

## ASPECTS OF SIMULTANEOUS CONTROL OF THE PATHOGENS AND PESTS ON CUCUMBER CROPS UNDER HIGH PLASTIC TUNNELS

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### Abstract

The experience done at the R.I.V.F.G Vidra had as purpose determining the compatibility of some fungicides with different insecticides-acaricides, for controlling, at the same time, the pathogens and pests on cucumber crops. The experience was done in 2018, under high plastic tunnels and had 10 variants, in 4 replications, randomized complete block. Five treatments were applied at 10 - 11 days intervals: 3.09, 13.09, 24.09, 4.10, 15.10. The best results in controlling pathogens (*Sphaerotheca fuliginea*, *Pseudoperonospora cubensis*, *Alternaria cucumerina*) and pests (*Tetranychus urticae*, *Thrips tabaci*) were obtained at the variants: 8 (Ortiva Top 0.1% + Vertimec 1.8EC 0,1%) with efficacy - 91,1%, 9 (Ortiva Top 0.1% + Laser 240SC 0.05%) with 87.3% and 7 (Ortiva Top 0.1% + Mospilan 20SG 0.04%) with 86.1%. Through the obtained yield the same variants were noted: V8 with 3.86 kg/m<sup>2</sup>, V9 with 3.78 kg/m<sup>2</sup> and V7 with 3.75 kg/m<sup>2</sup> compared to 2.99 kg/m<sup>2</sup> at variant 10, untreated control.

Keywords: pathogens, pests, pesticides compatibility.

### 1. INTRODUCTION

In all controlling measures, chemical control have a particularly important role. The relatively simple use of pesticides, the rapid and often radical effect of treatments has greatly simplified the control technique, so the chemical method has become a safe method in crop protection (Costache et al., 2018).

The benefits of pesticides can be estimated by avoiding yield losses caused by pathogens and pests (Engindeniz et al., 2016).

Often crop of cucumbers is severely affected by pathogens and pests. The temperature and humidity conditions under high plastic tunnels, necessary for the growth and development of plants are, at the same time, favourable to the development of pathogens and pests, with obvious consequences for the quantity and quality of yield. This increases the risk of developing the attack, making it more difficult to control pathogens and pests (Parvatha Reddy, 2016).

During the growing period, reducing the number of treatments can be achieved by using compatible pesticide combinations to control, at the same time, the pathogens and pests (Costache et al., 2007).

On cucumber crops, under high plastic tunnels, frequently appear the attack of pathogens *Sphaerotheca fuliginea* (powdery mildew), *Pseudoperonospora cubensis* (downy mildew), *Alternaria cucumerina* (alternaria leaf spot) and pests *Thrips tabaci* (common thrips), *Tetranychus urticae* (red common spider) and *Cerosipha gossypii* (green cucumber aphid) which affects the yield, if are not taken the adequate control measures.

Research done at R.I.V.F.G Vidra, has as purpose identification of different combinations of fungicides with insecticides-acaricides, for controlling, at the same time, the pathogens and pests, in cucumber crops.

## 2. MATERIALS AND METHODS

The experience was done in 2018, in the cycle II of crop. Planting was done on August 3<sup>rd</sup>, using the Puccini F1 hybrid. The experience had 10 variants, in 4 replications, located randomly.

The experimental variants were as follows: V1. Melody Compact 49 WG (iprovalicarb 8.4% + copper oxychloride 40%) 0.2% + Mospilan 20SG (acetamiprid 20%) 0.04%; V2. Melody Compact 49 WG 0.2% + Vertimec 1.8EC (abamectin 18 g/l) 0.1%; V3. Melody Compact 49 WG 0.2% + Laser 240SC (spinosad 240 g/l) 0.05%; V4. Acrobat MZ 69 WG (dimethomorph 9% + mancozeb 60%) 0.2% + Mospilan 20SG 0.04%; V5. Acrobat MZ 69 WG 0.2% + Vertimec 1.8EC 0.1%; V6. Acrobat MZ 69 WG 0.2% + Laser 240SC 0.05%; V7. Ortiva Top (azoxystrobin 200 g/l + difenoconazol 125 g/l) 0.1% + Mospilan 20SG 0.04%; V8. Ortiva Top 0.1% + Vertimec 1.8EC 0.1%; V9. Ortiva Top 0.1% + Laser 240SC 0.05%; V10. Untreated control.

Five treatments were applied at 10 - 11 days intervals: 3.09, 13.09, 24.09, 4.10, 15.10.

Observations have been made on the appearance and evolution of pathogens attack *Sphaerotheca fuliginea*, *Pseudoperonospora cubensis* and *Alternaria cucumerina* and pests *Tetranychus urticae* and *Thrips tabaci* (frequency and intensity of the attack %) and were calculated: degree of attack (DA%) and efficacy (E%). Yield has been recorded on variants and replications. The yield data were processed by method of variance analysis.

## 3. RESULTS AND DISCUSSIONS

Observations made in recent years have highlighted that under the influence of climate change, there have been changes in the levels of attack of the pests mentioned above. *Sphaerotheca fuliginea* attack (GA=58.7%) has expanded and *Pseudoperonospora cubensis* attack has dropped considerably (GA=12.6%, Table 1).

**Table 1. Influence of climatic factors on the occurrence and evolution of pathogens and pests attack on the cucumber crop under high plastic tunnels (cycle II, Vidra, 2018)**

Pathogens, pests and climatic factors	Degree of attack (%) / month/ decade								
	The date of the attack	august		september			october		
		II	III	I	II	III	I	II	III
<i>Sphaerotheca fuliginea</i>	5.09	0	0	0.7	3.5	15.8	32.4	47.3	58.7
<i>Pseudoperonospora cubensis</i>	13.09	0	0	0	0.2	1.3	3.9	8.1	12.6
<i>Alternaria cucumerina</i>	22.09	0	0	0	0	0.7	2.9	5.3	8.9
<i>Tetranychus urticae</i>	21.09	0	0	0	0	0.4	1.9	4.6	6.7
<i>Thrips tabaci</i>	15.09	0	0	0	0.5	1.9	5.8	9.1	11.8
Minimum T. (°C)	-	21.3	21.8	23.4	20.4	14.5	12.9	11.3	8.8
Medium T. (°C)	-	29.8	29.9	29.4	25.4	23.0	21.1	17.2	14.6
Maximum T. (°C)	-	36.5	36.3	34.9	29.9	31.3	26.9	22.1	19.2
Minimum U.R. (%)	-	32.6	31.8	24.6	32.8	39.9	35.4	56.7	72.7
Medium U.R. (%)	-	52.6	49.6	33.6	40.1	59.0	46.2	70.9	83.9
Maximum U.R. (%)	-	79.6	72.6	46.1	52.8	82.1	62.4	87.9	99.8

The attack of pathogens and pests has been shown since September as follows: *Sphaerotheca fuliginea* (5.09), *Pseudoperonospora cubensis* (13.09), *Alternaria cucumerina* (22.09), *Thrips tabaci* (15.09) and *Tetranychus urticae* (21.09).

The occurrence and evolution of the attack of powdery mildew, produced by *Sphaerotheca fuliginea* (fig.1), were favored by average temperatures in the period from August to September (27.5°C) and average air humidity (47°C). The same climatic factors were less favorable for the development of the pathogen attack: *Pseudoperonospora cubensis* (downy mildew; fig.2), *Alternaria cucumerina* (alternaria leaf spot) and pests *Tetranychus urticae* (red common spider; fig.3) and *Thrips tabaci* (common thrips; fig 4).

From the combinations of tested products, the best results in the controlling, at the same time, of the pathogens (*Sphaerotheca fuliginea*, *Pseudoperonospora cubensis*, *Alternaria cucumerina*) and pests (*Tetranychus urticae*, *Thrips tabaci*) were obtained at variants 8 (Ortiva Top 0.1% + Vertimec 1.8EC 0.1%) with efficacy 91.1%, 9 (Ortiva Top 0.1% + Laser 240SC 0.05%) with 87.3% and 7 (Ortiva Top 0.1% + Mospilan 20SG 0.04%) with 86.1% (Table 2).

**Table 2. The efficacy of some combinations of fungicides with different insecticides-acaricides in simultaneous control of pathogens and pests on cucumber crop under high plastic tunnels (Vidra, 2018)**

Variants	Pathogens and pests											Total DA (%)	Mean E (%)
	<i>Sphaerotheca fuliginea</i>		<i>Pseudoperonospora cubensis</i>		<i>Alternaria cucumerina</i>		<i>Tetranychus urticae</i>		<i>Thrips tabaci</i>				
	DA (%)	E (%)	DA (%)	E (%)	DA (%)	E (%)	DA (%)	E (%)	DA (%)	E (%)			
1.	26.7	54.5	2.6	79.4	2.1	76.4	3.8	43.3	2.7	77.1	37.9	61.6	
2.	25.3	56.9	3.1	75.4	1.9	78.6	0.5	92.5	2.5	78.8	33.3	66.3	
3.	23.7	59.6	2.8	77.8	1.7	80.9	3.2	55.2	1.5	88.1	32.9	66.7	
4.	25.9	55.9	3.0	76.2	2.4	73.0	3.5	47.8	2.6	78.0	37.4	62.1	
5.	23.7	59.6	3.5	72.2	2.1	76.4	0.3	95.5	2.0	83.0	31.6	68.0	
6.	22.4	61.8	3.2	74.6	2.0	77.5	3.0	55.2	1.8	84.7	32.4	67.2	
7.	1.8	96.9	3.7	70.6	2.0	77.5	4.1	38.8	2.1	82.2	13.7	86.1	
8.	1.6	97.3	3.4	73.0	1.8	79.8	0.3	95.5	1.7	85.6	8.8	91.1	
9.	1.9	96.8	3.3	73.8	1.6	82.0	3.8	43.3	1.9	84.0	12.5	87.3	
10.	58.7	-	12.6	-	8.9	-	6.7	-	11.8	-	98.7	-	

Regarding the obtained yields the same variants were noted: : V8 (Ortiva Top 0.1% + Vertimec 1.8 EC 0.1%) with 3.86 kg/m<sup>2</sup>, V9 (Ortiva Top 0.1% + Laser 240 SC 0.05%) with 3.78 kg/m<sup>2</sup> and V7 (Ortiva Top 0.1% + Mospilan 20 SG 0.04%) with 3.75 kg/m<sup>2</sup>, compared to 2.99 kg/m<sup>2</sup> at variant 10, untreated control (Table 3).

Following the statistical calculation, by the variance analysis method, it was found that the differences in obtained yield, in addition to the untreated control (variant 10), were very significant.

**Table 3. Simultaneous control of pathogens and pests on cucumber crops under high plastic tunnels – obtained yield (Vidra, 2018)**

Variant	Yield			
	kg/m <sup>2</sup>	Relative yield %	Difference from V10 (kg/m <sup>2</sup> )	Signification
1.	3.57	119.4	+0.58	***
2.	3.69	123.4	+0.70	***
3.	3.55	118.7	+0.56	***
4.	3.62	121.1	+0.63	***
5.	3.67	122.7	+0.68	***
6.	3.56	119.1	+0.57	***
7.	3.75	125.4	+0.76	***
8.	3.86	129.1	+0.87	***
9.	3.78	126.4	+0.79	***
10.	2.99	100.0	Mt	-

LD 5%=0.06; LD 1%=0.08; LD 0.1%=0.11



Figure 1. *Sphaerotheca fuliginea* – attack on the leaf



Figure 2. *Pseudoperonospora cubensis* – attack on the leaf

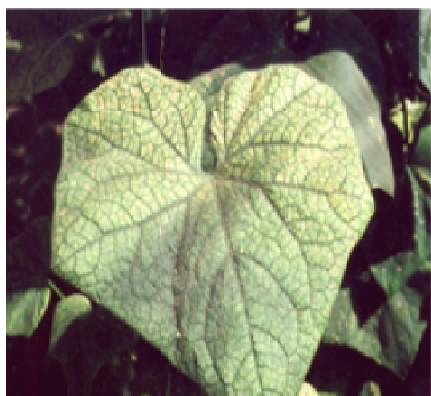


Figure 3. *Tetranychus urticae* – attack on the leaf

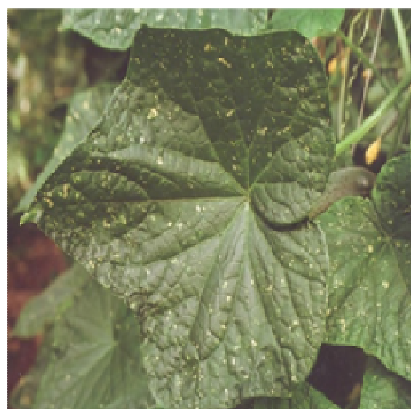


Figure 4. *Thrips tabaci* – attack on the leaf

#### 4. CONCLUSIONS

At the cucumber crops under high plastic tunnels, cycle II, the attack of the following pathogens *Sphaerotheca fuliginea* (DA=58.7%), *Pseudoperonospora cubensis* (DA=12.6%) and *Alternaria cucumerina* (DA=8.9%) and pests *Tetranychus urticae* (DA=6.7%) and *Thrips tabaci* (DA=11.8%) was identified.

The best results in the controlling, at the same time, of the pathogens (*Sphaerotheca fuliginea*, *Pseudoperonospora cubensis*, *Alternaria cucumerina*) and pests *Tetranychus urticae*, *Thrips tabaci*) were obtained at variants 8 (Ortiva Top 0.1% + Vertimec 1.8EC 0.1%) with efficacy 91.1%, 9 (Ortiva Top 0.1% + Laser 240SC 0.05%) with 87.3% and 7 (Ortiva Top 0.1% + Mospilan 20SG 0.04%) with 86.1%.

Regarding the obtained yields the same variants were noted: V8 (Ortiva Top 0.1% + Vertimec 1.8 EC 0.1%) with 3.86 kg/m<sup>2</sup>, V9 (Ortiva Top 0.1% + Laser 240 SC 0.05%) with 3.78 kg/m<sup>2</sup> and V7 (Ortiva Top 0.1% + Mospilan 20 SG 0.04%) with 3.75 kg/m<sup>2</sup>, compared to 2.99 kg/m<sup>2</sup> at variant 10, untreated control.

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