



# Analysis of Control Efficacy of Different Fungicides Against Downy Mildew of Onion in South Korea

In-Seong Lee, Jin-Sol Kim, Bang-Hee Lee, Su-Hyun Kim, Kwang-Yeol Yang\*  
 Department of Plant Biotechnology, College of Agriculture and Life Science, Chonnam National University, Gwangju 61186, South Korea

## Abstract

During the nursery seedlings stage at Muan, South Korea on 2013, moisture and temperature conditions were favorable for the occurrence of onion downy mildew. Therefore, the different fungicides was evaluated for their efficacy in controlling onion downy mildew under nursery seedlings conditions. It showed sufficient to evaluate the efficacy of different fungicides for the control of onion downy mildew since disease incidence of the untreated control was 51.1%. Occurrence of onion downy mildew was reached by 4.4% at treated plot with Mancozeb (MAN plot), a protectant fungicide, resulting in the highest control value with 91.4%. Incidence of the disease was 10% in MIX plot treated with various fungicides like Amectotradin plus Dimethomorph, Fluopicolide plus Propamocarb HCL, or Dimethomorph plus Pyraclostrobin, showing 80.4% of control value. Among the various fungicides, Amectotradin plus Dimethomorph fungicide (AME plus DIM plot) was selected and treated three times to nursery seedlings, it resulted in 12.2% disease incidence and 76.1% of control value. There was statistically significant difference between three different fungicides plots and untreated control for disease incidence. These results suggest that the application of fungicides on onion nursery seedlings was effective to control the onion downy mildew.

## Introduction

### What is onion downy mildew?

- Onion downy mildew caused by *Peronospora destructor* Berk, is an economically important disease causing losses both in the yield and quality of onion (*Allium cepa* L.).
- Infection in onion causes early defoliation, reduced size and poor storage ability of bulbs. The pathogen attacks the plants at all stages of growth and all parts of the plant may be invaded.
- Systemic infection occurs when plants are grown from infected bulbs, but local infection partly is caused by air-borne conidia (Develash et al., 1997).
- Onion bulbs with systemic infection are damaged faster and during moist weather all the leaf surface on infected plants is covered by grayish violet sporulation of *P. destructor*. In case of local infection, oval to cylindrical spots slightly paler than the rest of foliage are apparent on the leaves. Older leaves are attacked first and infection spreads to other leaves and plants (Viranyi, 1974).
- Development of downy mildew epidemics depends primarily on moisture, but temperature and light also are important factors, which influence different stages of *P. destructor* (Friedrich et al., 2003).
- Fungicides are exclusively used to control the onion downy mildew. The fungicide efficiency depends on the time of application and developmental stages of the disease. It is very important to notice the first symptoms of the disease in sufficient plant protection system (Palti, 1989; Survilieene et al., 2008).
- In the present research, several fungicides were evaluated under nursery field conditions to find effective fungicides for the control of onion downy mildew.

## Results

**Table 1.** List of fungicides used in this study

Fungicide	a.i.(%)	Formulation	Group name
Mancozeb	75	WP	Dithiocarbamates
Amectotradin+dimethomorph	27+20	SC	QxI+CAA
Fluopicolide+propamocarb HCl	5+50	SC	Benzamide+carbarnates
Dimethomorph+pyraclostrobin	16+9.5	SC	CAA+Qol

WP, wettable powder; SC, suspension concentrate; QxI, quinone-xinhibitors; CAA, carboxylic acid amides; Qol, quinone outside inhibitors.

**Table 2.** Fungicide spray schedule for the control of onion downy mildew at the stage of seedlings

Treatment	Spraytime		
	October 10, 2013	October 18, 2013	October 28, 2013
MAN	Mancozeb	Mancozeb	Mancozeb
AME+DIM	Amectotradin+dimethomorph	Amectotradin+dimethomorph	Amectotradin+dimethomorph
MIX	Amectotradin+dimethomorph	Fluopicolide+propamocarb HCl	Dimethomorph+pyraclostrobin
Untreated control	-	-	-

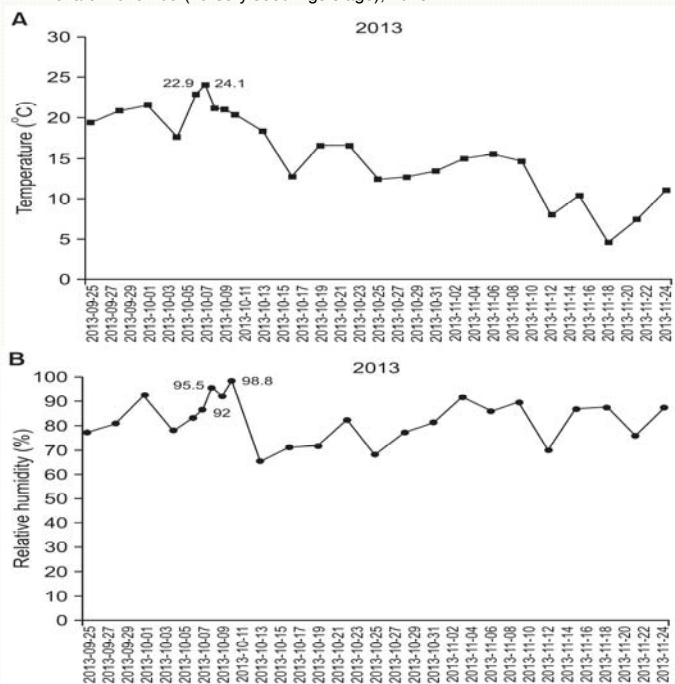
-, no spray.

**Table 3.** Control effect of different fungicide treatments against downy mildew of onion caused by *Peronospora destructor* at the stage of seedlings

Treatment	Disease incidence (%)*	Control value (%)†
MAN	4.4 b	91.4
AME+DIM	12.2 b	76.1
MIX	10.0 b	80.4
Untreated control	51.1 a	-

MAN, mancozeb; AME+DIM, amectotradin+dimethomorph; MIX, amectotradin+dimethomorph, fluopicolide+propamocarb HCl, dimethomorph+pyraclostrobin. \*Average percentage infected onion plants for each of three replicates. Different letters among treatments indicate the significant difference according to Duncan's multiple range tests, P=0.05. †Control value (%)=(1–percentage of onion plants diseased in fungicide treatment/percentage of onion plants diseased in untreated control) × 100.

**Fig. 1.** Temperature(A) and relative humidity(B) conditions in Mokpo area from late-September to late-November(nursery seedlings stage), 2013.



## Conclusions

- Fungicides spray in nursery field was significantly effective to control onion downy mildew compared to untreated control.
- On the basis of this study, at least three sprays of fungicide Mancozeb was the most effective in reducing the disease severity.

## References

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