

## CONTROLLING OF THE MAIN PATHOGENS ON MELON CROPS UNDER HIGH PLASTIC TUNNELS

Gabriela Șovărel<sup>1</sup>, Ana-Emilia Cenușă<sup>1</sup>, Marcel Costache<sup>1</sup>, Simona-Ștefania Hogeă<sup>1</sup>

<sup>1</sup>Research and Development Institute for Vegetable and Flower Growing, Vidra, Calea București, no.22, Ilfov, Romania

### Abstract

The experience which was conducted at the R.I.V.F.G. Vidra, in 2018, under high plastic tunnels had as purpose determining the efficacy of different combinations of fungicides used for simultaneous control of pathogens in melon crop. The experience had 10 variants, in 4 replications, located randomly. The experimental variants were as follows: V1. Melody Compact 49 WG 0.2% + King 0.05%; V2. Melody Compact 49 WG 0.2% + Systhane Forte 0.02%; V3. Melody Compact 49 WG 0.2% + Ortiva Top 0.1%; V4. Aliette 80 WG 0.2% + King 0.05%; V5. Aliette 80 WG 0.2% + Systhane Forte 0.02%; V6. Aliette 80 WG 0.2% + Ortiva Top 0.1%; V7. Acrobat MZ 69 WG 0.2% + King 0.05%; V8. Acrobat MZ 69 WG 0.2% + Systhane Forte 0.02%; V9. Acrobat MZ 69 WG 0.2% + Ortiva Top 0.1%; V10. Untreated control. During the growing season, the attack of the following pathogens was manifested: *Sphaerotheca fuliginea* (DA=94.9%), *Pseudoperonospora cubensis* (DA=24.9%) and *Alternaria cucumerina* (DA=12.7%). The mean efficacy of combinations of fungicides recorded the highest values for variants 3 (88.7%), 9 (87.8%) and 6 (86.1%). Regarding the obtained yield, the best variants were: 3 (51.8 t/ha), 9 (51.5 t/ha) and 1 (51.2 t/ha), while at variant 10 untreated control, this was only 31.8 t/ha.

Key words: pathogens, simultaneous control, efficacy, yield.

### 1. INTRODUCTION

Melon crop occupies an important area around the world, the biggest surfaces being in China, with 490.327 ha, followed by Turkey, Iran, Afghanistan and India. In Europe, Romania occupies 5th place with an area of 3345 ha after Spain, Italy, Ukraine and France (FAO, 2017).

Foliar diseases in melons have a negative impact on the yield and quality of the fruit (Egel, 2016). In USA, in the main areas where melons are grown, is recommended to apply the fungicide to control pathogens: *Pseudoperonospora cubensis* (Elumin, Bravo, Catamaran, Mancozeb, Omega), *Sphaerotheca fuliginea* (Aprovia Top, Fontelis, Luna Experience, Luna Sensation, Inspire Super) and *Alternaria cucumerina* (Aprovia Top, Echo, Equus, Initiate, Cabrio EG, Dithane; 2018).

On melon crops under high plastic tunnels, frequently appear the attack of pathogens *Sphaerotheca fuliginea*, *Pseudoperonospora cubensis*, *Alternaria cucumerina* and pests *Tetranychus urticae*, *Thrips tabaci*, *Cerosipha gossypii* and *Liriomyza* sp. which decreases the yield in terms of quantity and quality, if are not taken the adequate control measures.

To prevent the appearance and control of these pathogens are used many chemical products, "bio" products and cultivars with different levels of resistance/ tolerance to attack (Costache M. et al., 2007; Costache M. et al., 2018).

During the growing period, the attack of pathogens may overlap, so it is necessary to establish different combinations of fungicides to control them simultaneously, which allow a reduction of number of treatments.

Research done at R.I.V.F.G. Vidra, had as purpose identification of different combinations of fungicides for the simultaneous control of pathogens *Sphaerotheca fuliginea*, *Pseudoperonospora cubensis* and *Alternaria cucumerina* on melon crops.

## 2. MATERIALS AND METHODS

The experience was conducted at the R.I.V.F.G. Vidra, in 2018, under high pastic tunnels, in the cycle I of crop. The melon variety used was Festiv. The experience had 10 variants, in 4 replications, located randomly:

V1. Melody Compact 49 WG (iprovalicarb 8.4% + copper oxychloride 40%) 0.2% + King (tebuconazole 250 g/l) 0.05%; V2. Melody Compact 49 WG 0.2% + Systhane Forte (myclobutanil 240 g/l) 0.02%; V3. Melody Compact 49 WG 0.2% + Ortiva Top (azoxystrobin 200 g/l + difenoconazole 125 g/l) 0.1%; V4. Aliette 80 WG (fosetyl-Al 80%) 0.2% + King 0.05%; V5. Aliette 80 WG 0.2% + Systhane Forte 0.02%; V6. Aliette 80 WG 0.2% + Ortiva Top 0.1%; V7. Acrobat MZ 69 WG (dimethomorph 9% + mancozeb 60%) 0.2% + King 0.05%; V8. Acrobat MZ 69 WG 0.2% + Systhane Forte 0.02%; V9. Acrobat MZ 69 WG 0.2% + Ortiva Top 0.1%; V10. Untreated control.

Four treatments were applied at 10 days intervals (26.06, 06.07, 16.07 and 26.07).

Observations have been made on the appearance and evolution of pathogens attack *Sphaerotheca fuliginea*, *Pseudoperonospora cubensis* and *Alternaria cucumerina* (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

Due to climatic changes, attack of the *Sphaerotheca fuliginea* (powdery mildew) has evolved a lot, according with observations made in recent years.

In the experience, the attack of the following pathogens has been manifested: *Sphaerotheca fuliginea* (DA=94.9%), *Pseudoperonospora cubensis* (DA=24.9%) and *Alternaria cucumerina* (DA=12.7%), the values mentioned referring to the variant untreated control.

Attack by *Sphaerotheca fuliginea* has been manifested since the first decade of June (06.06), by *Pseudoperonospora cubensis* since the third decade of June (21.06) and by *Alternaria cucumerina* since the first decade of July (09.07; Table 1).

The occurrence and evolution of the attack of *Sphaerotheca fuliginea* were favored by the relatively high average temperature (31.6 °C), from June to August and lower average atmospheric humidity (54.3%), from the same period. At the same time these conditions were less favorable for the appearance and evolution of the pathogens *Pseudoperonospora cubensis* and *Alternaria cucumerina*.

The fungicides combinations: Melody Compact 49 WG 0.2%, Aliette 80 WG 0.2% or Acrobat MZ 69 WG 0.2% with King 0.05%, Systhane Forte 0.02% or Ortiva Top 0.1% provided a good protection for melon plants against the attack of pathogens *Sphaerotheca fuliginea*, *Pseudoperonospora cubensis* and *Alternaria cucumerina*, the average efficacy beeing between 77.5% (Aliette 80 WG 0.2% + King 0.05%; Aliette 80 WG 0.2% + Systhane Forte 0.02%) and 88.7% (Melody Compact 49 WG 0.2% + Ortiva Top 0.1%; Table 2).

**Table 1. Influence of climatic factors on the occurrence and evolution of pathogens attack on the melon crops under high plastic tunnels (cycle I, Vidra, 2018)**

Pathogen and climatic factors	Degree of attack (%) / month/ decade									
	The date of the attack	June			July			August		
		I	II	III	I	II	III	I	II	III
<i>Sphaerotheca fuliginea</i>	06.06	0.5	1.8	3.5	5.3	9.7	21.7	35.9	69.7	94.9
<i>Pseudoperonospora cubensis</i>	21.06	0	0	0.8	1.7	2.9	4.5	6.1	17.8	24.9
<i>Alternaria cucumerina</i>	09.07	0	0	0	0.4	1.2	2.7	4.1	6.9	12.7
Minimum T. (°C)	-	24.8	26.9	23.3	22.4	24.5	26.8	24.5	22.2	24.9
Medium T. (°C)	-	32.8	35.2	26.7	29.1	31.9	30.4	33.6	32.2	32.9
Maximum T. (°C)	-	38.6	40.5	30.4	34.5	36.9	33.2	39.9	38.9	38.4
Minimum R.H. (%)	-	31.9	58.7	80.9	55.1	31.5	30.8	34.5	31.6	28.8
Medium R.H. (%)	-	39.6	67.7	89.8	67.9	36.8	39.6	51.8	49.2	46.8
Maximum R.H. (%)	-	50.7	84.6	95.8	83.7	43.4	50.1	78.6	80.3	70.0

**Table 2. The efficacy of some combinations of fungicides in simultaneous control of pathogens on melon crops under high plastic tunnels (Vidra, 2018)**

Variant	<i>Sphaerotheca fuliginea</i>		<i>Pseudoperonospora cubensis</i>		<i>Alternaria cucumerina</i>		Mean E (%)
	DA (%)	E (%)	DA (%)	E (%)	DA (%)	E (%)	
1. Melody Compact 49 WG 0.2% + King 0.05%	14.7	84.5	3.2	87.1	2.1	83.5	85.0
2. Melody Compact 49 WG 0.2% + Systhane Forte 0.02%	11.6	87.8	3.8	84.7	2.4	81.1	84.5
3. Melody Compact 49 WG 0.2% + Ortiva Top 0.1%	9.5	90.0	2.8	88.7	1.6	87.4	88.7
4. Aliette 80 WG 0,2% + King 0.05%	17.8	81.2	4.1	83.5	4.1	67.7	77.5
5. Aliette 80 WG 0.2% + Systhane Forte 0.02%	13.1	86.0	4.9	80.3	4.3	66.1	77.5
6. Aliette 80 WG 0.2% + Ortiva Top 0.1%	11.3	88.1	3.3	86.7	2.1	83.5	86.1
7. Acrobat MZ 69 WG 0.2% + King 0.05%	14.0	85.2	3.5	85.9	2.4	81.1	84.1
8. Acrobat MZ 69 WG 0.2% + Systhane Forte 0.02%	10.9	88.5	4.3	82.7	2.7	78.7	83.3
9. Acrobat MZ 69 WG 0.2% + Ortiva Top 0.1%	8.7	90.8	2.9	88.3	2.0	84.2	87.8
10. Untreated control	94.9	-	24.9	-	12.7	-	-

The mean efficacy of combinations of fungicides recorded the highest values for variants: 3 (88.7%), 9 (87.8%) and 6 (86.1%).

Regarding the obtained yield the following variants were noted: 3 (Melody Compact 49 WG 0.2% + Ortiva Top 0.1%) with 5.18 kg/m<sup>2</sup>, 9 (Acrobat MZ 69 WG 0.2% + Ortiva Top 0.1%) with 5.15 kg/m<sup>2</sup> and 1 (Melody Compact 49 WG 0.2% + King 0.05%) with 5.12 kg/m<sup>2</sup>, compared to 3.18 kg/m<sup>2</sup> at variant 10, untreated control (Table 3).

**Table 3. Simultaneous control of the pathogens on melon 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	5.12	161.0	+1.94	***
2	5.00	157.2	+1.82	***
3	5.18	162.9	+2.00	***
4	4.95	155.7	+1.77	***
5	4.88	153.5	+1.70	***
6	5.10	160.4	+1.92	***
7	5.11	160.7	+1.93	***
8	5.07	159.4	+1.89	***
9	5.15	161.9	+1.97	***
10	3.18	100.0	Mt	-

LD 5%=0.08; LD 1%=0.11; LD 0.1%=0.15

Following the statistical calculation, by the variant analysis, it was found that the differences in obtained yield, compared to the untreated control variant, are very significant.



**Figure 1. Variant 3 (Melody Compact 49 WG 0.2% + Ortiva Top 0.1%)**



**Figure 2. Variant 9 (Acrobat MZ 69 WG 0.2% + Ortiva Top 0.1%)**





Figure 3. Variant 10 (untreated control)



Figure 4. *Alternaria cucumerina*- attack on the leaf

#### 4. CONCLUSIONS

At the melon crops under high plastic tunnels, cycle I, the attack of the following pathogens was identified: *Sphaerotheca fuliginea* – powdery mildew (DA=94.9%), *Pseudoperonospora cubensis* - downy mildew (DA=24.9%) and *Alternaria cucumerina* - alternaria leaf spot (DA=12.7%).

The mean efficacy of combinations of fungicides recorded the highest values for variants: 3 (Melody Compact 49 WG 0.2% + Ortiva Top 0.1% - 88.7%), 9 (Acrobat MZ 69 WG 0.2% + Ortiva Top 0.1% - 87.8%) and 6 (Aliette 80 WG 0.2% + Ortiva Top 0.1% - 86.1%).

The yield obtained had the highest values for the variants: 3 (Melody Compact 49 WG 0.2% + Ortiva Top 0.1% - 5.18 kg/m<sup>2</sup>), 9 (Acrobat MZ 69 WG 0.2% + Ortiva Top 0.1% - 5.15 kg/m<sup>2</sup>) and 1 (Melody Compact 49 WG 0.2% + King 0.05% - 5.12 kg/m<sup>2</sup>) compared to 3.18 kg/m<sup>2</sup> at variant 10, untreated control.

#### 5. REFERENCES

- Costache, M., Roman, T., Costache, C. (2007). Bolile și dăunătorii culturilor de legume [Diseases and pests of vegetable crops ] (p. 62-71). București: Editura Agris-Redacția revistelor agricole.
- Costache, M., Șovărel, G., Bratu, E. (2018). Bolile și dăunătorii culturilor de legume din spații protejate. Recunoaștere și combatere [Diseases and pests of vegetable crops from protected areas. Recognition and combat] (p. 17). București: Editura Ceres.
- Egel, D. (2016) Fungicide Spray Schedule for Cantaloupe and Watermelon - Issue: 612 Vegetable crop hotline - A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service. Retrieved May 10, 2016, from <https://vegcropshotline.org/article/fungicide-spray-schedule-for-cantaloupe-and-watermelon/>
- \*\*\* 2018, from [https://ag.purdue.edu/btny/midwest-vegetable-guide/Documents/2018/01\\_MWVegGuide\\_2018.pdf](https://ag.purdue.edu/btny/midwest-vegetable-guide/Documents/2018/01_MWVegGuide_2018.pdf)
- \*\*\* 2017, from <http://www.fao.org/statistics/en>