SOME ASPECTS REGARDING CHARCOAL ROT (SCLEROTIUM BATATICOLA) ATTACK ON SUNFLOWER IN ROMANIA

Alina Ioniţă, H.Iliescu, V.Jinga
Research Institute for Plant Protection, 8, Ion Ionescu de la Brad, 71592 Bucharest, Romania

SUMMARY

It is shown the development of Sclerotium bataticola attack on sunflower in Romania, during the last 4 years, provided the cultivars, applied technology as well as the climatic conditions to be found mainly in the second half of vegetation. There are also rendered data about the possibilities to transmit the pathogen and its characteristics (pathogenity, virulence, agressiveness).
One mentions also some recommendations of prevention and control.

INTRODUCTION

Sunflower precocious maturity is a complex process including parasite and physiological causes. Among the parasite factors is Macrophomina phaseolina (Tassi) Goid. which in general attacks under its sterile form Sclerotium bataticola Tauben. Having a proper enzymatic charge Sclerotium bataticola is a parasite for many cultivated or spontaneous plants, thus making it difficult to develop control and prevention methods. Present in most of the European agricultural regions, the parasite is to be found in Romania, too, with serious implications in precocious maturity.
This work deals with some aspects regarding the appropriate approach of both control and prevention measures for this pathogen.

MATERIAL AND METHODS

The pathogen isolation and growing were run on potato-dextrose-agar (PDA) (pH 5.5-6.0), at 28-30°C. The biological activity of benzimidazoles (Fundazol 50 WP) was evaluated by observing its influence on fungus growth in medium which contained 0.01-10 ppm.
Field experiments were set up in randomized blocks in regions favourable to fungus attack.
Both the influence of plant density/ha and fertilization level on the attack development were registered.
In a quite favourable area, under natural contamination conditions, the behaviour of simple and three-way hybrids was evaluated; the attack frequency and its influence on thousand kernel weight (TKW)

were registered. It was also noted its spreading in the main sunflower cropping areas in Romania.

RESULTS AND DISCUSSIONS

The works carried out tried to reveal the relation parasite-host plant describing the phenomenon of getting diseased as a complex process, in which pathogeny is due to the microorganism ability to produce a toxine and to develop itself within the vessels (Chan and Sackston, 1969, 1973).

Accordingly Davet (1987) and Saumon (1984) stressed out that colonization of host tissues by pathogen is early done, but the rapidity of the phenomenon is function of a lot of both biotic and abiotic factors.

With sunflower, the first symptom is characterised by whitening of the stalk lower part which, in time, becomes silver grey. At the surface of the affected parts and in depth black microsclerotia can be seen, of various size. The leaves lose their green colour, yellowing; the whole plant wilting due to phloemic and xylemic vassels obturation with mycelium and sclerotia.

The diseased plants root system is diminuated, completly necrotic, with lots of microsclerotia on the secondary roots.

Contrary, Peron (1990) described earlier attack of aerial parts which occurs on the leaves, the symptoms looking like those caused by Phomopsis. A strong action of the product Fundazol 50 WP could be observed, starting from 0.1 ppm, while Basu Ghandhary and Sharma (1988) obtained a total fungus inhibition at 25; 50 and 100 ppm, as far as the biological activity is concerned.

In this work density and fertilization level were observed in terms of the influence of some abiotic factors on both sunflower charcoal rot occurrence and development.

With Florom 206, for 70 ths.plants/ha the percentage of plants showing charcoal rot symptoms ranged between 61.3% (1988) and 93.5% (1989) compared with 43.4 and 66.3% respectively, corresponding to 40 ths. plants/ha; with Felix, the differences between attack frequency registered for the two experimental densities are much lower, therefore the attack frequency is proportionally related to plant density/ha (Table 1).

Speaking about fertilization influence, it is confirmed that the nitrogen excess stimulating the vegetative apparatus development, stresses out the hydric stress, the plants had already been sub-

mitted to, on site.

If in $N_oP_oK_o$ variant, at the end of vegetation, the attack frequency was 66.3% in $N_{160}P_{80}K_o$ variant, there were 90.1% diseased plants. Lack of potassium negatively influences host defending ability against pathogens attack. Thus, the attack frequency on the steady N_{160}-P_{80} with the variable K_o-K_{80} influences a significant decrease of diseased plants number (from 90.1% to 20.3%) caused by potassium (Table 2).

Table 1 - Density influence on attack frequency caused by some sunflower pathogens

-natural contamination-

Hybrid	Density ths. pl/ha	Attack frequency % Sclerotium bataticola 1989	Sclerotium bataticola 1990	Sclerotinia sclerotiorum 1989	Sclerotinia sclerotiorum 1990	Alternaria spp. 1989	Alternaria spp. 1990	Yield q/ha 1989	Yield q/ha 1990
Florom 206	40	43.4	66.3	13.3	3.1	46.5	40.3	18.3	22.1
	50	56.4	71.3	14.5	3.6	54.4	45.0	19.4	21.4
	60	59.4	74.4	18.4	4.5	59.6	43.6	17.1	20.9
	70	61.3	93.5	26.2	5.9	84.3	89.0	16.1	20.1
Felix	40	46.1	43.4	4.4	0.3	32.4	34.5	20.8	20.8
	50	51.4	49.5	5.3	1.6	36.5	76.4	20.9	19.2
	60	52.3	51.6	7.1	2.1	46.5	72.5	19.2	18.8
	70	49.4	50.3	11.2	2.0	70.4	80.4	17.9	17.4
LD 5%								1.3	0.9

Table 2 - Influence of fertilization on Sclerotium bataticola and other diseases attack

1989 - 1990

Dosage rate/ha	Attack frequency % Sclerotium bataticola	Sclerotinia sclerotiorum	Alternaria spp.	Yield q/ha
$N_oP_oK_o$	66.3	6.3	60.0	24.0
$N_oP_oK_{40}$	36.4	5.2	54.3	24.4
$N_oP_oK_{80}$	31.5	2.6	36.2	23.6
$N_{80}P_{40}K_o$	92.3	8.3	83.4	23.9
$N_{80}P_{40}K_{40}$	32.4	3.1	31.5	25.6
$N_{80}P_{40}K_{80}$	24.3	2.6	26.5	24.6
$N_{80}P_{80}K_o$	96.3	7.1	93.4	29.9
$N_{80}P_{80}K_{40}$	36.1	4.6	30.4	31.3
$N_{80}P_{80}K_{80}$	29.1	3.1	25.4	30.4
$N_{160}P_{80}K_o$	90.1	18.3	96.5	21.3
$N_{160}P_{80}K_{40}$	34.1	10.3	33.4	25.1
$N_{160}P_{80}K_{80}$	20.3	5.1	26.9	24.6
LD 5%				1.1

From the experimental results with genetical sunflower forms response to Sclerotium bataticola attack, under natural contamination, if could be observed a good behaviour of Turbo, Super, Florom 305, Festiv and Felix hybrids, which in the two years showed values ranging between 8.7 and 13.4% without any significant decrease of TKW - estimated for seeds from attacked/nonattacked plants (Table 3).

Table 3 - Behaviour of some sunflower formes to Sclerotium bataticola attack.

- natural contamination -

Variant	Biological cathegory	1989 Attack frequency (%)	1989 TKW Attacked (%)	1989 TKW Non-attacked (%)	1990 Attack frequency (%)	1990 TKW Attacked (%)	1990 TKW Non-attacked (%)
HS 1622	simple hybrid	36.6	54.3	76.5	39.4	50.6	7o.5
Florom 3o5	simple hybrid	1o.7	71.4	79.3	12.9	69.7	75.3
Florom 32o	simple hybrid	81.6	64.1	81.1	79.5	63.1	79.7
Florom 2o6	simple hybrid	43.1	54.6	76.5	48.1	5o.6	73.3
Fundulea 53	simple hybrid	53.5	52.6	75.3	56.8	49.7	74.8
Felix	simple hybrid	11.9	78.3	81.4	13.o	75.8	78.7
Super	three way hybrid	9.6	81.3	85.8	1o.7	82.o	83.5
Festiv	three way hybrid	11.5	79.8	84.9	13.4	75.3	82.9
Turbo	three way hybrid	8.7	78.9	83.1	9.o	76.o	8o.3
Select	simple hybrid	36.5	75.1	86.6	38.5	76.5	84.9
Record	cvar.	96.5	31.7	69.6	98.3	28.6	65.7
LD 5%		9.1	6.3	5.5	1o.3	8.7	4.6

Record cvar. and Fundulea hybrid were very susceptible.
We noted that due to a pronounced polyphagous activity and to the mode of spreading and transmission among the integrated control elements, the agrotechnical measures play an important part, mainly if we take into account that the chemical as well as the known and practised biological measures, so far, have a limited share.

CONCLUSIONS

Sclerotium bataticola is a polyphagous parasite whose attack manifests on a lot of cropping plants belonging to different botanical families.
Increase of plant density leads to pathogen attack intensification.
Unbalanced fertilization (nitrogen excess or lack of potassium) stress out the disease severity.
There could be noted differences referring to the behaviour of several hybrids to Sclerotium bataticola attack that asking for a sunflower resistance breeding programme against this pathogen.

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