

Chemical Control of Gray Mold in *Scutellaria baicalensis* Georg

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ABSTRACT

This study was conducted to evaluate the control effect of fungicides on control of Gray mold, growth characteristics, and root yield in the cultivation of *Scutellaria baicalensis* after barley cropping. All fungicides treated had no effect on the growth and flowering rate of *Scutellaria baicalensis*. All seed disinfectants had no effect on the growth and flowering date of *Scutellaria baicalensis* Georg. The major seed disinfectants were Benomyl Wp, 20%, Captan Wp, 50%, Hymexazol Ec, 30%, Carboxin D, 37.5%. Dry root yield were increased largely with Benomyl Wp, 20%, seed disinfectant than the other seed disinfectants had no injury with standard dosage. On the other hand, all seed disinfectants had slight injury in the double dosage level for the *Scutellaria baicalensis* Georg.

Key words : chemical control, gray mold

INTRODUCTION

Scutellaria baicalensis is an annual medicinal plant grown at the upland field. The cultivation of *Scutellaria baicalensis* at Yeosu occupies 80% of the national production with the field area of 100 ha and seeding it in late May it is and harvested in mid or late November. There a few researches of the increase of *Scutellaria baicalensis* (RDA, 1991 a, b, c), (Kwon et al., 1996, 1997, 2002), (Park et al., 1997), but there was no research of the effect of the screening of seed disinfectant for control of disease, root yield and major agronomic characteristics in *Scutellaria baicalensis* has been done. This experiment is to investigate the effect of seed disinfectant for control of disease of *Scutellaria baicalensis*.

MATERIALS AND METHODS

This experiment was conducted at the experimental farm of Sunchon National University from 1999 to 2000, and the varieties used in this trial were Yeochon, Seungju and Gwangyang were the most promising varieties of *Scutellaria baicalensis* at the Yeochon arear, Chonnam province of Korea.

Physicochemical composition of arable soil layer has pH 6.4 and poor contents of organic matters and phosphate, but its contents of K, Ca and Mg are low as shown in table 1. The selected crop damage is disease and its attack is enough to decide the efficacy of disease of 15.2% attack by non-Treatment.

Screening test of seed disinfectant applied in cultivating *Scutellaria baicalensis*

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Table 1. Soil properties of the experimental plot at the beginning of experiment

PH(H ₂ O)	OM (g/kg)	Av : P ₂ O ₅	Ex. cation(molt/kg)			
			K	Ca	Mg	CEC(me/100g)
1 : 5						
6.4	4.5	382	0.74	3.10	3.9	11.2

A seed disinfectant were benomyl Wp [20%(100g/20 l)], captan Wp [50%(40g/20 l)], hymexazol Ec [3%(40ml/20 l)], carboxin D. [37.5%(25g/1kg)] and the soaking date of seed disinfectant was June 11, 2000 and the observation of infectant plant rate of 142 plants per experimental plot was performed on July 1, 2000.

Experimental plot was arranged with split-plot design with three replications, experimental area per plot was 12m², direct sowing was done with 30×10cm on June 11. Fertilizer were applied at the rate of 9-14-9 kg/10a of N-P₂O₅-K₂O. One third of the total, total P₂O₅ and K₂O manure of 1,000kg/10a were incorporated into the soil before seeding and rest of N fertilizer was applied in late July.

Experiment of harmful effects of in seed disinfectant by treated dosages in *Scutellaria baicalensis*

The seed disinfectant on the germination and growth of *Scutellaria baicalensis* at the nursery field are compared by a broad outlook (0-9) by one time at soaking of benomyl Wp [20%(100g/20 l)], captan Wp [50%(40g/20 l)], triferine Ec [17%(20ml/20 l)], etridiazole Ec [25%(100ml/20 l)], thioplanat-mythyl Wp [50%(20 l /20 l)] of standard plots design and benomyl Wp[20 l (100g/20 l)], captan Wp [50%(40g/20 l)], triferin Ec [17%(20ml/20 l)], etridiazole Ec [25%(10ml/20 l)], thioplanat-mythyl Wp [50%(20 l /20 l)] of double plots design treatment. Experimental plot was arranged with split-plots design with three replications and experimental area and cultivation method per plot are the same as the above.

RESULTS AND DISCUSSION

Screening test of seed disinfectant applied in cultivating *Scutellaria baicalensis*

Prevention of Gray mold by seed disinfectant treatment. The results of examining the preventive effects of Gray mold by treating four kinds of seed disinfectant including benomyl Wp [20%(100g/20 l)] on June 11 when its infection rate reaches 14.2% after 10 days of non-treatment plots which were enough to judge the efficacy of seed disinfectant on *Scutellaria baicalensis* experimental field are shown in Table 2. There was no effect by rainwater after the treatment of disinfectants and according to the examination on July 1, to days after applying seed disinfectant for three varieties such as Yeochon local, Seungju local, and Gwangyang local at 142 plants per plot, Yeochon local was 14.2%, Seungju local 15.3% and Gwangyang local 16.2% at non-treatment plot showed high rate of infected plant with 15.2%, but the plots treated with benomyl Wp [20%(100g/20 l)] showed low rate of infected plant as 1.2% and control value was high as 93.2%, the plot treated with captan Wp [50%(40g/20 l)] has low rate of infected plant as 1.3% and its control value was high as 90.0% and the plot treated with hymixazol Ec [30%(40ml/20 l)] has 1.4% of infected plant rate and its control value was 89.4%, and the plot treated with carboxin D. [37.5%(25g/kg)] has 1.5% of infected plant rate and its control value was 87.6%.

Effects of seed disinfectant treatment on growth and dry root yield

Table 2. Disease control effect of *Scutellaria baicalensis* Geory field

Seed disinfectant	Infected plant(%)				Significant difference (KMRT)	Control value (%)
	Yeochon	Seungju	Gwangyang	Mean ± SD		
Benomyl Wp, 20% (100g/20 l)	1.1	1.2	1.3	1.2±0.1	a	93.2
Captan Wp, 50% (40g/20 l)	1.2	1.3	1.4	1.3±0.2	a	90.0
Hymexazol Ec. 30% (40ml/20 l)	1.3	1.4	1.5	1.4±0.3	a	89.4
Carboxin D, 37.5% (25g/kg)	1.4	1.5	1.7	1.5±0.3	a	87.6
Control	14.2	15.3	16.2	15.2±0.6	b	-

The effects of seed disinfectant treatment on growth and dry root yield of *Scutellaria baicalensis* are shown in Table 3. The stem length of Yeochon local, Seungju local and Gwangyang local at non-treated plot were short with 30, 29, 28cm, but all treatments of chemical soaking were long those of the plots treated with benomyl Wp [20%(100g/20 l)] were 35, 34, 32cm, those of the plots treated with captan Wp [50%(40g/20 l)] were 34, 33, 31cm, those of the plots treated with hymexazol Ec [30%(400ml/20 l)] were 33, 32, 30cm, those of the plots treated with carboxin D. [37.5%(25g/kg)] were 32, 31, 29cm. The main root length showed the same tendency as the stem length and Yeochon local, Seungju local, Gwangyang local were 23.5, 21.6, 20.3 cm at non-treated plot, the plot treated with benomyl Wp [20%(100g/20 l)] were 26.2, 25.6, 24.9 cm, that treated with captan Wp [50%(40g/20 l)] were 25.4, 24.4, 23.5, that treated with hymexazol Ec [30%(400ml/20 l)] were 24.7, 23.5, 22.8 cm, that treated with carboxin D. [37.5%(25g/kg)] were 24.0, 22.7, 21.4 cm. On the experimental plots treated with all seed disinfectant and non-treated plots of dry root yield per 10a, Yeochon local was 162kg, Seungju local was 140kg and Gwangyang local was 124kg at non-treated

plot, but plot treated with benomyl Wp [20%(100g/20 l)] were 178, 159, 144kg, which showed yield increase of 144, 128, 116% respectively, plot treated with captan Wp [50%(40g/20 l)] were 172, 152, 140kg, which showed yield increase of 139, 123, 113% respectively, plot treated with hymexazol Ec [30%(100 ml/20 l)] were 170, 148, 137kg, which showed yield increase of 137, 119, 110% respectively, plot treated with carboxin D [37.5%(25g/kg)] were 166, 143, 130kg, which showed yield increase of 134, 115, 105% respectively and it is considered that all seed disinfectant show yield increase, there is no reduction in yield and these are ideal seed disinfectant.

Experiment of harmful effects of seed disinfectant by treated dosages in cultivating of *Scutellaria baicalensis*

The examination of the amount of seed disinfectant for gray mold and its harmful effects of the *Scutellaria baicalensis* are shown in Table 4. There in no symptom of harmful effect of seed disinfectant and double dosage used shows slight symptom of it. Accordingly, it is thought that for prevention of gray mold of the *Scutellaria baicalensis*, its yield can be increased by

Table 3. Comparison of growth characteristics and yield of *Scutellaria baicalensis* treated with seed disinfectant

Seed disinfectant		Flowering date	Stem length	Main root length(cm)	Branch root	Main root diameter length(cm)	Yield of dry root (mm)	Index (%) (kg/10a)
Benomyl Wp, 20% (100g/20 l)	Y	July 23	35	26.2	30.1	9.5	178	144
	S	July 22	34	25.6	29.4	8.5	159	128
	G	July 20	32	24.9	28.6	8.2	144	116
Captan Wp, 50% (40g/20 l)	Y	July 23	34	25.4	29.4	9.4	172	139
	S	July 22	33	24.4	28.8	8.4	152	123
	G	July 20	31	23.5	27.5	8.1	140	113
Hymexazol Ec. 30% (40ml/20 l)	Y	July 23	33	24.7	28.3	9.3	170	137
	S	July 22	32	23.5	27.2	8.2	148	119
	G	July 20	30	22.8	26.3	7.8	137	110
Carboxin D, 37.5% (25g/kg)	Y	July 23	32	24.0	27.7	9.1	166	134
	S	July 22	31	22.7	26.5	7.9	143	115
	G	July 20	29	21.4	25.5	7.4	130	105
Control	Y	July 23	30	23.5	26.1	8.8	162	131
	S	July 22	29	21.6	25.4	7.5	140	113
	G	July 20	28	20.3	24.7	7.2	124	100

Y : Yeochon Local, S : Sungju Local, G : Gwangyang Local

Table 4. Plant injury of *Scutellaria baicalensis* of seed disinfectant

Seed disinfectant		Standard dosage			Doble dosage		
		10 ⁺	20	30	10	20	30
Benomyl Wp, 20% (100g/20 l)	Y	0	0	0	1	1	1
	S	0	0	0	1	1	1
	G	0	0	0	1	1	1
Captan Wp, 50% (40g/20 l)	Y	0	0	0	1	1	1
	S	0	0	0	1	1	1
	G	0	0	0	1	1	1
Hymexazol Ec. 30% (40ml/20 l)	Y	0	0	0	1	1	1
	S	0	0	0	1	1	1
	G	0	0	0	1	1	1
Carboxin D, 37.5% (25g/kg)1	Y	0	0	0	1	1	1
	S	0	0	0	1	1	1
	G	0	0	0	1	1	1

⁺ Days after seed disinfectant,

Y : Yeochon Local, S : Sungju Local, G : Gwangyang Local,

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

reducing the period of competition between gray mold and the *Scutellaria baicalensis*, the dry yield of root per 10a at the plot treated with benomyl Wp [20%(100g/20 ℓ)] showed 178kg at Yeochon local, 159kg at Seungju local and 144kg at Gwangyang local and it is excellent seed disinfectant, but the residue of agricultural chemicals after using seed disinfectant and the change of effective components should be continuously examined.

According to Kwon(2005), the yield of job's tears was increased largely with benomyl Wp, 20%, seed disinfectant than the other seed disinfectants and control, and had no injury with standard dosage. In this experiment, the results were much a like.

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