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OIL-BASED ADJUVANTS IMPROVE FUNGICIDE ACTIVITY AGAINST DOWNY MILDEW IN GLASSHOUSE GROWN ONION SEEDLINGS

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INTRODUCTION

The penetration and translocation of sytemic fungicides can be enhanced by adjuvants which may disrupt the wax and cuticular layers. The development of the crystalline structure of epicuticular waxes on successive leaves in onions makes spray retention more difficult (1). Enhanced activity with lipid adjuvants is usually associated with improved foliar penetration (2).

MATERIALS AND METHODS

Seven treatments using six different adjuvants were applied as both pre- and post- inoculation sprays to onion seedlings in a replicated glasshouse pot trial. Pre-inoculation fungicide sprays were applied a.m. on 28.8.96 and all pots inoculated p.m. with a metalaxyl-sensitive isolate of *Peronospora destructor* ($4x10^4$ conidia/L, 80% germination on water agar) in distilled water. Post-inoculation fungicide treatments were applied 48 h later.

Plants were enclosed in high humidity containers overnight then kept in a glasshouse for 13 days; returned to high humidity then rated for disease severity (% leaf area affected) and % plants showing sporulation the next day. (Acrobat® MZ= 90g/kg dimethomorph + 600g/kg mancozeb, Top Wet[1] =100% organic wetting agent, Tween 80[2] =Polyoxyethylene(20) Sorbitan mono-oleate, Synertrol® Oil[3] =832g/L emulsifiable vegetable oil, Nu Film[5] =904g/L Di-1-Menthene and DC-Tron[6] =839g/L petroleum oil).

RESULTS

All the pre-inoculation fungicide treatments significantly reduced disease severity (P=0.001) and completely suppressed sporulation (Table 1), which is highly desirable in disease management of onion downy mildew. The only treatments that maintained the same level of inhibitory effect on disease progress when applied post-infection were Acrobat® MZ with Synertrol, Codacide and DC-Tron.

Acrobat® MZ alone gave unsatisfactory control which would suggest that there may be limited uptake and translocation with this formulation as a post-infectional treatment. Additional research to determine the effectiveness of dimethomorph and mancozeb, as separate components, would provide further insight into the activity of the combined formulation.

The oil-based adjuvants,namely, Synertrol, Codacide and DC-Tron obviously enhanced the penetration and translocation of this systemic fungicide. Testing these adjuvants under field conditons is recommended.

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Table 1. The effect of spray adjuvants on the efficacy of Acrobat® MZ (2g/L) as pre- and post- infectional treatments to control onion downy mildew in young plants.

Treatment	Leaf area affected (%)		% of plants showing sporulation	
	Pre-inoculation	Post-inoculation	Pre-inoculation	Postinoculation
1. Acrobat®MZ	7.25 ab	28.38 cd	0 a	31.72 bc
2. Acrobat®MZ + Top Wet[1] (0.2 mL/L)	4.04 a	31.46 d	0 a	43.60 c
3. Acrobat®MZ + Tween 80[2] (0.2 mL/L)	2.25 a	29.75 d	0 a	36.63 c
4. Acrobat®MZ + Synertrol Oil[3] (3 mL/L)	4.63 a	17.13 b	0 a	15.76 ab
5. Acrobat®MZ + Codacide[4] (3 mL/L)	2.75 a	10.50 ab	0 a	14.86 ab
6. Acrobat®MZ + Nu Film[5] (0.3 mL/L)	2.38 a	24.42 cd	0 a	63.17 d
7. Acrobat®MZ + DC-Tron[6] (20 mL/L)	7.38 ab	9.50 ab	0 a	7.82 a
8. Unsprayed control	34.50 de	43.79 e #	67.14 d	87.43 e
LSD (P= 0.05)	(11.72)		(17.61)	
(P= 0.001)	(20.36)		(30.47)	

Treatment means followed by the same letter are not significantly different, using Fisher's LSD test.