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Chemical Control of Weed for Flax

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ABSTRACT

This study was conducted to evaluate the effect of herbicides on weed control, growth characteristics and yield in flax, after direct seeding it to the field, the herbicides treated had no effect on the emergence period. The major weeds were decreased some what more with mecoprop-wp, herbicide than the other herbicides and by hand weeding. Mecoprop-wp and simazin-wp were had no injury but sethoxydim- EC and 2.4-D-wp were slighthy harmful for the flax with recommended concentration, On the other hand, all herbicides were harmful in the double dosage level

Keys words **:** flax, herbicides, weed control

INTRODUCTION

Since flax has soft fiber and slender cells, it is easy to release a fine thread and its fiber tension doubles cotton and its resistance against friction trebles cotton. Also as it shows quick absorption and evaporation of moisture and has strong tension at wet condition and linen sprout is blocked by absorbing water, there is no gap. Therefore, it is a good material to make tent, fire hose and water bag. It gives a cool feeling when it makes undergarment or summer wear because it doesn't keep warm. It has many applications owing to these characteristics (Kwon, 1987; Kwon *et al.*, 1988, 1989a, 1989b).

It is used for beauty thread, lace thread and net thread as thread material and water-proof, cloth hose, tablecloth, tent and surgery gauze as texture. Remnants of flax is used for making linen paper, paper money, securities and tobacco filter (Park *et al.*, 1987, 1989, 1990).

Its seed contains about 35-45% of oil content and it makes linseed oil. Since linseed oil is dry, it is used as the materials of print ink and paint and its remnants (gas) are used for livestock feed and fertilizer (Son, 1987).

Flax was cultivated at paddy field by general farmhouses in the 1900 and herbicide experiment was conducted in 1968 (Kwon, 1968). Because production of rice has been surplus and accumulated for more than three years since the late 1990s, government reduced the production of rice and began to cultivate other crops. For cultivating other crops, flax was selected as an alternative crop, but the urgent task to be settled in farming flax was prevention of weeds and these studies reports some findings of experiment for prevention of weeds performed in 1968 and 1998.

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MATERIALS AND METHODS

This experiment was conducted at Jeonnam Rural Development Administration and test plot of farmhouses located at Haeryong-myon, Sunchon-city, Jeonnam from March to June of 1968 and from March to June of 2001 and announced materials used Wiera.

1. Selection Test of Herbicide Applicable to Cultivation of at Flax by Direct Sowing

Currently marketed herbicides including sethoxydim-Ec, 20%, 2.4-D-Wp, 40% , mecoprop-Wp, 50% , simazin-Wp and 50% were treated immediately after sowing and generation, growth and yield of weeds were compared.

Experiment plot was placed with randomized block design and did three times repeat, randomized block design and did 3th iteration, test area per plot was $20m^2$, plot was made at 0.3m intervals of 1.2m width and 0.2m height at the 15th of March, fertilizer of N-P_2O_5-K_2O = 5-3-6 kg/10a was applied and compost of 800 kg/10a was applied, seeds of 9kg per 10a after preparing soils were sown and others conformed to cultivation methods of flax. Examination of weeds was conducted once early in June (the 15th of June) and after observing the growth of weeds within specimen plot, the whole area of $20m^2$ per plot was examined and it was changed into the quantity of weeds within $1m^2$.

2. Currently marketed herbicides including sethoxydim-Ec, 20%, 2.4-D-Wp, 40%, mecoprop-Wp, 50% , simazin-Wp, 50%

Experiment plots were placed with three-replicated design by order and test area and cultivation area per plot followed the above methods. Examination of harmful effects of herbicide on flax within experiment plots was conducted by each plot after 10, 20 and 30 days after application of herbicide.

RESULTS AND DISCUSSION

1. Selection Test of Herbicide Applicable to Cultivation of Flax

1) Effects of Prevention of Weeds by Application of

Table 1. Weed control effect of herbicides in flax field

Herbicides	Kind of weed	No. of weed (plant/m^2) Mean±SD	Dry wt. of weed (g/m^2)	Weed control value(%)
Sethoxydim-Ec, 20%	5	1.7±0.3	3.6	74.8
	5	4.0±0.8	5.5	80.9
2,4-D-Wp, 40%	5	1.4±0.1	2.9	79.7
	5	3.6±0.4	4.8	83.4
Mecoprop-Wp, 50%	5	1.1±0.1	2.5	82.5
	5	3.6±0.4	4.4	84.8
Simazin-Wp, 50%	5	1.6±0.2	3.2	77.6
	5	4.7±0.6	6.5	77.9
No weeding	5	4.9±0.7	14.3	0.00
	5	14.5±3.1	28.9	0.00

Upper : 1968, lst year of experiment.

Lower : 1998, 2nd year of experiment.

Herbicide

Results of examining the effects of preventing weeds using three kinds of herbicides such as sethoxydim-Ec, 20%, etc. immediately after sowing flax were shown in Table 1.

The first types found were five and the number of individual weeds was smaller at all plots applying herbicides than at the plot using no herbicides with 4.9 plant/m^2 and 14.5plant/m^2. In particular, it was small 1.1plant/m^2, 3.6plant/m^2, 1.4plant/m^2 and 35plant/m^2 at mocoprop-Wp, 50%, 2.4-D-Wp and 40% plots respectively.

Dried quantity of flax was less as 2.5g/m^2, 4.49g/m^2 and 2.9g/m^2, 4.8g/m^2 at plot applying herbicides of mecoprop-Wp, 50%, 2,4-D-Wp, 40% than the plot using no herbicides (14.3g/m^2, 28.9g/m^2). Therefore, prevention values of mecoprop-Wp, 2,4-D-Wp were higher.

2) Difference of Yield of Weeds According to Quantity of Herbicide, mecoprop-wp

Yield of weeds after herbicide application was shown in Table 2 and 3. Yield of weeds was found as Alopecurus aequalis var. a murensis (kom) ohwi > Stellaria alsine Grimm var. undulata ohwi > Persicaria hy dropiper spach>Lamium amplexicaule L. > Eleusine indica(L.) Gaertn in order and Lamium amplexicaule L. of weeds showed good weeding effects, but all other weeds showed great weeding effects at plots applying mecoprop-wp and 2.4-D-wp. These weeding effects were the same as findings of research reported by Ahn, *et al* (1995).

3) Difference of Weeding Values According to Kinds of Herbicides

mecoprop-Wp medicine showed high weeding values at any types and achieved higher weeding effects as mean 88.3% and followed by sethoxydim-Ec

Table 2. Amount of needs emerged in the flax field applied herbicides(1968)

Herbicides	1)*	2)	3)	4)	5)	Total±SD
Sethoxydim-Ec, 20%	1.4	0.0	0.0	0.0	0.3	1.7±0.3
	2.9	0.0	0.0	0.0	0.7	3.6±0.7
2,4-D-Wp, 40%	1.3	0.0	0.0	0.0	0.1	1.4±0.1
	2.5	0.0	0.0	0.0	0.4	2.9±0.5
Mecoprop-Wp, 50%	1.0	0.0	0.1	0.0	0.0	1.1±0.1
	2.4	0.0	0.1	0.0	0.0	2.5±0.4
Simazin-Wp, 50%	1.3	0.3	0.1	0.0	0.0	1.6±0.4
	2.5	0.5	0.2	0.0	0.0	3.2±0.5
No weeding	2.6	0.7	0.1	1.3	1.2	4.9±0.7
	4.5	2.7	2.2	3.1	1.8	14.3±0.3

Upper : Number of weeds (Plant/m^2)

Lower : Dry weight of weeds(g/m^2)

Scientific name :

1)* = *Alopecurus aequalis* var. a murensis (kom) ohwi

2) = *Persicaria hy dropiper* spach

3) = *Lamium amplexicaule* L.

4) = *Stellaria alsine* Grimm var. undulata ohwi

5) = *Eleusine indica*(L.) Gaertn

Table 3. Amount of needs emerged in the flax field applied herbicides(1998)

Herbicides	1)*	2)	3)	4)	5)	Total±SD
Sethoxydim-Ec, 20%	2.6	0.0	0.0	0.0	1.4	4.0±0.5
	3.7	0.0	0.0	0.0	1.8	5.5±0.8
2,4-D-Wp, 40%	2.4	0.0	0.0	0.0	1.2	3.6±0.4
	3.2	0.0	0.0	0.0	1.6	4.8±0.6
Mecoprop-Wp, 50%	2.2	0.0	1.4	0.0	0.0	3.6±0.4
	3.1	0.0	1.1	0.0	0.0	4.4±0.3
Simazin-Wp, 50%	2.3	1.2	1.2	0.0	0.0	4.7±0.5
	3.5	1.4	1.6	0.0	0.0	6.5±0.9
No weeding	3.4	2.4	2.7	3.7	2.3	14.5±1.2
	8.7	4.9	4.6	5.8	4.9	28.9±2.8

herbicide as mean 81.8%, but 2,4-D-Wp and simazin-Wp showed low effects as mean 73.2%. In particular, mecoprop-Wp showed higher effects at Persicaria hy dropiper spach, Lamium amplexicaule L., Stellaria alsine Grimm var. undulata ohwi and Eleusine indica(L.) Gaertn as mean 100%, 85.8%, 100% and 100% respectively, but Alopecurus aequalis var. a murensis (kom) ohwi had lower weeding effect as mean 55.6%. Sethoxydim-Ec and 2.4-D-Wp had higher weeding effects at Persicaria hy dropiper spach, Lamium amplexicaule L. and Stellaria alsine Grimm var. undulata ohwi as 100% respectively, but Alopecurus aequalis var. a murensis (kom) ohwi and Eleusine indica(L.) Gaertn had lower weeding effects as mean 46.6%, 53.9%, 63.2% and 72.6%, and simazin-Wp was effective at Stellaria alsine Grimm var. undulata ohwi and Eleusine indica(L.) Gaertn as 100% respectively, but Alopecurus aequalis var. a murensis (kom) ohwi, Persicaria hy dropiper spach and Lamium amplexicaule L. had lower weeding effects as mean

Table 4. Comparison of weed control for emerged in the field applied different herbicides (unit : %)

Herbicides	1)	2)	3)	4)	5)	Total±SD
Sethoxydim-Ec, 20%	35.6	100	100	100	61.2	79.3±1.8
	57.6	100	100	100	63.3	84.2±2.3
2,4-D-Wp, 40%	44.5	100	100	100	77.8	60.2±1.1
	63.2	100	100	100	67.4	86.1±2.4
Mecoprop-Wp, 50%	46.7	100	95.4	100	100	88.4±2.5
	64.4	100	76.1	100	100	88.1±2.6
Simazin-Wp, 50%	44.5	81.4	90.9	100	100	67.1±1.5
	59.8	71.4	65.2	100	100	79.3±1.8
No weeding	0	0	0	0	0	0
	0	0	0	0	0	0

Upper : 1968, lst year of experiment.

Lower : 1988, 2nd year of experiment.

Table 5. Comparison of growth characteristics and yield of flax treated with herbicides

Herbicides	Stem length(cm)	No. of plants per 30cm	Yield (kg/10a)	
			Seed±SD	Stem±SD
Sethoxydim-Ec, 20%	61.4	20	85.5±0.7	254.0±3.5
	66.7	21	79.4±0.6	256.2±4.1
2,4-D-Wp, 40%	64.7	24	79.3±0.5	250.4±3.1
	68.5	24	78.3±0.4	258.8±4.3
Mecoprop-Wp, 50%	68.2	22	76.8±0.3	271.4±4.7
	69.8	26	81.4±0.6	288.8±4.8
Simazin-Wp, 50%	70.0	22	83.4±0.7	255.8±4.2
	68.5	24	80.0±0.6	267.7±4.3
No weeding	67.0	20	72.3±0.5	251.2±4.1
	68.0	24	76.4±0.6	265.2±4.5

Upper : 1968, lst year of experiment.

Lower : 1998, 2nd year of experiment.

52.2%, 76.4% and 78.1% respectively.

4) Difference in Growth and Yield by Application of Herbicides

Influences of applying herbicides on growth and yield of flax were shown in Table 5.

Stem length showed little differences between plot using no herbicides with 67.68cm and plot applying herbicides, but plot using sethoxydim-Ec, 2.4-D-Wp was higher as 68.2cm and 70cm respectively. The number of plants at 30cm intervals showed the same trend as stem length and there was no great difference between 20 plants at plot using no herbicides and plot applying herbicides, but 2.4-D-Wp harvested 24 plants and other plots applying herbicides were similar as 20-22 plants.

In the yield of seeds per 10a, plots using no herbicides had 72.3kg and 76.4kg, but plots applying sethoxydimEc, 2.4-D-Wp and simazin-Wp had no decrease of yield as 85.5kg, 79.3kg, 76.8kg and 83.4kg respectively and in the yield of stems per 10a, plots using no herbicides showed 251.2kg and 265.2kg and those applying herbicides showed no decrease of yield as 254.0kg, 250.4kg, 271.4kg and 255.8kg respectively, and it was considered that it could reduce the labors to kill weeds.

Consequently, effects of weeding by applying herbicides showed no decrease of yield and high weeding effects and it was the same findings as those of research on prevention of weeds at rape farm by Ahn *et al.* (1995).

2. Experiment of Harmful Effects of Herbicides by Their Application Concentration in Sowing Flax

Examination of applying standard and double quantity of herbicides to flax on harmful effects of herbicides was shown in Table 6. As shown in Table 6, harmful effects of sethoxydim-Ec, 2.4-D-Wp were severe and as a result of applying double quantity of mecoprop-Wp and simazin-Wp, its damage was great and withering to death was found. Therefore, yield of flax could be increased by decreasing the period of early competition between weeds and crop with herbicides and it was considered that mecoprop-Wp was excellent herbicide owing to its high weeding value and changes of its remnants and valid components after using herbicides should be continuously examined.

Table 6. Plant injury of flax of applied herbicides

Herbicides	Rewmmended concentration			Double concentration (for harmful effect)		
	10*	20	30	10	20	30
Sethoxydim-Ec, 20%	6	6	6	9	9	9
	6	6	6	9	9	9
2,4-D-Wp, 40%	4	4	4	9	9	9
	4	4	4	9	9	9
Mecoprop-Wp, 50%	0	0	0	7	7	7
	0	0	0	7	7	7
Simazin-Wp, 50%	0	0	0	7	7	7
	0	0	0	7	7	7

Plant injury : 0 (No injury) - 9 (Completely killed)

* : Days the after applied herbicides

Upper : 1968, lst year of experiment.

Lower : 1998, 2nd year of experiment.

LITERATURE CITED

Ahn G. S., B. S. Kwon, S. K. Kim and D. H. Chung. 1995. Chemical control of weed for rapes. Kor. J. Grassl. Sci. 15 : 186-191.

Kwon B. S. 1968. Chemical control of weed for flax. Research report of office of chonnam rural development. 1:198-202.

Kwon B. S. 1987. Studies on the ecology of fibre resources plant. I. Effect of planting date on agronomic characteristics and varietal differences in flax varieties. Sunchon Natl. Univ. Bull. 6 : 183-191.

Kwon B. S., J. I. Lee and H. J. Park. 1988. Comparison of agronomic character and yield as affected by seeding dates of flax. Korean J. Crop Sci. Vol. 33(2) : 169-173.

Kwon B. S., H. J. Park, J. I. Lee. 1989a. Response of flax varieties to growing periods. The saemaeul research review of Sunchon Natl. Univ. Vol. 5 : 77-81.

Kwon B. S., H. J. Park, J. I. Lee, E. R. Son and J. K. Hwang. 1989b. Response of flax varieties to planting density. Korean J. Crop Sci. 34(3) : 225-228.

Park H. J., J. I. Lee and Kwon B. S. 1987. Genetic analysis and correlation coefficients in flax varieties. Korean J. Breed. Vol. 19(4) : 392-398.

Park H. J., Kwon B. S., J. I. Lee, E. R. Son, and J. K. Hwang. 1989. Response of flax varieties to fertilizer. Korean J. Crop Sci. 34(4) : 353-357.

Park H. J., Kwon B. S. and J. I. Lee. 1990. Varietal classification by multivariate analysis in Flax. Korean J. breed. 22(1) : 65-71.

Son. E. R. 1985. Fiber Crops of Industrial Crop Science. pp. 80-91.

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