

ASPECTS REGARDING THE CONTROL OF PATHOGENS ON BELL PEPPER IN THE FIELD

ASPECTE PRIVIND CONTROLUL AGENȚILOR PATOGENI LA CULTURA DE ARDEI GRAS DIN CÂMP

ȘOVĂREL Gabriela¹*, COSTACHE M.¹

*Corresponding author e-mail: gabriela_sovarel@yahoo.com

Abstract. *The main objective of this experience was to develop a program of treatments for the control of pepper diseases in the field. The experience was achieved in 2017 at RDIVFG Vidra, 5 variants, placed in randomized blocks, using Buzau 10 bell peppers variety. In the crop of pepper in the field, the highest yields were recorded in variant which was applied to the following succession of products: T1. Copper Max 50 WP 0.25%; T2. Bravo 500 SC 0.2%; T3. Champ 77 WG 0.25%; T4. Orius 25 EW 0.05%; T5. Copper Max 50 WP 0.25%; T6. Ortiva Top 0.1% with 29.9 t / ha (19.6% increased yield compared with untreated control) and variant T1. Copper Max 50 WP 0.25%; T2. Polyram DF 0.2%; T3. Champ 77 WG 0.25%; T4. Orius 25 EW 0.05%; T5. Copper Max 50 WP 0.25%; T6. Ortiva Top 0.1% with 29.7 t / ha (18.8% increased yield compared to the untreated control).*

Key words: bell pepper, fungicides

Rezumat. *Principalul obiectiv al acestei experiențe a fost elaborarea unui program de tratamente pentru controlul agenților de dăunare la cultura de ardei din câmp. Experiența a fost realizată în anul 2017, la ICDLF Vidra, în 5 variante, așezată în blocuri randomizate, folosind soiul de ardei gras Buzau 10. La cultura de ardei din câmp, cele mai mari producții s-au înregistrat la varianta la care s-a aplicat următoarea succesiune de produse: T1. Copper Max 50 WP 0,25%; T2. Bravo 500 SC 0,2%; T3. Champ 77 WG 0,25%; T4. Orius 25 EW 0,05%; T5. Copper Max 50 WP 0,25%; T6. Ortiva Top 0,1% cu 29,9 t/ha (19,6 % spor față de martor) și la varianta T1. Copper Max 50 WP 0,25%; T2. Polyram DF 0,2%; T3. Champ 77 WG 0,25%; T4. Orius 25 EW 0,05%; T5. Copper Max 50 WP 0,25%; T6. Ortiva Top 0,1% cu 29,7 t/ha (18,8 % spor de producție față de martor).*

Cuvinte cheie: ardei gras, fungicide

INTRODUCTION

In Romania, green pepper crops in greenhouses and field are frequently attacked by some pathogens that cause significant damage, leading to the compromise of culture if no phytosanitary treatments are done. The main pathogens that cause disease are *Xanthomonas vesicatoria*, *Pseudomonas tomato*, *Botrytis cinerea*, *Alternaria tenuis*, *Leveillula taurica*, *Phytophthora capsici*, *Verticillium dahliae* and *Fusarium oxysporum* f. sp. *vasinfectum* (Costache et al.,

¹Research Development Institute for Vegetable and Flower Growing - Vidra, Romania

2007). Other pathogens are also spread in other countries, such as *Ralstonia solanacearum*, *Clavibacter michiganensis* subsp. *michiganensis*, *Colletotrichum gloeosporioides*, *Cercospora capsici*, *Choanephora cucurbitarum*, *Stemphylium solani*, *Sclerotium rolfsii*, *Sclerotinia sclerotiorum* (Shankar *et al.*, 2014). Bacteria are controlled by copper based products, streptomycin sulfate, anthracnose with products based on azoxistrobin and pyraclostrobin, root, stems and fruits rot with products based on cyazofamid, dimethomorph + ametoctradin, fluopicolide, mandipropamid, mefenoxam + copper, oxathiapripline + chlorothalonil or mefenoxam or mandipropamide (Meadows and Sharpe, 2017).

MATERIAL AND METHOD

The experience was realized in 2017 at RDIVFG Vidra, placed in randomized blocks, in 4 replicates using the Buzau 10 bell pepper variety.

Planting in the field was done on May 9, 2017. During the vegetation period were applied 6 foliar treatments (T1 - T6) at 12-16 days intervals: June 23, July 7, 19, August 4, 21 and September 6.

Technological control variants (tab. 1) were determined according to the sequence of pathogens in crops.

The main objective of this experience was to develop a program of treatments for the control of pepper pests in the field.

Table 1

Variants for pathogen control on bell pepper cultivated in the field (Vidra, 2017)

Variant	23.06.2017	07.07.2017	19.07.2017	04.08.2017	21.08.2017	06.09.2017
	T1	T2	T3	T4	T5	T6
1.	Copper Max 50 WP 0.25%	Bravo 500 SC 0.2%	Champ 77 WG 0.25%	Orius 25 EW 005%	Copper Max 50 WP 0.25%	Ortiva Top 0.1%
2.	Champ 77 WG 0.25%	Cabrio Top 0.2%	Copper Max 50 WP 0.25%	Score 250 EC 0.05%	Champ 77 WG 0.25%	Ortiva 250 EC 0.075%
3.	Copper Max 50 WP 0.25%	Polyram DF 0.2%	Champ 77 WG 0.25%	Orius 25 EW 0.05%	Copper Max 50 WP 0.25%	Ortiva Top 0.1%
4.	Champ 77 WG 0.25%	Dithane M45 WP 0.2%	Copper Max 50 WP 0.25%	Score 250 EC 0.05%	Champ 77 WG 0.25%	Ortiva 250 EC 0.075%
5.	Untreated check	-	-	-	-	-

RESULTS AND DISCUSSIONS

The first pathogen reported to the pepper culture in the field was *Pseudomonas tomato* (6.07) and last *Leveillula taurica* (24.08). The pathogen attack began in the third decade of July (*Botrytis cinerea* – 21.07; *Alternaria tenuis* – 24.07; *Xanthomonas vesicatoria* – 26.07: tab. 2).

Table 2

The occurrence and evolution of pathogens and pests attack in field pepper crops in correlation with climatic factors (Vidra, 2017)

Degree of attack / frequency of attack (%)/month, decade

The pathogen or the pest	Date of the attack	Degree of attack / frequency of attack (%)/month, decade																	
		May			June			July			August			September					
		III	II	III	I	II	III	I	II	III	I	II	III	I	II	III			
<i>Xanthomonas vesicatoria</i>	26.07	0	0	0	0	0	0	0	0	0	0	0.7	1.5	2.8	4.1	6.4	7.5	8.9	
<i>Pseudomonas tomatu</i>	06.07	0	0	0	0	0	0.8	1.3	1.9	2.4	3.3	3.8	4.5	5.5	6.1				
<i>Alternaria tenuis</i>	24.07	0	0	0	0	0	0	0	1.0	1.8	2.5	3.1	3.5	4.2	6.7				
<i>Botrytis cinerea</i>	21.07	0	0	0	0	0	0	0	1.4	2.0	2.8	3.5	4.3	6.9	8.8				
Minimum temperature (°C)	-	12.4	15.0	14.0	16.3	15.9	15.9	17.5	17.5	21.1	18.3	15.1	13.7	15.3	10.5				
Maximum temperature (°C)	-	21.4	27.0	26.0	31.9	28.4	28.9	31.0	36.6	31.8	28.7	28.8	29.4	19.2					
Average temperature (°C)	-	16.5	20.1	19.8	23.8	22.0	22.0	24.0	30.8	25.6	21.3	20.8	21.5	14.2					
Minimum relative humidity (%)	-	57.0	47.5	43.8	36.4	46.0	37.8	35.7	26.9	27.4	30.2	29.3	30.8	41.7					
Maximum relative humidity (%)	-	79.6	77.8	74.4	82.5	74.7	63.6	63.3	52.4	57.0	56.4	72.3	61.7	64.6					
Average relative humidity (%)	-	66.9	59.5	56.8	56.4	57.9	47.6	46.8	36.7	38.7	41.7	46.9	44.8	50.7					
Rainfall (mm)	-	7.5	20.0	22.5	1.0	84.0	8.5	6.5	0	0	45.0	30.0	1.0	2.0					

Table 3

The efficacy of some variants of treatments for controlling the pathogen on bell pepper crop in the field (Vidra, 2017)

Degree of attack / frequency of attack (%) and efficacy (E %)

Variant	kg/m ²	t/ha	Yield % increased yield compared to the untreated control	Degree of attack / frequency of attack (%) and efficacy (E %)										
				<i>Pseudomonas tomatu</i> (GA %)	E (%)	<i>Xanthomonas vesicatoria</i> (GA %)	E (%)	<i>Alternaria tenuis</i> (FA %)	E (%)	<i>Botrytis cinerea</i> (FA %)	E (%)	<i>Leveillula taurica</i> (GA %)	E (%)	E average (%)
1	2.986	29.9	119.6	1.1	82.0	1.4	84.3	1.2	82.1	1.7	80.7	1.0	81.8	82.2
2	2.940	29.4	117.6	1.3	78.7	1.6	82.0	1.0	85.1	1.5	81.8	0.9	83.6	82.2
3	2.970	29.7	118.8	1.3	78.7	1.7	80.9	1.3	80.6	1.4	84.1	1.1	80.0	80.9
4	2.965	29.6	118.4	0.8	86.9	1.0	88.8	0.8	88.0	1.5	82.9	1.0	81.8	85.7
5	2.496	25.0	100.0	6.1	-	8.9	-	6.7	-	8.8	-	5.5	-	-

The attack of pathogens had a slow evolution due to the low rainfall from the second decade of July to the second decade of August (15 mm) and low atmospheric humidity (52.4 - 63.6%) and high temperatures (28.9 - 36.6 ° C).

Under these conditions, the mean efficacy of the treatment variants was relatively similar, ranging from 80.9% (variant 3) and 85.7% (variant 4, Table 3).

Regarding the bell pepper yield in the field, depending on the variants of experiments, it had values between 29.4 t / ha (V 2) and 29.9 t / ha (V 1), compared to 25.0 t / ha in the untreated control variant (tab. 3).

The best results were recorded in variant 1 where it was applied the next succession of products: T1. Copper Max 50 WP 0.25%; T2. Bravo 500 SC 0.2%; T3. Champ 77 WG 0.25%; T4. Orius 25 EW 0.05%; T5. Copper Max 50 WP 0.25%; T6. Ortiva Top 0.1% with 29.9 t/ha (19.6 % increased yield compared to the untreated control) and variant 3: T1. Copper Max 50 WP 0.25%; T2. Polyram DF 0.2%; T3. Champ 77 WG 0.25%; T4. Orius 25 EW 0.05%; T5. Copper Max 50 WP 0.25%; T6. Ortiva Top 0.1% with 29.7 t/ha (18.8 % increased yield compared to the untreated control). It can be appreciated that all variants where were applied treatments for pathogen control, have been obtained similar yield values.

CONCLUSIONS

The control of pathogens in field can be achieved with very good results on bell pepper crops using the following treatment program: T1. Copper Max 50 WP 0.25%; T2. Bravo 500 SC 0.2%; T3. Champ 77 WG 0.25%; T4. Orius 25 EW 0.05%; T5. Copper Max 50 WP 0.25%; T6. Ortiva Top 0.1%.

Bacterial control can be done with copper based products (Copper Max 50 WP 0.25%, Champ 77 WG 0.25%), and for the other pathogens Polyram DF 0.2%; Orius 25 EW 0.05% and Ortiva Top 0.1%.

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