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Studies on the Efficiency of Some Fungicide at Two-Row Spring Barley for Fighting Against Spot Blotch (*Cochliobolus sativus* Ito and Kurib) in the North-West Suceava Plateau

[1]Ioan Gontariu and [2]Ioan Catalin Enea
[1]Faculty of Food Engineering, Stefan Cel Mare University,
Street Universitatii No. 13, 720229 Suceava, Romania
[2]Agricultural Research and Development Station of Suceava,
B-dul 1 Decembrie 1918, No. 15, 720246 Suceava, Romania

Abstract: Fungus infects young leaves by direct penetration into epidermis or through stomata. *C. sativus* produces distinct elongate brown-black lesions (spot-blotch) that rarely >1 cm in length. The blotchy lesions contrast sharply with green or leaf tissue. Primary infections occur on coleoptiles, primary roots and subcrown internodes. Secondary conidia develop on the above-ground parts of plant. They disperse by wind and initiate lesions on leaves and culms. The circulation of *Cochliobolus sativus* fungus is realized through seed and soil as well the attack manifesting on the young plants and also during the whole period of vegetation. The efficiency of some fungicides applied to seed and during vegetation was tested. In order to control this patogen, two treatments were applied. From the researches made by RSDS Suceava for a longer period of time, researchers found out that the grain losses are almost 14% from the total production if there are not made any seed treatments and of minimum 16% if there are not applied two foliar treatments in the vegetation.

Key words: Symptoms, pathogenity, treatment, fungicide, seed, vegetation

INTRODUCTION

Leaf symptoms are obvious after heading and most frequent on lower leaves. After penetration the mycelia grow in the leaf tissues as inter- and intra-cellular infection. Mycelium is deep olive-brown, septated. Conidiophores emerge through stomata, less frequently directly between epidermal cells. Conidiophores are deep olive-brown, erect, single or clustered, 50.150×6.0.8.5 m septate. Conidia are deep olive or olive-brown, ovate to oblong, erect or slightly curved, 30-134×12.30 m with 2.13 septate. They germinate by two polar cells. The perfect stage is rarely found. Pseudothecia are dark-brown, bottle-shaped or globose, 300.400 m in diameter. Asci are numerous, spindle-shaped or cylindrical with a short peduncle, 110.220×32.45 m contain 1.8 (more often 4.8) ascospores (Bhandari *et al*., 2003).

Ascospores filamentous and spirally flexed within asci, 6.14 septate, hyaline or slightly yellowish, 160.360×6.0-9.0 m fungus persists in abundance as mycelium and conidia principally. In the Summer period, the fungus develops in conidia stage. Optimum temperature for the fungus growth is 27.28°C, minimal 10°C, maximal 29°C, optimum for conidia formation is 16.25°C light accelerates conidia formation. Mycelium and conidia survive at temperature 32.33°C. Optimum humidity ratio of a substratum for the fungus development is 60-80%; optimum pH is 6-7. The maximal infection of overground plant organs occurs at temperature >15°C and relative humidity of air 95-97%. *C. sativus* overwinters as mycelium and conidia on plant debris and on grain. In conditions of a droughty climate *C. sativus* conidia are kept in ground to 5 years (Tupenevich,1970). Grain yield losses due to the spot blotch reach 24-27% in highly susceptible cultivars (disease severity is 80% and higher).

The loss of grain yield of the resistant cultivar reaches 3.4% and those of the most susceptible ones reaches 25.6% (Khasanov, 1992). When a target trait consists of several ccomponents or is associated with multiple traits, it is necessary to determine wich components are most useful for indirect selection. In this multi-trait selection, it is necessary to identify the genetical control of different trait and procedures to combine them together (Chahal and Gosal, 2002). To improve a complex trait through multi-traits selection, the response to single trait selection may then be associated with so-called correlated responses to selection with regard to other traits (Bos and Cagliari, 1995). In Romania,

Corresponding Author: Ioan Gontariu, Faculty of Food Engineering, Stefan Cel Mare University, Street Universitatii No. 13, 720229 Suceava, Romania

the spot blotch succeeded to keep up at a low level towards other countries from Europe and America where there have been significant crop losses. In the last years, in the area belonging to the Research Development Station Suceava (RSDS) were discovered powerful attacks of spot blotch which dominates the foliar diseases and the classical pathogens (*Pyrenophora gramineea* Rabh Ito and Kurib and *P. Teres* (Sacc, Drechs) which produce the tearing of the leaves, respectively the reticulated spotting are less and less present and they affect in a smaller measure the production of these cultures. Even if lately there were created new cultivars of Spring barley with a high potential of production, still the complex of the foliar diseases succeeds to produce important losses to the farmers every year.

MATERIALS AND METHODS

In the years, 2008-2010 at R.S.D.S. Suceava there was investigated the efficiency of some fungicide which were applied to the seed and in the vegetation for fighting foliar diseases and especially for fighting against spot blotch. The experiences were made in randomized blocks with three repetitions, the surface of a lot being 10 m^2. During the vegetation period, there was investigated the symptoms produced by the pathogen in different stages of vegetation, the degree of attack produced by *Cochliobolus sativus*, the evolution of the foliar disease and for the harvesting, it was calculated the grains production; Cultivated cultivar-Maria.

Under the aspect of the rainfall, the year 2008 was the most humid year, the excess of rainfall in comparison with the multi-annual average being ranged between 87 L m^{-2} in April and culminated with 213 L m^{-2} in July. The year 2009 was a normal year from the climatic point of view, the deviations towards the multi-annual averages to temperature and rainfall as well varying in very small limits. In exchange in 2010, the rainfall quantity from Spring and Summer are kept in high limits by culminating in July with 71.5 L m^{-2} towards the multi-annual average. The temperatures were kept in reasonable limits towards the multi-annual average being higher with 1-2°C towards this one (Table 1).

RESULTS AND DISCUSSION

The circulation of *Cochliobolus sativus* fungus is realized through seed and soil as well the attack manifesting on the young plants and also during the whole period of vegetation. The young plants are destroyed before coming out from the soil and those which were affected later are developed very difficult. The plants which survive will have a dark green color, erectile position and will present an excessive twinning. For adult plants, the attack is manifested on the leaves, glumes and grains. On the leaves then on the glumes appear circular or oval spots of brown color with well-defined margins and on the seeds in the embryo area appears a black dot. The fungus attacks the stalk's callus producing black-coffee spots which can afterwards become bigger. Because of these symptoms, the plant is seriously affected by producing major physiological unbalances that will produce the sibling's death, partial earing, sterility and grains degeneration and eventually to a significant decrease of the grain production.

The influence of the seed treatments on the pathogen: During the experimental years to the cultivars which were seed treated, the Spring was uniform by succeeding a good protection of the young plants in the 1st phase of vegetation, the pathogen attack being much more diminished. In exchange for the variant on which was not applied the seed treatment, the Spring was ununiform and later during the vegetation period, there were observed very clearly the symptoms of spot blotch by a late development and excessive twinning of a great number of plants.

If in the 1st stage from 2008 when was registered the 1st degree of attack, this one had decreased values including for the untreated variant in the 2nd stage, the pathogen evolved a lot, the most decreased degree of attack registering for the Nuprid (25.5%) treated variant and Cruiser 350 FS (25.8%). The highest production gain was registered for Amiral product with 500 kg ha^{-1} more than for the untreated variant (Fig. 1). The greatest attack was registered for the variant treated with Lamardor (28.0%) by obtaining at the same time, the

Table 1: Investigation of some fungicide factors

Experimental factors	Products	Active substance	Dose (l or kg ton^{-1})
Seed treatments	Amiral 3 FS	Tebuconazol 30 g L^{-1}	1.00
	Cruiser 350 FS	Tiametoxam 350 g L^{-1}	1.50
	Lamardor 400 FS	Proticonazol 250 g L^{-1}+tebuconazol 150 g L^{-1}	0.15
	Nuprid AL 600 FS	Imidacloprid 600 g L^{-1}	1.00
Vegetation treatments	Amistar Xtra 280 SC	Azoxistrobin 200 g L^{-1}+ciproconazol 80 g L^{-1}	0.75
	Acanto plus	Ciproconazol 80 g L^{-1}+ picoxistrobin 20 g L^{-1}	0.50
	Arteea 300 EC	Iproconazol 80 g L^{-1}+propiconazol 250 g L^{-1}	0.40
	Bravo 500 EC	Clorotalonil 500 g L^{-1}	1.70
	Alert	Flusilazol 125 g L^{-1}+carbendazim 250g L^{-1}	0.80

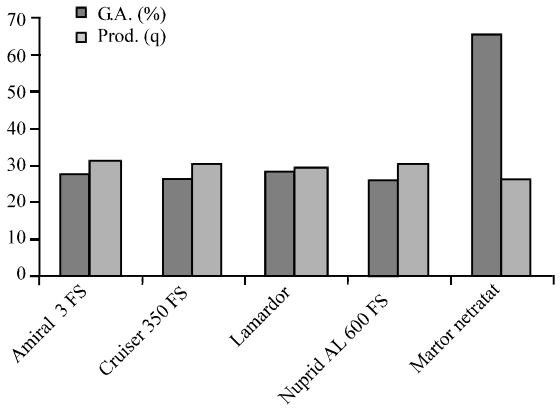

Fig. 1: The efficiency of some fungicide applied to the seed in order to prevent the *Cochliobolus sativus* attack for the Spring barley in 2008

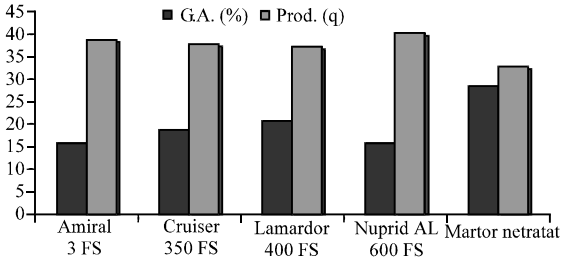

Fig. 2: The efficiency of some fungicide applied to the seed in order to prevent the *Cochliobolus sativus* attack for the Spring barley in 2009

smallest production (300 kg more towards the witness). In 2009, the pathogenic pressure was manifested with a more reduced intensity than in the former year so that the greatest attack was of 20.6% for the treated variant with Lamardor, the untreated witness having a value of the attack degree of 28.0% (Fig. 2).

The best production gain was registered for the Nuprid product (770 kg ha^{-1} more towards the witness) at a degree of attack of 15.5%. The variant treated with Lamardor remains the weakest variant with a production gain of 460 kg ha^{-1} towards the witness. In the year 2010, the greatest degree of attack was registered for the variant treated with Lamardor with 30.5% and with a production of 320 kg ha^{-1} towards the witness.

The influence of the foliar treatments over the pathogen: In the year 2008, the degree of attack owed because of the *Cochliobolus sativus* was ranged between 8.5 and 19.5% for the treated variants and for the untreated witness this one had values of until 45% (Fig. 3). The saved production was owed to the two treatments which were applied and is placed between 700 kg ha^{-1} for the inferior limit and 1760 kg ha^{-1} for the superior limit. The best

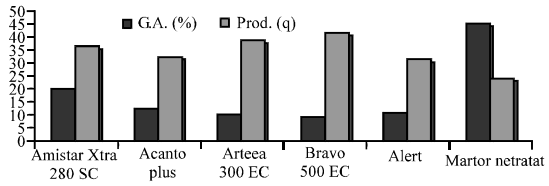

Fig. 3: The efficiency of some fungicides applied in the vegetation period in order to prevent the *Cochliobolus sativus* attack for the Spring barley in 2008

variant was when the treatment was made with Bravo 500 EC product with the mention that it was exceeded the producer recommended dose from 1.5-1.7 L ha^{-1}. Towards the untreated witness, the production was bigger with 1760 kg ha^{-1}. The variant with the weakest results was for the alert treatment where the production gain was with 1060 kg ha^{-1} smaller than the best variant. The other products brought production gains ranged between 800 and 1480 kg ha^{-1}.

In 2009, the pathogen exerted a more reduced pressure over the barley genotype, the degree of attack for the untreated witness being 21.5%, lower with 24% towards the former year. In this year, the production gain owed to the treatment was ranged between 950 and 1200 kg ha^{-1}. The best variant remains the same as in the former year, the variant treated with Bravo 500 EC and the variant with the smaller production gain was realized for Acanto plus product, respectively 450 kg ha^{-1} towards the witness. In 2010, the pressure exerted by the *Cochliobolus sativus* pathogen has determined an attack degree ranged between 9.5 and 21.6% for the treated variants and for the untreated witness was of 42%. The production gains were gained between 900 and 1200 kg ha^{-1}, the best variant being in this year that treated with Bravo 500 EC product and with a production gain towards the witness of 1160 kg ha^{-1}.

CONCLUSION

The pathogen can not be fought only by seed treatments being necessary to be applied two treatments for a maximum production gain because the present conditions in the soil produce secondary infections which in association with the classical foliar diseases could tight the production in a very high percentage. The most efficient seed treatment was with amiral product which under a bigger pathogenic pressure has obtained a very good production gain followed by Nuprid. In the vegetation, the most efficient treatments have proved those based on chlorothalonil (Bravo 500 EC) obtaining the biggest production gain followed closely by Arteea 300 EC.

REFERENCES

Bhandari, D., M.R. Bhatta, E. Duvellier and S.M. Shrestha, 2003. Foliar blight of wheat in Nepal: Resistance breeding, epidemiology and disease management. Proceedings of the 4th International Wheat Tan Spot and Spot Blotch Workshop, July 21-24, 2003, North Dakota State University, Fargo ND, USA., pp: 145-150.

Bos, I. and P. Cagliari, 1995. Selections Methods in Plant Breeding. Chapman Hall, UK.

Chahal, G.S. and S.S. Gosal, 2002. Principles and Procedures of Plant Breeding. Alpha Science, New-Delhi, India.

Khasanov, B.A., 1992. Keys to Fungi. Causal Agents Of Helminthosporium Diseases of *Bipolaris, Drechslera* and *Exserohilum* species. Fan Publ., Tashkent, pages: 243.

Tupenevich, S.M., 1970. Root Rot of Spring Wheat in Droughty Areas of North Kazakhstan and Steppe Areas of Western Siberia. In: Root Rot of Grain Cereals and Measures of Struggle Against them, Peresypkin, V.F. (Ed.). Kolos, Moscow University, Moscow, pp: 3-8.