SUNFLOWER INOCULATION BY SOME PARASITIC FUNGI

M. Aćimović
Faculty of Agriculture, Institute of Field and Vegetable Crops,
21000 Novi Sad, Yugoslavia

Summary

Different methods for sunflower inoculation by pathogenic fungi were studied in the field. The fungi included in the study were: *Alternaria helianthicola, Alternaria helianthinficiens, Phomopsis helianthi, Macrophomina phaseoli and Sclerotinia sclerotiorum.*

The fungi were cultured on the sterilized seeds of sunflower, oil rape, soybean, pea, bean, hemp, wheat, oat, barley, sorghum and maize, which were used for the inoculation of sunflower stem.

The most suitable for the inoculation were the seeds of small size (oil rape, oats, barley, sorghum and hemp), which remained compact after the sterilization and fungus development.

The plants inoculated in the period of their development, i.e., from the middle of budding to full flowering, gave the best results of infection.

Introduction

Numerous parasitic fungi attack sunflower plant in the course of vegetation period. Sunflower plants are infected by mycelia, conidia and ascospores.

The plant infection is always successful under the field condition. However, the inoculation of plants by some fungi is not always equally successful in greenhouse and in field. The objective of the investigation discussed in this paper was to study the success of the infection of sunflower inoculated by well-known and economically significant fungi, under the field conditions.

Material and Methods

Six fungi, *Alternaria helianthi, Alternaria helianthicola, Alternaria helianthinficiens, Phomopsis halianthi, Macrophomina phaseoli and Sclerotinia sclerotiorum,* were isolated from the infected parts of sunflower grown in Vojvodina Province (North-East part of Yugoslavia). The fungi were cultured on seeds of sunflower (*Helianthus annuus*), maize (*Zea mays*), sorghum (*Sorghum halepense*), wheat (*Triticum vulgare)*, barley (*Hotdeum vulgare)*, oats (*Avena sativa)*, bean (*Phaseolus vulgaris)*, pea (*Pisum sativum*), soybean (*Glycine max*), oil rape (*Brassica oleracea)* and hemp (*Cannabis sativa).*

The mycelia developed well on the sterilized seeds. Seven to ten days after sowing, the seeds were covered by the mycelia (Figures 1 and 2).

At the beginning of flowering, the sunflower plants (NS-H-26-RM) were inoculated by 10-day old culture of the studied fungi. The sunflower stems were injured with the awl and one seed with mycelium was inserted per one stem with nippers. Ten plants were inoculated by each fungus.

For ten days, the number of infected plants was inspected on each inoculated combination. All inoculated plants were inspected for the disease manifestation. Stem dissection was done after 5 and 10 days, to observe fungi spreading in sunflower tissue.

Results

Observing the development of six fungi on sterilized seeds of 11 crops and their application for sunflower plant inoculation in field, several conclusions were made. All six tested fungi developed well on all 11 crop seeds and under optimum temperatures. As such, the fungi were suitable for sunflower inoculation. The infection was successfully performed with all 11 tested inocula, since it was 100% effective. Nevertheless, we found that some difficulties exist with respect to seed size and its compactness. When using the seeds of larger size the stem injury have to be bigger what makes difficult the inoculation. The soft seed coat split during the sterilization and the seed becomes loose and unsuitable for inoculation. Seed of maize, bean, pease, soybean, wheat and sunflower belong to this group of crops.

The seed of oats, barley, hemp, oil rape, sorghum and sunflower which has small seeds, are suitable for the inoculation.

Discussion

The appplication of different inoculation methods is not always satisfactory at extensive plant breeding programs for the resistance to important pathogens. According to our opinion, the method we applied gives fast and certain results. This method is most appropriate for breeding program on sunflower genotypes resistant to economically significant sunflower parasites such as *Alternaria helianthi, Alternaria helianthinficiens, Phomopsis helianthi, Sc.sclerotiorum* (Aćimović, 1962, 1969, 1978; Aćimović, Štraser, 1981; Aćimović, Lačok, 1991).

The method used in our study gives results better than the tooth pick method.

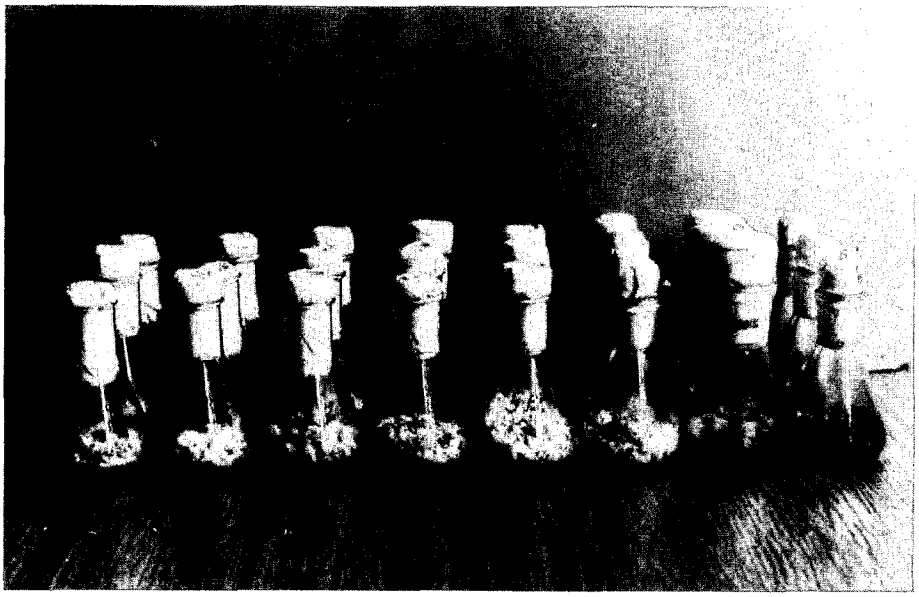

Fig. 1 *Phomopsis helianthi* fungus mycelium on sterilized seeds of various crops

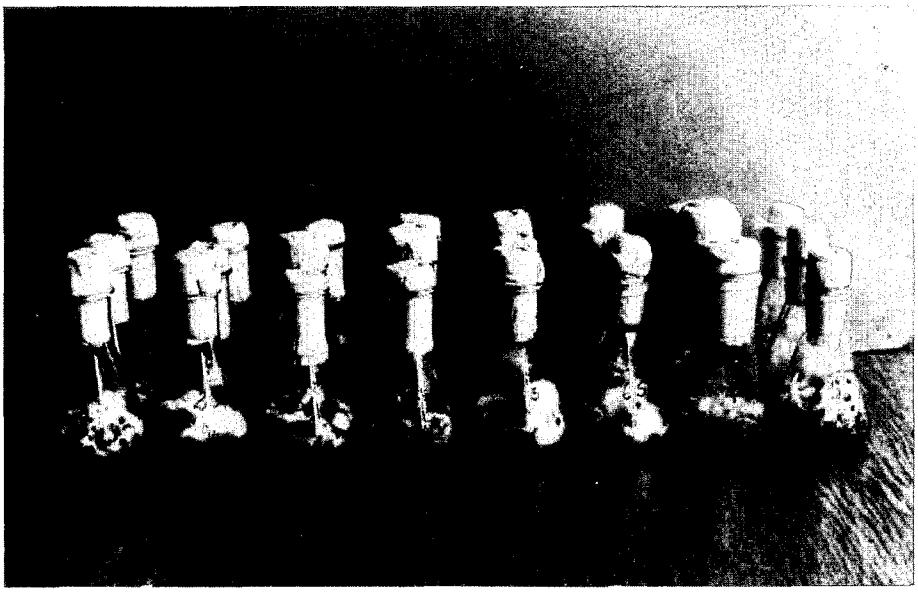

Fig. 2 *Sclerotinia sclerotiorum* fungus on sterilized seeds of various crops

Conclusion

We studied different methods of sunflower inoculation in field by pathogenic fungi *Alternaria helianthicola, Alternaria helianthinficiens, Phomopsis helianthi, Macrophomina phaseoli and Sclerotinia sclerotiorum.*

The fungi were cultured on the sterilized seeds of sunflower, oil rape, soybean, pea, bean, hemp, wheat, oat, barley, sorghum and maize.

The most suitable for the inoculation were seeds of small size (oil rape, oats, barley, sorghum and hemp), which remained compact after the sterilization and fungus development.

The plants inoculated in the period of their development, from the middle of budding to full flowering gave the best results of infection.

References

Aćimović, M., (1962): Sclerotium bataticola Taub., kao uzročnik uvelosti suncokreta u Vojvodini. Zaštita bilja, br. 69-70, 125-138.

Aćimović, M., (1969): Alternaria sp. - novi parazit suncokreta u Jugoslaviji. Zaštita bilja, br. 106, 305-309.

Aćimović, M., (1978): Problem of Sclerotinia sclerotiorum (Lib.) debary in Sunflower Production, 3rd International Congress of Plant pathology 125 (Summary).

Aćimović, M., Štraser, Nada., (1981): Phomopsis sp. - a new parasite in sunflower. Helia 4:43-58.

Aćimović, M., Lačok, Nada, (1991): Alternaria helianthinficiens Simmons, Wolcz. and R. Roberts sp. nov., the causal agent of brown - red spot, a new sunflower disease. Helia 14:129-144.