

## RESEARCH ON THE EFFICACY OF FUNGICIDES FOR CONTROL OF *MONILINIA LAXA* (ADERH. & RUHL.) HONEYON PLUM TREE

Tudorel POPA, Stelica CRISTEA, Cristinel Relu ZALĂ, Mali-Sanda MANOLE

University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Mărăști Blvd,  
District 1, 011464, Bucharest, Romania

Corresponding author email: tudorson2004@yahoo.com

### Abstract

*Monilinia laxa* is an important species in Romania causing brown rot blossom blight of pome and/or fruit of plum. The disease is also known as „monilinia blossom blight” or „brown rot blossom blight”. The blossom blight occurs mainly on stone fruit, including plum. *Monilinia laxa* (Aderh. & Ruhl.) Honey is an ascomycete fungus.

Research followed all the stages of the disease attack, as well as the occurrence of the first symptoms correlated with weather conditions, the evidence of the symptoms in plum tree, the data related to frequency (disease incidence), intensity (severity) and efficacy treatments with fungicides Dithane M-45 WP (80% mancozeb active ingredient), Topsin AL 70 WP (70% thiophanate methyl active ingredient), Merpan 80 WDG (80% captan active ingredient), Bravo 500 SC (500 g/l clorotalonil active ingredient), Alcupral 50 WP (50% cooper oxychloride active ingredient), Teldor 500 SC (500 g/l fenhexamid active ingredient) and Signum FG (26.7% boscalid + 6.7% piroclostrobin active ingredient) the pathogen *Monilinia laxa*, the varieties Anna Späth, d' Agen, Record, Stanley and Tuleu timpuriu. The study was developed during the proces of doctoral studies programme financed trough project POSDRU/107/1.5/S/76888.

**Key words:** attack, disease, monilia, plum, fungicides.

### INTRODUCTION

*Monilinia laxa* is an important species in Romania causing brown rot blossom blight of pome and/or fruit of plum.

The disease is also known as „monilinia blossom blight” or „brown rot blossom blight” (Rudolph, 1925 cited by Holb, 2008).

The blossom blight occurs mainly on stone fruits (Weaver, 1950), including plum (Schlagbauer & Holz, 1990).

*Monilinia laxa* (Aderh. & Ruhl.) Honey is an ascomycete fungus, class: *Letiomycetes*, order: *Helotiales*, family: *Sclerotiniaceae* (Kirk et al., 2008.).

The range of disease attack is highly variable each year, according to crop and area (Gheorghieș & Geamăn, 2003). From this point of view, this paper presents aspects regarding the *Monilinia* attack degree in plum tree.

*Monilia* disease, brown rot of fruit or plum mummification is a widespread disease of plum growing in all countries and may cause serious damage by destroying flowers and fruit (Bolay et al., 1972).

The results of this paper are included in the topic of the personal of doctoral thesis.

### MATERIALS AND METHODS

Visual observation is the fastest method to identify a disease based on signs and symptoms shown by infected plants. This method involves a high degree of subjectivity, depending largely on the diagnosing person's level of knowledge. The scoring attack for *Monilinia laxa* has a particular importance for the plum tree in establishing the need for chemical treatments during the vegetation season.

The attack value is represented by frequency (F%), intensity (I%) and attack degree (AD%). Frequency is the percentage of fruit attacked out of 100 examined fruit. Attack intensity indicates the degree to which the fruit is attacked under examination. Intensity was noted directly in percentage. The attack degree referred to the severity of disease in the crop and was calculated using frequency and intensity.

Calculations included five fruit trees belonging to the same variety in each variant (with or without treatment). For accurate information, we noted the attack/tree in every third row of fruit trees. We observed the attack in the same

tree on two levels by moving on the diagonal of the row, and we calculated the average.

Intensity was noted directly in percentage. The attack degree present severity of disease in the crop and was calculated using the frequency (disease incidence) and intensity (severity).

The fungicides used were Dithane M-45 WP (80% mancozeb active ingredient), Topsin AL 70 WP (70% thiophanate methyl active ingredient), Merpan 80 WDG (80% captan active ingredient), Bravo 500 SC (500 g/l clorotalonil active ingredient), Alcupral 50 WP (50% cooper oxychloride active ingredient), Teldor 500 SC (500 g/l fenhexamid active ingredient) and Signum FG (26.7% boscalid + 6.7% piroclostrobin active ingredient) (Henegar C., 2011).

The varieties used in this study were: Anna Späth, d'Agen, Record, Stanley and Tuleu timpuriu.

Experiments took place in an orchard of 10 years old from Bucharest.

Research was conducted between 2010 and 2012.

Treatments were applied as follows: first, at the end of vegetation; second, white button phenophase treatment; the third, treatment when 10-15% of petals were shaken and the last treatment applied at the beginning of fruit ripening (Popa et al., 2012). Four treatments were applied in different variants (Table 1).

For calculating the efficacy was taken into account attack degrees of variants with and without treatments.

The results were statistically assured by using variance analysis.

## RESULTS AND DISCUSSIONS

Successful management of *Monilinia laxa* involves a combination of health practices aimed to reduce the amount of initial inoculum and the judicious use of fungicides.

Observations took place a week after the application of the last treatment for each plum tree variety.

Only the effect of chemical treatments in different combinations was highlighted as cultural hygiene measures imposed by technology were applied in all variants.

Climatically, 2010 was more favorable than 2011 and 2012 for the attack of the pathogen *Monilinia laxa*.

Table 1. Treatment options

Treatment	Phenophase	Fungicides	Concentration (%)
1	end of vegetation	Alcupral 50 WP	0.4
2	white button	Dithane M-45 WP	0.2
		Merpan 80 WDG	0.15
		Bravo 500 SC	0.15
3	10-15% petals shaken	Bravo 500 SC	0.15
		Dithane M-45 WP	0.2
		Merpan 80 WDG	0.15
4	beginning of fruit ripening	Teldor 500 SC	0.08
		Topsin AL 70 WP	0.07
		Signum FG	0.05

It must be noted that the attack on the flowers, leaves and shoots in spring was insignificant in the three years of research and all varieties under study.

Dangerous attack was reported in the fruit, as most of the fruit attacked fell while only few remained mummified in the tree crown, most of them in 2012.

Table 2 presents the variants as follows:

- Variant 1 of treatment consisted of application of fungicides: Dithane M-45 WP, Bravo 500 SC, Teldor 500 SC.
- Variant 2 of treatment consisted of application of fungicides: Merpan 80 WDG, Dithane M-45 WP, Topsin AL 70 WP.
- Variant 3 of treatment consisted of application of fungicides: Bravo 500 SC, Merpan 80 WDG, Signum FG.

The data presented in Table 2 show that the results on the behaviour of the plum tree varieties to the pathogen *Monilinia laxa* in all variants treated with various fungicides (V1, V2 and V3) and the efficacy of treatments.

It is noteworthy that there was no attack of *Monilinia laxa* in the variety Record during the three years of research in the variants treated with fungicides Bravo 500 SC (applied in phenophase white button), Merpan 80 WDG (applied in phenophase 10-15 petals shaken) and Signum FG (applied at the beginning of fruit ripening).

Table 2. Efficacy of some fungicide used in season to prevent and control the attack of *Monilinia laxa* on some variety of plum

Variant	Variety	Years					
		2010		2011		2012	
		A.D. <sup>1</sup> (%)	E <sup>2</sup> (%)	A.D. (%)	E (%)	A.D. (%)	E (%)
1 Dithane M-45 WP, Bravo 500 SC, Teldor 500 SC.	Anna Späth	7.00	85.1	4.00	90.5	3.00	85.0
	d'Agen	7.00	85.4	5.00	87.2	4.00	81.8
	Record	5.00	86.1	2.00	92.9	2.00	83.3
	Stanley	9.00	87.3	7.00	87.3	5.00	79.2
	Tuleu timpuriu	6.00	86.7	4.00	88.6	2.00	85.7
2 Merpan 80 WDG, Dithane M-45 WP, Topsin AL 70 WP.	Anna Späth	8.00	83.0	5.00	88.1	4.00	80.0
	d'Agen	8.00	83.3	6.00	84.6	4.00	81.8
	Record	5.00	86.1	3.00	89.3	2.00	83.3
	Stanley	10.00	85.9	6.00	89.1	5.00	79.2
	Tuleu timpuriu	7.00	84.4	4.00	88.6	2.00	85.7
3 Bravo 500 SC, Merpan 80 WDG, Signum FG.	Anna Späth	3.00	93.6	1.00	97.6	2.00	90.0
	d'Agen	3.00	93.8	2.00	94.9	2.00	90.9
	Record	0.00	100.0	0.00	100.0	0.00	100.0
	Stanley	6.00	91.5	4.00	92.7	4.00	83.3
	Tuleu timpuriu	2.00	95.6	1.00	97.1	1.00	92.9
DL 5% = 72.6%; DL 1% = 76.5%; DL 0.1% = 78.9% - for efficacy							

<sup>1</sup>A. D. (%) = Attack degree;

<sup>2</sup>E (%) = Efficacy of treatment with fungicides.

The varieties Anna Späth and d'Agen had approximately a similar response to *Monilinia laxa* in 2010 in the variants treated with fungicides (85.1% respectively 85.4% efficacy). Efficacy for prevention of *Monilinia laxa* attack, ranged in the year 2010, at the first variant of phytosanitary treatments, from 85.1% (the variety Anna Späth) to 87.3% (the variety Stanley). In the second variant, in the same year, the efficacy of treatments in the vegetation of plum against pathogen *Monilinia laxa* ranged from 83.3% (the variety Anna Späth) to 86.1% (the variety Record). The highest value of efficacy were recorded in the third variant, ranging from 91.5% (the variety Stanley) to 100.0% (the variety Record). In 2011, the efficacy of treatment varied in variant V1 between 87.2% (the variety d'Agen) and 92.9% (the variety Record) in variant V2 between 84.6% and 89.3% for those varieties and in the variant V3 between 92.7% (the variety Stanley) and 100.0% to Record variety. In 2012, it was the least favorable climatic for pathogen *Monilinia laxa* were recorded following variations efficacy of treatments: in V1 from 79.2% (the variety Stanley) to 85.7% (the variety Tuleu timpuriu); In V2 were recorded the same values to the same variety,

respectively 79.2% (the variety Stanley) and 85.7% (the variety Tuleu timpuriu)

Should be noted that the application of systemic fungicides in the ripe fruit phenophase played an important role in protecting the fruit when rainfall occurred until the harvest.

## CONCLUSIONS

*Monilia* disease, brown rot of fruit or plum mummification, is a widespread disease of plum growing in all countries and may cause serious damage by destroying flowers and fruit.

The range of *Monilinia laxa* attack in plum tree is highly variable each year.

The variety Record showed the lowest attack degree of the pathogen *Monilinia laxa*.

In all variants with different combinations of fungicides applied were recorded very good values of efficacy of phytosanitary treatments during the growing season.

In the three years of research, the highest values of efficacy treatments we recorded for the third variant of treatment, with fungicides Bravo 500 SC, Signum FG and Merpan 80 WDG.

The best values of efficacy treatments are recorded at the year with average pressure in the attacking pathogen *Monilinia laxa* in plum.

Treatments is fully justified especially in a highly favorable climatic year (with many precipitation and heat) for *Monilia* disease, as it was in 2010.

### ACKNOWLEDGEMENTS

This study was developed during the proces of doctoral studies programme financed trough project POSDRU/107/1.5/S/76888.

### REFERENCES

- Bolay A., Noury G., Ducrat V., et Germanier R., 1972. Progres dans la lutte contre la monilioze, Revue suisse de viticulture, arboriculture et horticulture IV (1), p. 15-21.
- Gheorghieș C., Geamăn I., 2003. Diseases of Horticultural Plants. Ed. Universitas Co., Bucharest, p. 198-200.
- Henegar C., 2011. Codex of Plant Protection Products Certified in România. Ed. Carmel Print, Arad.
- Holb I. J., 2008. Brown rot blossom blight of pome and stone fruits: symptom, disease cycle, host resistance, and biological control. International Journal of Horticultural Science 14 (3), p. 15–21.
- Kirk P. M., Cannon P. F., Minter D. W., Stalpers J. A., 2008. Dictionary of the Fungi. 10th Edition. Cab International. UK. Editors Cromwell Pres, Trowbridge.
- Popa T., Stelica Cristea, C. R. Zala, 2012. Preliminary research regarding *Monilinia laxa* (Aderhold & Ruhland) Honey ex Whetzel attack in plum tree. Scientific papers series A. Agronomy, vol. LV, Bucharest, p. 225-228.
- Rudolph B. A., 1925. *Monilinia* blossom blight (brown-rot) of apricots. California University Agricultural Experimental Station Bulletin, p. 383.
- Schlagbauer H. E., Holz G., 1990. Infection and colonization of plum blossoms by *Monilinia laxa*. Phytophylactica 22, p. 419–422.
- Weaver L. O., 1950. Effect of temperature and relative humidity on occurrence of blossom blight of stone fruits. Phytopathology 40, p.1136–1153.