Active Ingredients Combinations for Pathogens Control on Cucumber Crops under High Plastic Tunnels

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Abstract

In Romania, *Pseudoperonospora cubensis* and *Sphaerotheca fuliginea* are the most important pathogens on cucumber crops under high plastic tunnels. For controlling these pathogens there are applied products with different active ingredients: dimethomorph 9 %, mancozeb 60 %, myclobutanil 240 g/l, penconazole 100 g/l, iprovalicarb 8.4 %, copper oxychloride 40%. The best efficacy for controlling *Pseudoperonospora cubensis* and *Sphaerotheca fuliginea* was obtained both combinations foseyl-aluminium 80% 0.2% + penconazole 100 g/l 0.025% (84.8%. 100%) and fosetyl aluminium 80% 0.2% + myclobutanil 240 g/l 0.02% (83.7%, 100%).

Keywords: cucumber, pathogens control, plastic tunnels

Introduction

In Romania, *Pseudoperonospora cubensis* and *Sphaerotheca fuliginea* are the most important pathogens on cucumber crops under high plastic tunnels (Costache *et al.* 2007). A study realised in Bulgaria, in the period 2006 - 2011 showed that the combination with active ingredients (dimethomorph 225g/l + initium 300 g/l) 0.07%, cymoxanil 60g/kg + copper hydroxide 436 g/kg) 0.2% and trifloxistrobin 25g/kg + cymoxanil 25 g/kg) 0.05% had good efficacy (86.13 – 89.31%) for controlling *Pseudoperonospora cubensis* on cucumbers (Masheva *et al.* 2013). Famoxadone + cymoxanil was the most effective treatment against downy mildew followed by clove oil, zinc oxide nanoparticles, EMs1, *B. pumillus*, *B. subtilis* and castor oil, respectively in two growing seasons (2012-2013/2013-2014; Mohamed *et al.* 2016),

Aims and objectives

The aim of this research is to identify active ingredients combinations for simultaneously control of these pathogens.

Materials and methods

The research take place during 2015, under high plastic tunnels with multiple possibility of ventilation, using cucumber hybrid Mirabelle F₁. Planting date august 1, 2015, density 33000 plants/ha.

For controlling *Pseudoperonospora cubensis* and *Sphaerotheca fuliginea* were used 7 vatriants: 1. (dimethomorph 9 % + mancozeb 60 %) 0.2% + myclobutanil 240 g/l 0.02%; 2. (dimethomorph 9 % + mancozeb 60 %) 0.2% + penconazole 100 g/l 0.025%; 3. fosetyl-aluminium 80% 0.2% + myclobutanil 240 g/l 0.02%; 4. fosetyl-aluminium 80% 0.2% + penconazole 100 g/l 0.025%; 5. (iprovalicarb 8.4 % + copper oxychloride 40 %) 0.2% + myclobutanil 240 g/l 0.02%; 6. (iprovalicarb 8,4 % + copper oxychloride 40 %) 0.2% + penconazole 100 g/l 0.025% and 7. Untreated check.

Were made three applications during vegetable period. First application was made at beginning infection risk (02.09) and the others at 7 days intervals (09.09 and 16.09).

Tab. 1. Efficacy of some fungicides combinations for simultaneously control of *Pseudoperonospora cubensis* and *Sphaerotheca fuliginea* pathogens on cucumbers

Variant	Concentration (%)	Degree of attack (%)			Efficacy (%)			Yield	
		<i>P.cubensis</i>	<i>S.fuliginea</i>	Total	<i>P.cubensis</i>	<i>S.fuliginea</i>	Total	t/ha	%
1	0.2+0.02	16.9	0	16.9	73.0	100.0	82.8	38.6	112.9
2	0.2+0.025	18.5	0	18.5	70.4	100.0	81.2	38.4	112.3
3	0.2+0.02	10.2	0	10.2	83.7	100.0	89.6	39.3	114.9
4	0.2+ 0.025	9.5	0	9.5	84.8	100.0	90.3	39.7	116.1
5	0.2+ 0.02	16.0	0	16.0	74.4	100.0	83.7	39.0	114.0
6	0.2+ 0.025	16.8	0.2	17.0	73.1	99.4	82.7	38.7	113.1
7	-	62.5	35.8	98.3	-	-	-	34.2	100.0

There were made observations regarding the frequency (%) and severity (%) of pathogen attack and were calculated the attack degree (%) and efficacy (%). The degree of attack was calculated with formula $(F\% \times S\%) / 100$ and efficacy with formula $(DA \text{ untreated } \% - DA \text{ treated } \%) \times 100 / DA \text{ untreated}$.

Results and discussion

The best efficacy for controlling *Pseudoperonospora cubensis* and *Sphaerotheca fuliginea* was obtained both variants 4. fosetyl-aluminium 80% 0.2% + penconazole 100 g/l 0.025% (84.8%, 100%) and 3. fosetyl-aluminium 80% 0.2% + myclobutanil 240 g/l 0.02% (83.7%, 100%).

The degree of attack on untreated check was 62.5% at *Pseudoperonospora cubensis* and 35.8 % at *Sphaerotheca fuliginea*.

The actives substances myclobutanil 240 g/l and penconazole 100 g/l, applied for controlling *Sphaerotheca fuliginea* have a very good efficacy.

Conclusion

There were identified several product combinations which provide a good control of main pathogens on cucumbers under protected crops.

The best efficacy for controlling *Pseudoperonospora cubensis* and *Sphaerotheca fuliginea* was obtained both fosetyl-aluminium 80% 0.2% + penconazole 100 g/l 0.025% and fosetyl-aluminium 80% 0.2% + myclobutanil 240 g/l 0.02%.

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