Research Regarding the Simultaneous Control of the Pathogens on Tomatoes Crops under High Plastic Tunnels

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Abstract

In Romania the most important pathogens on tomatoes crops are *Alternaria porri* f.sp. *solani*, *Botrytis cinerea*, *Fulvia fulva*, *Phytophthora infestans* and *Erysiphe* sp. During period of vegetation, the attacks of mentioned pathogens are frequently overlapping. For simultaneously control of pathogens were used some combination with different active substances (chlorothalonil 500g/l, iprodione 500 g/l, fenhexamid 500 g/l, thiophanate methyl 500g/l, metiram 80%, dimethomorph 9%, mancozeb 60%, difenoconazole 250 g/l, fenamidone 75g/l, propamocarb HCL 375 g/l. The best results for controlling *Alternaria porri* f.sp. *solani*, *Botrytis cinerea* and *Fulvia fulva* are metiram 80% 0.2% + thiophanate methyl 500g/l 0.14% with 93.5% efficacy. In the untreated check the degree of attack was 78.6% (44.3% *A. solani*, 7.0% *B. cinerea* and 27.3% *F. Fulva*). For controlling *Phytophthora infestans*, *Erysiphe* sp. and *Fulvia fulva* (fenamidone 75g/l + propamocarb HCL 375 g/l) 0.2% + difenoconazole 250 g/l 0.05% with 94.5% efficacy. In the untreated check the degree of attack is 81.2% (38.4% *P. infestans*, 27.4% *Erysiphe* sp., 15.4% *F. fulva*).

Keywords: *pathogens control, plastic tunnels, tomatoes*

Introduction

In Romania the most important pathogens on tomatoes crops are: *Alternaria porri* f.sp. *solani* (early blight) (Tomescu, 2003), *Botrytis cinerea* (grey mould) (Snowdwn A, 2010), *Fulvia fulva* (leaf mold), *Phytophthora infestans* (late blight) (Corbu, 2014) and *Erysiphe* sp. (powdery mildew).

Aims and objectives

During period of vegetation, the attack of mentioned pathogens are frequently overlapping. The aim of this research is to identify fungicide combinations for simultaneously control of pathogens attack.

Materials and methods

The research were realised on 2015, under high plastic tunnels with multiple possibility

of ventilation, using tomato hybrid Prekos F₁. Planting date 20.06.2015, density 38000 plants/ha.

For controlling *Alternaria porri* f. sp. *solani*, *Botrytis cinerea* and *Fulvia fulva* were used 7 variants: 1. chlorothalonil 500g/l 0.2% + iprodione 500 g/l 0.1%; 2. chlorothalonil 500g/l 0.2% + fenhexamid 500 g/l 0.08%; 3. chlorothalonil 500g/l 0.2% + thiophanate methyl 500g/l 0.14%; 4. metiram 80% 0.2% + iprodione 500 g/l 0.1%; 5. metiram 80% 0.2% + fenhexamid 500 g/l 0.08%; 6. metiram 80% 0.2% + thiophanate methyl 500g/l 0.14%; 7. Untreated check.

For controlling *Phytophthora infestans*, *Erysiphe* sp. and *Fulvia fulva* pathogens were used 5 variants: 1. (dimethomorph 9% + mancozeb 60%) 0.2% + difenoconazole 250 g/l 0.05%; 2. (dimethomorph 9% + mancozeb 60%)

Tab. 1. Efficacy of some fungicides combination for simultaneously control of pathogens *Alternaria solani*, *Botrytis cinerea* and *Fulvia fulva* on tomatoes

Variant	Concentration (%)	Degree of attack (%)				Efficacy (%)	Yield (t/ha)
		<i>A. solani</i>	<i>B.cinerea</i>	<i>F. fulva</i>	Total		
1	0.2 + 0.1	4.0	1.7	0	5.7	92.7	50.9
2	0.2 + 0.08	5.7	1.0	3.8	10.5	86.6	50.4
3	0.2 + 0.14	4.7	1.1	1.8	7.6	90.3	50.6
4	0.2 + 0.1	3.1	1.1	3.1	7.3	90.7	48.8
5	0.2 + 0.08	6.3	0	3.9	10.2	87.0	48.5
6	0.2 + 0.14	2.5	0	2.6	5.1	93.5	49.3
7	-	44.3	7.0	27.3	78.6	-	45.3

Tab. 2. Efficacy of some fungicides combinations for simultaneously control of pathogens *Phytophthora infestans*, *Erysiphe* sp. and *Fulvia fulva* on tomatoes

Variant	Concentration (%)	Degree of attack (%)				Efficacy (%)	Yield (t/ha)
		<i>Ph. infestans</i>	<i>Erysiphe</i> sp.	<i>F. fulva</i>	Total		
1	0.2 + 0.05	3.5	1.4	0	4.9	94.0	49.9
2	0.2 + 0.14	4.9	3.2	0.3	8.4	89.6	49.8
3	0.2 + 0.05	3.1	1.0	0.4	4.5	94.5	51.8
4	0.2 + 0.14	4.5	3.8	1.4	9.7	88.0	51.0
5	-	38.4	27.4	15.4	81.2	-	44.7

0.2% + thiophanate methyl 500 g/l 0.14%; 3. (fenamidone 75g/l + propamocarb HCL 375 g/l) 0.2% + difenoconazole 250 g/l 0.05%; 4. (fenamidone 75g/l + propamocarb HCL 375 g/l) 0.2% + thiophanate methyl 500 g/l 0.14% and 5. Untreated check.

Were made six applications, at 10 days intervals, during the growing season. First application was made at beginning infection risk.

There were made assessments (10 days after last application) on the leaves regarding the frequency (F %) and severity (S %) of pathogen attack and were calculated the attack degree (DA %) and efficacy (E %). 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 discussions

The best efficacy for controlling *Alternaria porri* f.sp. *solani*, *Botrytis cinerea* and *Fulvia fulva* were obtained with the variants: 1. chlorothalonil 500g/l 0.2% + iprodione 500 g/l 0.1% (92.7%) and 6. metiram 80% 0.2% + thiophanate methyl 500g/l 0.14% (93.5%; tab. 1).

For controlling *Phytophthora infestans*, *Erysiphe* sp. and *Fulvia fulva* the best results were obtained from the following variants: 3. (fenamidone 75g/l + propamocarb HCL 375 g/l) 0.2% + difenoconazole 250 g/l 0.05% and 1. (dimethomorph 9% + mancozeb 60%) 0.2% + difenoconazole 250 g/l 0.05%, with 94.5% and respectively 94.0% efficacy (tab. 2).

Conclusion

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

Very good efficacy for controlling *Alternaria porri* f.sp. *solani*, *Botrytis cinerea* and *Fulvia fulva* are metiram 80% 0.2% + thiophanate methyl 500g/l 0.14% and chlorothalonil 500g/l 0.2% + iprodione 500 g/l 0.1%.

For controlling *Phytophthora infestans*, *Erysiphe* sp. and *Fulvia fulva* the best results were obtained from the following combinations: (fenamidone 75g/l + propamocarb HCL 375 g/l) 0.2% + difenoconazole 250 g/l 0.05% and (dimethomorph 9% + mancozeb 60%) 0.2% + difenoconazole 250 g/l 0.05%.

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