

Three-Year Results of Experiment Aimed to Suppression Gray Mold (*Botryotinia Fuckeliana*) Using Software of Meterological Station

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Received: September 28, 2016 / Accepted: December 26, 2016 / Published: March 25, 2017

Abstract: Strawberry is species attacked by a large number of disease and pests, one of the most important diseases which significantly affects the yield and fruit quality is *Botryotinia fuckeliana*, inducer gray mold. For its suppression fungicides are used by application in practice based mainly on developmental stages of strawberries without taking into account the biology of pathogens and weather conditions. That influences the occurrence and development of pathogens.

The aim of testing is to check the software that is based on recording the temperature, the length of wetting leaf and which, based on these data, shows the risk of a possible realization of pathogen infection by *Botryotinia fuckeliana*. Our objective was to determine the optimal time to protect strawberries from gray mold in relation to height of risk that software provides and phenophases of strawberry and thus reduce the number of treatments.

Key words: strawberry, gray mold, meteorological station

1. Introduction

In working with agricultural producers of strawberries, we recognized a significant problem related to the use of pesticides in order to protect from disease, especially when it comes to gray mold strawberries. An audit software use and establishing a model for prediction of gray mold strawberries contributions are targeted and timely application of fungicides and ensures the production of safe food production, reducing production costs and greater competitiveness strawberry berries on the domestic and foreign markets. Our objective was to determine the optimal time to protect strawberries from gray mold in relation to height of risk that software provides and phenophases of strawberry and thus reduce the number of treatments.

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Strawberry fruit rot can occur in all plant parts, but the most important is his appearance on the fruit. It usually occurs at the point of contact calyx leaves or fruit at the point where they touch healthy and diseased tissue.

On the diseased parts, freckles spread quickly and cover the entire fruit. This is affected by rotting fruits and quickly lose their flavor and quality. On the surface of diseased fruit, the fungus forms a plush gray mycelium. A very large number of conidia can be formed on konidioforama mycelial pathogens. *Botryotinia fuckeliana* form a rich, septated mycelium olive-brown color. The pathogen can be maintained as the extinct saprofit parts of berries. The plant residues are held in the form of permanent mycelium or sclerotia.

Development of the disease favors chilly and rainy weather. Humidity is the most important factor that affects the occurrence of diseases. The spores can germinate and infect the fruits in a drop of water (if moisture is 4-8 hours) at a temperature of 13-15°C. The pathogen attacks the fruits while more small and green, especially later in ripening. Most favorable temperature for the development of the disease varies from 15-20° C. However, the agent of the disease can infect the fruits in place drops of water (if moisture is 4-8 hours) at a temperature of 13-15°C.



2. Materials and Methods

Experiment during testing in 2012, 2013 and 2014 was set in strawberry variety Clery in location Karavukovo. Timing of fungicide application is based on the mini meteorological station METOS Pessl Instruments in which the software is installed for the forecast *Botryotinia fuckeliana*, based on recording length of wetting leaves and temperature gives the level of risk for strawberry infection by pathogens *Botryotinia fuckeliana*.

For the causal agent of gray rot of strawberries is a characteristic that infects flowers and strawberries. For infection, in addition to infectious materials needed and the length of a certain period of wetting leaves and temperature. Bulger et al. 1987 found a correlation between the length of periods of wetting leaves and temperature, which was at that time. To achieve 100% infection and the use of fungicides is necessary to sheet wetting period lasts at least 32 hours at an air temperature of 20 ° C. For each period the wetting list longer than 4 hours METOS believe that the risk is greater than 0. In the days when the length of the wetting list shorter than 4 hours is considered to be the so-called. dry period. Based on the amount of signaling risks Metos number of treatments with the application of fungicides can be reduced.

The experiment was set up according to EPPO Standard PP 2/9 tours (1), 2003 Fungicide treatments are based on two criteria:

- a) The amount of risk on the basis of data from METOS (risks greater than 20%, 30%, 50% and 70%).
- b) Phenophases development of strawberries.



3. Results

The application of fungicides in 2012 in the first treatment is related to two criteria: a) the risk based on data from Metos (risk greater than 20%, 30%, 50% and 70%) and b) development phenophases strawberries. The following treatments are related to the length of action fungicides. For treatments are used fungicides registered in the Republic of Serbia for protection against gray mold - fungicide Ronilan DF (a.m. vinclozolin) Switch 62.5 WG (ai cyprodinil + fludioxonil) and Signum (boscalid + pyraclostrobin a.m.). During 2012, 2013 and 2014 in the trial, after 4 harvest. Estimates of incidence of the disease in the fruits were made according to standard EPPO for sightseeing PP 2/9 (1), 2003, defending the fruits of 26 plants in three repetitions for each sample and calculate the number of healthy fruits and number of diseased fruits, as well as their weight. The first assessment was carried out at the time of the first harvest, but all others were made in each subsequent reading.

Table 1. Results of experiment in the year 2012

Variants	Number of treatment	Date of treatment	Fungicides	Risk %	% effectiveness variants	Yield% K=100%
1 (BBCH 55-61)	I	5.4.	Ronilan 1,5l/ha	27	50.32	197,00
	II	16.4.	Ronilan 1,5l/ha	69		
	III	26.4.	Signum 1,5kg/ha	78		
	IV	12.5.	Switch 0,8kg/ha	56		
2 (BBCH -55-61)	I	6.4.	Ronilan 1,5l/ha	58	58.49	178,00
	II	18.4.	Ronilan 1,5l/ha	75		
	III	28.4.	Signum 1,5kg/ha	58		
	IV	12.5.	Switch 0,8kg/ha	56		
Control						100,00

Table 2. Results of experiment in the year 2013

Variants	Number of treatment	Date of treatment	Fungicides	Risk %	% effectiveness variants	Yield% K=100%
1	I	24.04.(BBCH 61-65 – 27% flowers)	Signum 1,5 kg/ha	78	65,26	114,14
	II	04.05.	Signum 1,5 kg/ha	74		
	III	21.05.	Switch 0,8 kg/ha	62		
	IV	28.05.	Switch 0,8 kg/ha	76		
2	I	27.04. (BBCH 61-65 – 46% flowers)	Signum 1,5 kg/ha	78	70,74	106,01
	II	10.05.	Signum 1,5 kg/ha	78		
	III	21.05.	Switch 0,8 kg/ha	62		
3	I	30.04. (BBCH 65 – 71% flowers)	Signum 1,5 kg/ha	78	83,09	98,13
	II	10.05.	Signum 1,5 kg/ha	78		
	III	21.05.	Switch 0,8 kg/ha	62		
	IV	28.05.	Switch 0,8 kg/ha	76		
4	I	04.05. (BBCH 65 – 71% flowers)	Signum 1,5 kg/ha	78	79,37	103,72
	II	21.05.	Switch 0,8 kg/ha	62		
	III	28.05.	Switch 0,8 kg/ha	76		
5	I	04.05. (BBCH 81-85 –fruit 5-10 %)	Signum 1,5 kg/ha	78	53,46	111,68
	II	21.05.	Switch 0,8 kg/ha	62		
	III	28.05.	Switch 0,8 kg/ha	76		
Control						100,00

Table 3. Results of experiment in the year 2014

Variants	Number of treatment	Date of treatment	Fungicides	Risk %	% effectiveness variants	Yield% K=100%
1. (BBCH 61)	I	04.04.	Signum 1,5kg/ha	62	80,2	192,42
	II	14.04.	Signum 1,5kg/ha	53		
	III	23.04.	Switch 0,8 kg/ha	76		
	IV	28.04.	Switch 0,8 kg/ha	78		
	V	05.05.	Switch 0,8 kg/ha	78		
2. (BBCH 65)	I	14.04.	Signum 1,5kg/ha	53	78	191,78
	II	23.04.	Signum 1,5kg/ha	76		
	III	28.04.	Switch 0,8 kg/ha	78		
	IV	05.05.	Switch 0,8 kg/ha	78		
3. (BBCH 67)	I	23.04.	Signum 1,5kg/ha	76	74	127,04
	II	28.04.	Switch 0,8 kg/ha	78		
	III	05.05.	Switch 0,8 kg/ha	78		
Control						100,00



Acknowledgements

Given that so far the causal agent of strawberry gray mold was mainly based on the application of fungicides in the period from the beginning of flowering until harvest before - "calendar" .Our three-year results indicate that the use of fungicides can be based on software METOS and to supporti the risks and the developmental stages of strawberries. When the amount of the risk is more than 50% and block the strawberry is in the beginning of the flowering stage of development (BBCH 61) to do the first treatment, and subsequent treatments linked to the persistence of fungicides, waiting period and the level of risk (over 50-70%).



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