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# EFFECTIVENESS OF TREATMENTS ON THE ATTACK OF *POLYSTIGMA RUBRUM* PATHOGENS AND *STIGMINA CARPOPHILA* ON PLUM IN ŞOIMARI LOCATION, PRAHOVA COUNTY

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***Abstract***

*The work studies the occurrence of Polystigma rubrum and Stigmina carpophila pathogens which are frequent yearly in plum orchards with varying degrees of attack intensity. It was followed by the attack of the two pathogens in the period 2017-2018 in the 'Stanley', 'Anna Spath' and 'Gras românesc' varieties. It was found that the attack of the Polystigma rubrum pathogen had values in 2018 ranging from 31% to the 'Stanley' variety and 19.5% to the' Gras românesc' variety. In the case of the Stigmina carpophila fungus attack, the most severe attack was 38% in the year 2017. The effectiveness of prophylactic and therapeutic treatments ranged between 65% and 71% during the analyzed period.*

***Key words****: cultivar, degree of attack, effectiveness, fungus, plum.*

## INTRODUCTION

*Polystigma rubrum* and *Stigmina carpophila* are micromicetes found yearly in plum orchards in Romania.

Plum diseases produced by *Polystigma rubrum*, *Stigmina carpophila* and *Monilia laxa* are common in conditions of natural infection in the climatic conditions in north-west of Romania and cause significant losses (Mitre et al., 2015).

*Polystigma rubrum* are responsible for the disease, called plum-leaf blister, and *Stigmina carpophila* causes shot-hole disease of plum (Gheorghies & Geaman, 2003; Bubici et al., 2010). Iliev and Stoev (2011) show that *Polystigma rubrum* is one of the most common diseases of the plum. Stoev et al. (2017) shows, that plum-leaf blister manifested itself in all 7 varieties investigated.

Under the conditions of Bulgaria from 1996-2003, the Stanley and Anna Spath varieties were tolerant of diseases such as red patches of leaves (Vitanova et al., 2004).

The study of the biological parameters of the *Stigmina carpophila* fungus revealed the development of fungal colonies under certain *in vitro* conditions (Văcaroiu et al., 2009).

## MATERIALS AND METHODS

The research has followed the evolution of the *Polystigma rubrum* and *Stigmina carpophila* pathogen attacks on plum leaves 'Stanley', 'Anna Spath' and 'Gras românesc' cultivars in a classical orchard in Şoimari, Prahova County. The frequency of the attack (F %), the intensity (I %) and the attack rate (GA %) on the leaves for the two years studied were determined. The following formulas were used: F = n x 100/N, in which n = the number of attacked plants/ organs, N = total plant/organ analysis, attack intensity was calculated using formula I = Σ (i x f) where: i = the percentage of the attack, f = the number of organs/plants with the respective attack percentage, n = the total number of attacked organs/plants analyzed, GA = F x I/100, where F = attack frequency, I = attack intensity. The fungal attack was monitored in control and variants: 2% bordeleza, 2% Confidor oil 1.5%, 0.2% Topsin WDG, and Luna experience 400 SC 0.05%, Signum FG 0.5%. Efficacy of treatment (E%) was calculated according to the formula E (%) = [(GAc-GAv)/GAm] x 100, where GAc = control; Gav = degree of attack in the treated alternative.

## RESULTS AND DISCUSSIONS

The data in Table 1 show that in plum varieties monitored as control, the attack of plum-leaf blister and shot-hole disease of plum had a maximum incidence (F = 100%) during the analyzed period. In 2017 in the 'Stanley' cultivar, the attack of the *Polystigma rubrum* recorded an intensity of 29% and in 2018 31%. In the same variety, the *Stigmina carpophila* fungus attack on the leaves had an intensity of 38% and in the year 2018 36%. In the 'Anna Spath' variety, it was found that the intensity of the *Polystigma rubrum* attack was higher in 2018 (I = 28%) than in 2017 (I = 22.5%). The attack of leaf mycotic attack on the same variety recorded a lower degree of attack in 2018 (GA = 31.5%) compared to 2017, when the attack rate was 34%. The 'Gras românesc' cultivar recorded the smallest values of the disease attack monitored between 2017 and 2018. Thus, the attack of the *Polystigma rubrum* fungus was 19.5% in 2017 and 21.5% in 2018. Regarding the *Stigmina carpophila* fungus attack, it had values of about 30% during this period.

Table 1. Fungus attack *Polystigma rubrum* and *Stigmina carpophila* on plum (2017-2018) in Şoimari location, Prahova County

| Variety | Year | Pathogen/disease | | | | | |
|---|---|---|---|---|---|---|---|
| | | *Polystigma rubrum*/ plum-leaf blister | | | *Stigmina carpophila*/ shot-hole disease of plum | | |
| | | F (%) | I (%) | GA (%) | F (%) | I (%) | GA (%) |
| 'Stanley' | 2017 | 100 | 29 | 29 | 100 | 38 | 38 |
| | 2018 | 100 | 31 | 31 | 100 | 36 | 36 |
| 'Anna Spath' | 2017 | 100 | 22.5 | 22.5 | 100 | 34 | 34 |
| | 2018 | 100 | 28 | 28 | 100 | 31.5 | 31.5 |
| 'Gras românesc' | 2017 | 100 | 19.5 | 19.5 | 100 | 30.5 | 30.5 |
| | 2018 | 100 | 21.5 | 21.5 | 100 | 30 | 30 |

The prophylaxis and therapy of these diseases was provided by treatments with the products presented in Table 2. Their application was done in the recommended concentrations (Henegar & Andru, 2013) the data and the phenophase presented in Table 2. The products selected for application, applied against these diseases had an effect on other pathogens (e.g., *Monilinia laxa*) and were also accompanied by insecticide treatments against plum pests. Thus, treatment with Topsin WDG (0.2%) was associated with the insecticide Calypso 480SC (0.02%), and the fungicid Luna Experience 400CS (0.05%) and Signum FG (0.5%) with the insecticides Mospilan 20SG (0.045%) and Novadim Progress EC (0.075%) and insecticides Calypso 480SC (0.02%) and Mospilan 20SG (0.045%). Including copper-containing preparations can prevent diseases such as brown rot and red leaf spots (Stoev et al., 2017). The fungicide treatments were effective in controlling brown rot in different tree species (Popa et al., 2013; Chiţulescu & Cristea, 2017).

Table 2. Treatment scheme applied to control *Polystigma rubrum* and *Stigmina carpophila* pathogens on plum 2017-2018 in Şoimari location, Prahova County

| The product | Concentration (%); dose (l, kg/ha) | Phenophase | Date of administration |
|---|---|---|---|
| Zeama Bordeleza | 2% | Vegetative retention | 15.03 |
| Confidor oil | 1.5% | Vegetative retention | 05.03 |
| Topsin WDG (+ Calypso 480SC ) | 02% (+0.02%) | Green button | 05.04 |
| Luna experience 400 SC (+ Mospilan 20SG) | 0.05% (+0.045%) | White button | 20.04 |
| Signum FG (+ Calypso 480SC) | 0.5% (+0.02%) | Flowering corolla10-15% | 04.05 |
| Luna experience 400 SC (+Novadim Progress EC) | 0.05% (+0.075%) | Shake of the petals 10-15% | 17.05 |
| Signum FG (+ Mospilan 20SG) | 0.5% (+0.045%) | Fruit development | 01.06 |

The treatments applied significantly reduced the attack of fungi *Polystigma rubrum* and *Stigmina carpophila* against the control variant (Table 3).

In the 'Stanley' cultivar, in 2017 plum-leaf blister fell to 9.5%, compared with 29% in the control variant, and the attack of shot-hole disease reached 13%, compared to the untreated variant at which GA = 38%. In 2018 the attack of pathogens monitored in this variety was significantly reduced to the treated version.

In the 'Anna Spath' cultivar, application of fungicides reduced the attack that reached 7.5% and 8.5% in the case of the *Polystigma rubrum* pathogen, and 11% and 9.5% in the attack of *Stigmina carpophila* in the years 2017 and 2018 relative to the control variant (Table 3).

As for the 'Gras românesc' cultivar, it was found that the intensity of the attack had the lowest values for both pathogens analyzed following the application of the treatment scheme.

The effect on the plum-leaf blister was noted in 2017 when the attack reached 6% in the variant treated against the control where GA = 19.5%.

Table 3. The influence of the *Polystigma rubrum* and *Stigmina carpophila* on plum (2017/2018) in Şoimari location, Prahova County

| Cultivar | Year | Variant Untreated (control) / treatment | Pathogen / disease | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | *Polystigma rubrum*/ plum-leaf blister | | | *Stigmina carpophila*/ shot-hole disease of plum | | |
| | | | F (%) | I (%) | GA (%) | F (%) | I (%) | GA (%) |
| 'Stanley' | 2017 | Control | 100 | 29 | 29 | 100 | 38 | 38 |
| | | Treatment | 100 | 9.5 | 9.5 | 100 | 13 | 13 |
| | 2018 | Control | 100 | 31 | 31 | 100 | 36 | 36 |
| | | Treatment | 100 | 9 | 9 | 100 | 10.5 | 10.5 |
| 'Anna Spath' | 2017 | Control | 100 | 22.5 | 22.5 | 100 | 34 | 34 |
| | | Treatment | 100 | 7.5 | 7.5 | 100 | 11 | 11 |
| | 2018 | Control | 100 | 28 | 28 | 100 | 31.5 | 31.5 |
| | | Treatment | 100 | 8.5 | 8.5 | 100 | 9.5 | 9.5 |
| 'Gras românesc' | 2017 | Control | 100 | 19.5 | 19.5 | 100 | 30.5 | 30.5 |
| | | Treatment | 100 | 6 | 6 | 100 | 9.0 | 9.0 |
| | 2018 | Control | 100 | 21.5 | 21.5 | 100 | 30 | 30 |
| | | Treatment | 100 | 6.5 | 6.5 | 100 | 8.5 | 8.5 |

The effectiveness of the treatments applied against the pathogens monitored was calculated and it was found to have varied between 66.6% for 'Anna Spath' cultivar on the control of the *Polystigma rubrum* pathogen and 69.2% for the 'Gras românesc' cultivar (2017), 69% for the 'Anna Spath' and 'Gras românesc', 71% at Stanley cultivars (2018).

Regarding the efficacy of the treatments in controlling the *Stigmina carpophila* pathogen, the highest values were determined for the 'Stanley' cultivar (2018), and over 70% for the 'Gras românesc' cultivar during the analyzed period (Table 4).

Table 4. Effectiveness of the treatments applied in the control of the pathogens *Polystigma rubrum* and *Stigmina carpophila* (2017-2018) in Şoimari location, Prahova County

| Cultivar | Year | Pathogen/disease | | | | |
|---|---|---|---|---|---|---|
| | | The variant untreated (control) / treatment | *Polystigma rubrum*/ plum-leaf blister | | *Stigmina carpophila*/shot-hole disease of plum | |
| | | | GA (%) | E (%) | GA (%) | E (%) |
| 'Stanley' | 2017 | Control | 29 | 67.2 | 37 | 64.8 |
| | | Treatment | 9.5 | | 13 | |
| | 2018 | Control | 31 | 71 | 36 | 71 |
| | | Treatment | 9 | | 10.5 | |
| 'Anna Spath' | 2017 | Control | 22.5 | 66.6 | 34 | 66.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Treatment | 7.5 | | 11.5 | |
| | 2018 | Control | 28 | 69.6 | 31.5 | 69.8 |
| | | Treatment | 8.5 | | 9.5 | |
| 'Gras românesc' | 2017 | Control | 19.5 | 69.2 | 30.5 | 70.5 |
| | | Treatment | 6 | | 9 | |
| | 2018 | Control | 21.5 | 6.8 | 30 | 71.6 |
| | | Treatment | 6.5 | | 8.5 | |

## CONCLUSIONS

The frequency of the attack was maximum during the analysis period in all the varieties monitored. Micromicete of *Polystigma rubrum* was more virulent in 2018, and the pathogen *Stigmina carpophila* recorded a lower attack in the same year. The treatments applied significantly reduced the attack of the pathogens monitored. The effectiveness of fungicides intervention ranged between 65% and 71%.

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