

Selecting of Useful Chemicals Reducing of Leaf Blight on Job's Tears (*Coix lachry-ma-jobi* L. Var.)

Byung Sun Kwon*

Dept. of Resources Plant Development, Sunchon, Nat'l Univ. Sunchon 540-742, Korea

ABSTRACT

This study was conducted evaluate the control effect of fungicides on control of Leaf blight, growth characteristics, and dry yield in the cultivation of Job's tears. All fungicides treated had no effect on the growth of Job's tears. The major fungicides were mancozeb Wp, 75%, chlorothalonil Wp, 75%, dithianon Wp, 43%, difenoconazole Wp, 10%, benomyl Wp, 50%, and propineb Wp, 70%. Dry seed yield were increased largely with chlorothalonil Wp, 75% (33g/20 l), fungicide than the other fungicides and control. All fungicides had no injury with standard dosage. On the other hand all fungicides had slight injury in the double dosage level for the Job's tears.

Key words : leaf blight, Job's tears, fungicide

INTRODUCTION

The increase of crop productivity means the increase of production per unit area, which is achieved by the cultivation of high yielding varieties, the improvement of cultivation methods, and the prevention of damages from diseases and insect pests, but for the stability of productivity among these, the prevention of damage from disease and insect pests is important(RDA, 1991a, b, c, d, e); (Ahn *et al.*, 1992a, b); (Kwon *et al.*, 1988a, b, 1990, 1992, 1993).

Leaf blight of the Job's tears is found in leaf and leafstalk, it forms oval or insect proof large focus and also it has ashy brown in its middle and dark brown in its edge. As its lesion is severe, several lesion are mixed and it is decreased. Therefore this study reports the results of applying some fungicide for preventing Leaf

blight, the severe disease of the Job's tears.

MATERIALS AND METHODS

This experiment was conducted at farmer's field located at Yongjun-ri, Haeryong-myon, Sunchon city, Chonnam, Korea where is the production area of the Job's tears cultivars, Kwangyang local and Hadong local and Gurye local were used in this study.

Screening test of fungicides applied in cultivating Job's tears

The selected crop damage is Leaf blight and its attack is enough to decide the efficacy of fungicide as 12% of attack by non-treatment. A fungicide was mancozeb Wp [75%(40g/20 l)], chlorothalonil Wp [75%(33g/20 l)], dithianon Wp [43%(20ml/20 l)],

*Corresponding author : **Byung-Sun Kwon**, E-mail : kbs@sunchon.ac.kr

difenoconazole Wp [10%(10g/20 ℓ)], benomyl Wp [50%(13g/20 ℓ)], propineb Wp [70%(40g/20 ℓ)] and the spraying date of fungicides was July 15, 1999, and the observation of infected plant rate of 142 plants per experimental plot was performed on July 15, 1999.

Experimental plot was arranged with split-plot design with three repetitions, experimental area per plot was 10 m², direct seeding was done with 60×15cm on June 15, the amount of fertilizer applied (1kg/10a) was 1,000kg with the actual quantity of compost and N-P₂O₅-K₂O=5-8-8 kg/10a was applied at the beginning. The other cultural management was carried out in accordance with the conventional culture method of the Yongjun district in South of Korea.

Experiment of harmful effects of fungicides by treated dosages in cultivating Job's tears

The fungicides on the growth of Job's tears are compared by a broad outlook (0-9) by three times after 3 days (July 14), 5 days(July 16) and 10 days (July 21) of mancozeb Wp [75%(40g/20 ℓ)], chlorothalonil Wp [75%(33g/20 ℓ)], dithianon Wp [43%(20ml/20 ℓ)], difenoconazole Wp [10%(10g/20 ℓ)], benomyl Wp [50%(13g/20 ℓ)], propineb Wp [70%(40g/20 ℓ)] of standard plots design and mancozeb Wp [75%(80g/20 ℓ)], chlorothalonil Wp [75%(66g/20 ℓ)], dithianon Wp [43%(40g/20 ℓ)], difenoconazole Wp [10%(20g/20 ℓ)], benomyl Wp [50%(26g/20 ℓ)], propineb Wp [70%(80g/20 ℓ)] of double plots design treatment. Experimental plot was arranged with split-plot design with three replications and experimental area and cultivation method per pot are the same as the above.

RESULTS AND DISCUSSION

Screening test of fungicides applied in cultivating Job's tears Preventive effects of leaf blight by fungicide treatment

The results of examining the preventive effects of

leaf blight by treating six kinds of fungicide including mancozeb Wp [75%(40g/20 ℓ)] on July 15, when its infection rate reaches 12.3% after 3 days of non-treatment plots which were enough to Judge the efficacy of fungicide on the Job's tears experimental field are shown in Table 1.

There was no effect by rainwater after the treatment of disinfectants and according to the examination on July 21, 5 days after applying fungicide for three varieties such as 'Kwangyang local', 'Hadong local' and 'Gurye local' at 142 plants per plot, Kwangyang local was 13.3%, Hadong local 12.0%, and Gurye local 12.3% at non-treated plot show high rate of infected plant with 12.3%, but the plots treated with mancozeb Wp [75%(40g/20 ℓ)] shows low rate of infected plant as 1.2% and control value was high as 90.7%. Plot treated with chlorothalonil Wp [75%(33g/20 ℓ)] has low rate of infected plant as 1.1% and its control value was high as 91.6% and the plot treated with dithianon Wp [43%(20ml/20 ℓ)] has 1.5% of infected plant rate and its control value was 87.5%. And the plot treated with difenoconazole Wp [10%(10g/20 ℓ)] has 1.9% of infected plant rate and its control value was 86.4% the plot treated with benomyl Wp [50%(13g/20 ℓ)] has low rate of infected plant rate as 1.2% and its control value was high s 91.1% and the plot treated with propineb Wp [70%(40g/20 ℓ)] has 2.4% of infected plant rate, its control rate, its control value was 80.7% and all fungicide show the control value over 81.6%.

Effects of fungicides treatment on growth and yield

The effect of fungicide treatment on growth and yield of Job's tears are shown in Table 2. The plant height of Kwangyang local, Hadong local and Gurye local at non-treated plot were short with 118, 115, 121 cm, but all treatments of chemical spraying were long those of the plots treated with mancozeb Wp [75%(40g/20 ℓ)] were 154, 151, 165 cm, those of the plots treated with clorothalonil Wp [75%(33g/20 ℓ)]

were 173, 162, 184 cm, those of the plots treated with dithianon Wp [43%(20ml/20 l)] were 146, 144, 156 cm, those of the plots treated with difenoconazole Wp [10%(10g/20 l)] were 142, 141, 147 cm and those of the plots treated with benomyl Wp [50%(13g/20 l)] were 168, 160, 176 cm and the plant height of the plot treated with propineb Wp [70%(40g/20 l)] were 121, 118, 139 cm.

The number of grains shows the same tendency as the plant height and Kwangyang local, Hadong local, Gurye local had 46, 43, 50 grains at non-treated plot, the plot treated with mancozeb Wp [75%(40g/20 l)] had 57, 54, 66, that treated with chlorothalonil Wp [75%(33g/20 l)] had 67, 65, 70, that treated with dithianon Wp [43%(20ml/20 l)] had 60, 56, 63, that treated with difenoconazole Wp [10%(10g/20 l)] had 57, 54, 61, that treated with benomyl Wp [50%(13g/20 l)] had 61, 56, 68, and that treated with propineb Wp [70%(40g/20 l)] had 55, 50, 58.

On the insect pest of aphid and *Spodoptera exigua*, plots treated with all fungicides and non treated plots at a broad outlook were slight as 1 and in the dry grain of yield per 10a, Kwangyang local was 140kg, Hadong local was 134kg and Gurye local was 151kg at non-treated plot, but plot treated with mancozeb Wp [75%(40g/20 l)] were 218, 215, 233kg, which showed yield increase of 156, 154, 166% respectively, plot treated with chlorothalonil Wp [75%(33g/20 l)] were 232, 230, 242kg, which showed yield increase of 166, 164, 173% respectively, plot treated with dithianon Wp [43%(20ml/20 l)] were 207, 201, 215kg which showed yield increase of 148, 144, 154%, plot treated with difenoconazole Wp [10%(10g/20 l)] were 196, 185, 212kg, which showed yield increase of 140, 132, 151%, plot treated with benomyl Wp [50%(13g/20 l)] were 190, 180, 210kg, which showed yield increase of 136, 129, 150% and plot treated with propineb Wp [70%(40g/20 l)] were 182, 175, 198kg, which showed

Table 1. The control effect of fungicides on leaf blight in Job's tears

Fungicides	Infected plant(%)				Significant difference (DMRT)	Control value(%)
	Kwangyang	Hadong	Gurye	Mean ± SD		
Mancozeb Wp, 75% (40g/20 l)	1.1	1.2	1.6	1.2 ± 0.2	a	90.7
Chlorothalonil Wp, 75% (33g/20 l)	1.4	1.2	1.2	1.1 ± 0.1	a	91.6
Dithianon Wp, 43% (20ml/20 l)	1.5	1.8	1.8	1.5 ± 0.2	a	87.5
Difenoconazole Wp, 10% (10g/20 l)	1.1	1.9	2.0	1.9 ± 0.7	a	86.4
Benomyl Wp, 50% (13g/20 l)	1.2	1.2	1.3	1.2 ± 0.2	a	91.1
Propineb Wp, 70% (40g/20 l)	2.2	2.4	2.6	2.4 ± 1.3	a	81.6
Control	13.3	12.0	12.3	12.3 ± 3.3	b	-

yield increase of 130, 125, 141% and it is considered that all fungicide show yield increase, there is no reduction in yield and these are ideal fungicide.

Experiment of harmful effects of fungicides by treated dosages in cultivating Job's tears

The experiment of the amount of fungicide for leaf blight and its harmful effects on the Job's tears are shown in Table 3.

There is no symptom of harmful effect of fungicide and double dosage used shows slight symptom of it.

Accordingly, it is thought that for prevention of leaf blight of the Job's tears, its yield can be increased by reducing the period of competition between leaf blight and the Job's tears, the dry yield of grain per 10a at the plot treated with chlorothalonil Wp [75%(33g/20 l)] showed 232kg at Kwangyang local, 230kg at Hadong local and 242kg at Gurye local and it is excellent fungicide, but the residue of agricultural chemicals after using fungicide and the change of effective components should be continuously examined.

Table 2. Comparison of growth characters and yield of Job's tears varieties treated with fungicides

Fungicides		Plant height(cm)	No. of grains	Rate of ripeness(%)	100 grains wt(g)	Grain yield(kg/10a)	Index
Mancozeb Wp, 75% (40g/20 l)	K	154	57	69	8.4	218	156
	H	151	54	65	8.1	215	154
	G	165	66	73	9.1	233	166
Chlorothalonil Wp, 75% (33g/20 l)	K	173	67	75	8.7	232	166
	H	162	65	71	8.5	230	164
	G	184	70	77	9.5	242	173
Dithianon Wp, 43% (20ml/20 l)	K	146	60	66	8.3	207	148
	H	144	56	70	8.0	201	144
	G	156	63	74	9.0	215	154
Difenoconazole Wp, 10% (10g/20 l)	K	142	57	65	8.4	196	140
	H	141	54	61	7.8	185	132
	G	147	61	72	8.8	212	151
Benomyl Wp, 50% (13g/20 l)	K	168	61	74	8.5	190	136
	H	160	56	70	8.3	181	129
	G	176	68	75	9.3	210	150
Propineb Wp, 70% (40g/20 l)	K	121	55	63	7.4	182	130
	H	118	50	60	7.1	175	125
	G	139	58	70	8.0	198	141
Control	K	118	46	57	7.4	140	100
	H	115	43	53	7.2	134	141
	G	121	50	66	7.0	151	108
LSD(0.05)		18.80	11.21	7.7	3.1	48.93	-

K : kwangyang Local, H : Hadong Local, G : Gurye Local.

Table 3. Chemical injury of Job's tears varieties of applied fungicides

Fungicides		Standard dosage			Double dosage		
		10*	20	30	10	20	30
Mancozeb Wp, 75% (40g/20 l)	K	0	0	0	1	1	1
	H	0	0	0	1	1	1
	G	0	0	0	1	1	1
Chlorothalonil Wp, 75% (33g/20 l)	K	0	0	0	1	1	1
	H	0	0	0	1	1	1
	G	0	0	0	1	1	1
Dithianon Wp, 43% (20ml/20 l)	K	0	0	0	1	1	1
	H	0	0	0	1	1	1
	G	0	0	0	1	1	1
Difenoconazole Wp, 10% (10g/20 l)	K	0	0	0	1	1	1
	H	0	0	0	1	1	1
	G	0	0	0	1	1	1
Benomyl Wp, 50% (13g/20 l)	K	0	0	0	1	1	1
	H	0	0	0	1	1	1
	G	0	0	0	1	1	1
Propineb Wp, 70% (40g/20 l)	K	0	0	0	1	1	1
	H	0	0	0	1	1	1
	G	0	0	0	1	1	1

* Days after the applying fungicides.

‡ K : Kwangyang Local, H : Hadong Local, G : Gurye Local

Plant injury : 0 (No injury) - 1 (Soft chemical injury).

REFERENCES

Ahn, G. S., B. S. Kwon and C. H. Kim. 1992a. Influence of sowing time on growth, yield and nutrient quality of forage Job's tears. Korean Grassl. Sci. 12(2) : 123-126.

Ahn, G. S., B. S. Kwon and C. H. Kim. 1992b. Influence of fertilizer application on growth, yield and nutrient quality of forage Job's tears. Korean Grassl. Sci. 12(2) : 127-131.

Department of Plant Pathology, Agricultural Sciences Institute, RDA. 1991a. Leaf blight of Job's tears. Compendium of medicinal plant diseases with colour plates : 84-54

Department of Plant Pathology, Agricultural Sciences Institute, RDA. 1991b. Leaf blight of Peony. Compendium of medicinal plant diseases with colour plates : 111-117.

Department of Plant Pathology, Agricultural Sciences Institute, RDA. 1991c. Leaf spot of *Lithospermum erythrorhizon* Sieh. et Zucc. Compendium of medicinal plant diseases with colour plates : 105-106.

Department of Plant Pathology, Agricultural Sciences Institute, RDA. 1991d. Brown leaf blight of *Alisma canaliculatum* A. Braum et Bonche. Compendium of medicinal plant diseases with colour plates : 124-125.

Department of Plant Pathology, Agricultural Sciences Institute, RDA. 1991e. Brown leaf blight of *Cyperus rotundus* L. Compendium of medicinal plant diseases with colour plates : 131-132.

Kwon, B. S. and J. I. Lee. 1988a. Genetic studies on quantitative characters in Job's tears. Korean J. Breed. 20(1) : 22-27.

Kwon, B. S., J. I. Lee and H. J. Park. 1988b. Effect of fertilizer levels on major agronomic characteristics and seed yield in Job's tears. Korean J. Crop Sci. 33(4) : 401-411.

Kwon, B. S. and H. J. Park. 1990. Varietal classification by multivariate analysis in Job's tears. Korean J. Crop Sci. 35(2) : 126-131.

Kwon, B. S., H. J. Park, N. S. Sung and E. Tsuzuki. 1992. Effects of nitrogen levels and treatments on agronomic characteristics and yield in Job's tears. Korean J. Crop Sci. 37(5) : 413-418.

Kwon, B. S., H. J. Park, T. Umezaki and D. H. Chung. 1993. Effects of planting density of growth and yield of Job's tears (*Coix lachryma-jobi* L. var *mayen* STAPF). Korean J. Medicinal Crop Sci. 1(2) : 166-170.

Park, H. J., B. S. Kwon, N. S. Sung and T. Umezaki. 1993. Influence of sowing date on growth and seed yield of Job's tears (*Coix lachryma-jobi* L. var *mayen* STAPF). Korean J. Medicinal Crop Sci. 1(2) : 162-165.

Shin, J. S., B. S. Kwon, Y. T. Lim and H. J. Park. 2000. Disease control of brown leaf blight for *Alisma plantago*. Korean J. Crop Sci. 45(suppl. 1) : 180-181.

(Received Apr. 18, 2005)

(Accepted Jul. 27, 2005)