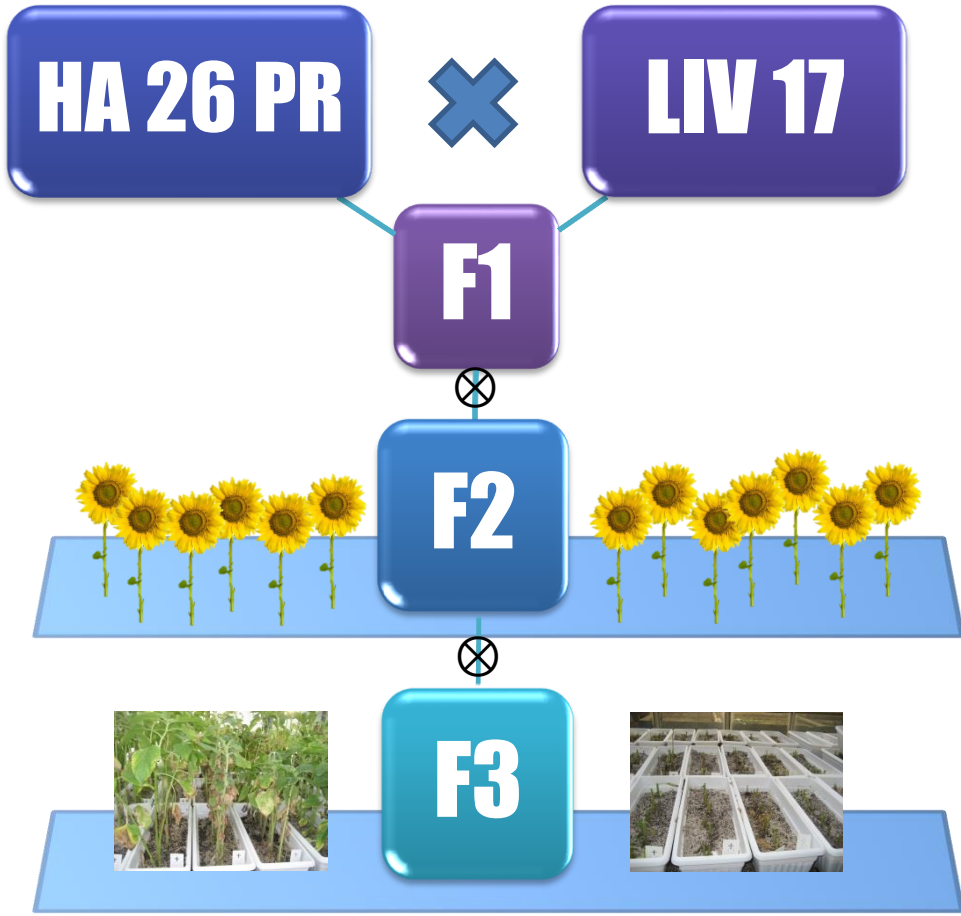


The screening procedure for resistance to broomrape was carried out in field trials during the 2012-2013 periods.





# GENETIC STUDY



naturally infested field

greenhouse



# METHODOLOGY

## Field trials

Parental lines,  $F_1$  plants, as well as 120 plants of the  $F_2$  population were grown in the naturally infested field.

Resistant (R) when no broomrape stalk was found on sunflower plants.

Susceptible (S) when least one broomrape stalk is present on sunflower plant.



# METHODOLOGY

## Greenhouse test

$F_3$  plants obtained by selfing of  $F_2$  plants grown on the infested field  
1 Pot - 10 plants of each  $F_2$  plant.

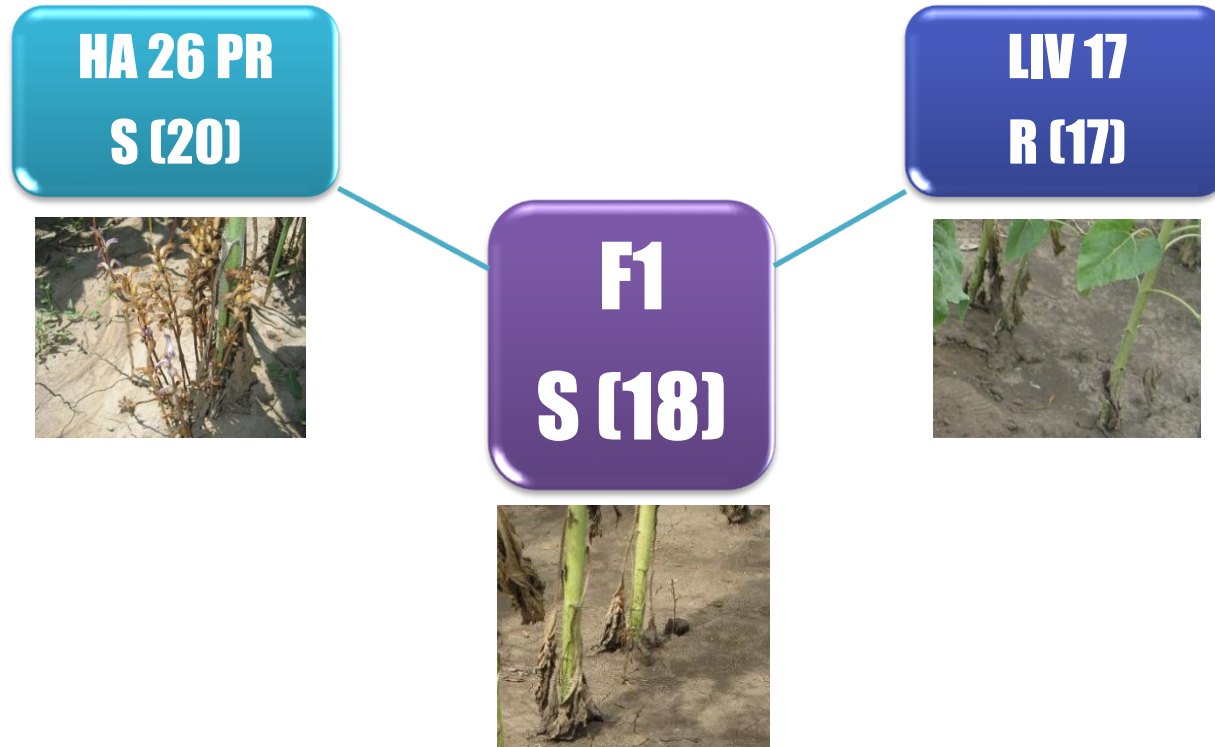
Pots filled with substrate containing seeds of broomrape collected from infested field. Duration of test is 7-8 weeks after sunflower sowing.

Resistant (R) - no broomrape nodules or stalk was found within the complete pot.

Susceptible (S) - plants were infested (even one broomrape nodule or/and stalk per plant).



# Broomrape resistance in F<sub>1</sub>



**RECESSIVE INHERTANCE**

# Segregation of broomrape resistance

HA-26-PR x LIV-17

F2 (99)

R (26) : S (73)



1:3

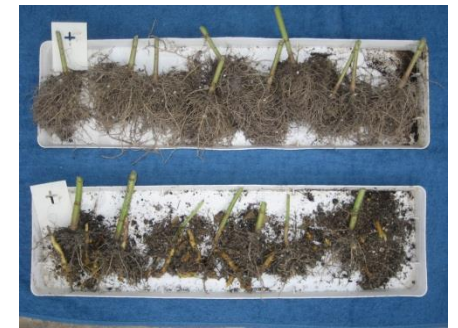


F3 (89)

R (26) : S<sub>heterozygotus</sub> (46) : S<sub>homozygotus</sub> (17)

1:2:1

SINGLE RECESSIVE GENE



# Conclusion

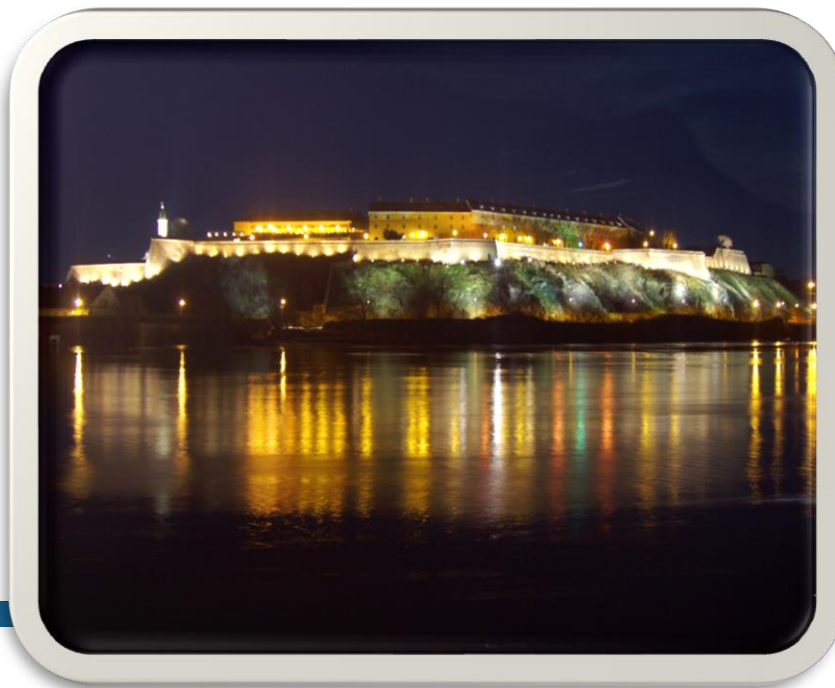
- Results pointed out that line LIV17 had a resistant reaction to highly virulent races of broomrape when gene was present in homozygous recessive condition.
- The present information will be further clarified using molecular markers in identifying *Or* gene.
- From the breeding perspective, recessive nature highlights the necessity to introduce resistance gene into both parental lines in order to obtain resistant hybrids.

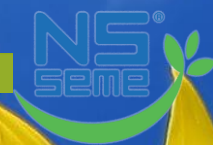
## Acknowledgements

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**International Sunflower Association and NS Institute are inviting you to  
20th International Sunflower Conference in Novi Sad, Serbia, 2020.**





**Thank you for your attention!**

**Vă mulțumim pentru atenție!**

