THE SELECTIVITY OF HERBICIDE ALACHLOR ON SWEET CORN (*Zea mays saccharata* Sturt) AND NUTSEDGE (*Cyperus rotundus* L.) ON QUARTZ SAND MEDIA

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ABSTRACT

Research was conducted on green house of Post Graduated (Magíster and Doctoral Program) of Sriwijaya University, during October until December 2009. Completely Randomized Design was adopted on this research with 8 treatments and four replication. Treatments are rate concentration (dosage) of Alachlor herbicide on quartz sand media. Duch as : H1=0 ; H2= 0.003 ; H3 = 0.03 ; H4 = 0.3 ; H5= 3 ; H6 = 30 ; H7 = 300 and H8 = 3000 ppm. The result showed that of Alachlor herbicide treatment have not gave significant effects on percentage germinating of sweet corn, while on germinating of bulbs nut-sedge gave some variante effects regarding to rate dosages. So far applications Alachlor on rate dosage 3000 ppm (equal 2,6 kg ha-^{1}) have shown crops phytotoxicity by reduce length of roots of sweet corn 53,30% and reduced shoots growth 60,03%. The length of roots and shoots of seedling nut-sedge reduced regarding to the increased rate of alachlor. Application alachlor on rate 3 ppm induce reduction of roots nut sedge 80,77% and shoots elongation reduce 54,62%. Retarding growth of nut sedge achieved 100% with the application of alachlor on rate 3000 ppm. The application alachlor on 3000 ppm gave the effects on reduced dry weight of roots and shoots of seedling sweet corn as much as 57,88% and 61,69%. The other side growth retarded by alachlor against nut sedge had appear on rate dosage 3 ppm by reducing dry weight of roots amounting to 86,37 % and shoots of seedling nut sedge amounting to 76,77%. Based on these research result can be conclude Alachlor was selective herbicides for sweet corn and effective to control growth of nut-sedge.

Key words : Selectivity, Alachlor, sweet corn, *nutsedge* , and quartz sands.

INTRODUCTION

Crops and weeds Hill associated while grown to gether, and Hill have competition each other whenever not enough supporting by growth factors (Syawal, 2010). Furthermore to avoid decrease of yields production, weeds controlled should have done on farming system. Weeds controlled system on sweet corn crops, herbicide sprayed are one of alternative effective and efficient methodes. Herbicides are chemicals agents which can be applied to reduce or control growth activity of weeds whenever apllied on righjt rate dosage (Sumintapura and Iskandar, 1980). One of the important decisión on herbicides used are to get selective control, to control weeds without Hill the main crops. To stipulate optimum herbicide rate dosage application on

certain crops, research trial need conducted to avoid exessive herbicide applications. Herbicide alachlor can be applied as pre planting and pre-emergnce treastment. According to Jordan and Harvey (1978) fresh weight shoots of pea seedling which grown on quartz sand médium was influenced by alachlor concentration. Application alachlor wih concentration 2 ppm have gave retard growth amounting to 62% and by increasing rate to 8 ppm give suppresed growth amounting to 75%.

Alachlor absorption commonly throuhg Juvenile meristem on roots, shoots and leafs of seedling. Furthermore Jordan and Harvey (1980) stated, using alachlor on roots of pea seedling will reduce weight shoots and roots of pea seedling as much as 15% and 40%. Dixon, at. Al.,(1980) have made research on the effect of alachlor again *Cyperus rotundus* in green house and fields condition trial. Research on in green house used soil médium, the application alachlor on rate 1.5 ppm give growth index 13% and on rate 0.75 ppm has growth index 46% on *Cyperus rotundus*. The other side from field trial research, applications alachlor on rate dosage 3.36 kg ha-1 suppressed the growth *Cyperus rotundus* amounting to 65%.

Furthermore Winarsih and Moenandir (1988) have made research on the selectivity alachlor on pea crops and *Cyperus rotundus* . GR 50 value (retardant 50%) on quartz sand médium againts pea crop length of roots and shoots each other 14 ppm and 125 ppm againts dry weight nd shoots are 358 ppm and 542 ppm.

GR 50 value for *Cyperus rotundus* on lenght of roots and shoots each others get 0.03 ppm and 0.95 ppm and for dry weight roots and shoots each others 0.07 ppm nd 1.33 ppm. Regarding to the above explanation need to be conducted research to determine the selectivity alachlor herbicide on sweet corn and nutsedge (*Cyperus rotundus).*

MATERIALS AND METHODS

Research was conducted by using quartz sand médium on green house of Post Graduate (Magíster and Doctoral program) Sriwijaya University during October until December 2009. Completely Randomized Design was adopted on this research trial with 8 treatments of rate concentration alachlor with four replication as listed below :

H1= 0 (control), H2= 0,003, H3= 0,03, H4= 0,3, H5= 3, H6= 30, H7= 300, H8= 3000 ppm.

RESULTS AND DISCUSSION

The effects of alachlor againts germinating, length of roots and shoots, fresh and dry weight sweet corn shown by Tabel 1. Application alachlor on rate concentration 0 ppm to 3.000 ppm on quartz sand media did not negatif effects on germinating sweet corn (Tabel 1). The length of rootsand shoots of seedling sweet corn, analized result and LSD test show the application alachlor on rate concetration 3.000 ppm have reduced significantly lengfth roots and shoots. The value retardand on roots and shoots each other 53,3% and 60.03% (Tabel 3).

Fresh weight roots and shoots seedling of sweet corn significantly decreases with increasing alachlor rate concentration. Application alachlor on rate 3.000 ppm has given growth retarding 37.14% on fresh weight roots and 27.75% fresh weight of shoots. Also on dry weight of roots and shoots got retardant growth each other amounting to 57.88% and 61.69% (Table 3). The effects of alachlor againts germinating , length of roots and shoots, fresh and dry weight nutsedge shown on Tabel 2.

Percentage germinating nutsedge decrease with the increasing appliction rate concentration of alachlor on rate 300 ppm. Nutsedge uncapable to germinating. Application on rate 30 ppm have gave retard the length of roots and shoots each other amounting to 91.13% and 92.45%. Application on rate concentration 30 ppm gave significant different againts all treatment for fresh weight roots and shoots nutsedges seedling and have retard on both above variable each other amounting to 92.74% and 86.79%. Furthermore for dry weight of roots and shoots give retards the growth each other amounting to 97.96% and 88.24% (Tabel 4).

Table 1. Seed germination (%), length of root and shoot (cm) fresh and dry weight (g) of sweet corn at various alachlor concentration (ppm) with quartz media.

Alachlor Concentration (ppm)	seed germination (%) [1)]	Length of root (cm) [2)]	Length of shoot (cm) [2)]	Fresh weigth of root (g) [3)]	Fresh weigth of shoot (g) [3)]	Dry weigth of root (g) [4)]	Dry weigth of shoot (g) [4)]
0,000	90,00 a	11,84 a	16,52a	41,87 a	71,64a	30,04 a	39,81a
0,003	90,00 a	11,32 ab	16,01a	41,24 a	70,97ab	29,52 a	39,43a
0,030	90,01 a	10,87 abc	15,51ab	40,13ab	70,36abc	28,92 a	39,10 a
0,300	90,00 a	9,77 bcd	14,51ab	39,28 bc	69,79abc	28,06 a	38,78 a
3,000	90,00 a	9,58 cd	13,58cd	39.41 bc	69,93 bc	27,44 ab	37,78 a
30,00	87,15 a	8,75 d	12,46de	37,65 c	68,44 c	25,01 b	36,81 a
300,0	90,00 a	6,60 e	11,06e	29,32 d	59,21d	16,51 c	27,21 b
3000	90,00 a	5,53 e	6,61 e	26,32 e	51,76e	12,66 d	15,26 c
LSD (5%)	2,98	1,56	1,86	1,83	2,19	3,23	3,90

Notes : Average number are followed by the same letter in the same colum show no significant difference (p= 0, 05)

1). Arcsin $\sqrt{x}$ transformation

2) = 10^3 transformation

3) = 10^5 transformation

Table 2. Seed germination (%), length of root and shoot (cm) fresh and dry weight (g) of nut-sedge at various alachlor concentration (ppm) with quartz media

Alachlor Concentration (ppm)	seed ger-[1] mination (%)	Length of [2] root (cm)	shoot (cm)	Fresh weigth of [3] root (g)	shoot (g)	Dry weigth of [4] root (g)	shoot (g)
0,000	9,31 a	1,97 a	3,24 a	2,56 a	3,40 a	2,22 a	2,71 a
0,003	8,87 ab	1,80 b	2,95b	2,54 a	3,31 ab	2,13 a	2,64 a
0,030	8,64 ab	1,58 c	2,74b	2,34 b	3,07 b	1,74 a	2,52 a
0,300	7,97 bc	1,34 d	2,50c	2,14 c	2,57 c	1,59 b	2,07 b
3,000	7,12 c	1,07 e	2,13d	1,60 d	2,08 d	1,06 c	1,46 c
30,00	3,43 d	0,89 f	1,13 e	0.97 e	1,41 e	0,78 d	1,15 d
300,0	0,71 e	0,71 g	0,71 f	0,71 f	0,71 f	0,71 d	0,71 e
3000	*0,71 e*	*0,71 g*	*0,71 f*	*0,71 f*	*0,71 f*	*0,71 d*	*0,71 e*
LSD (5%)	0,98	0,14	0,21	0,19	0,23	0,17	0,22

Notes : Average number are followed by the same letter in the same colum show no significant difference (p= 0, 05)

1) and 2) = $\sqrt{x}$ + 0,5 transformation

3) = 10^4 and $\sqrt{x}$ + 0,5 transformation

4) = 10^5 and $\sqrt{x}$ + 0,5 transformation

Tabel 3. Depression of root length, shoot length, root dry weight, shoot dry weigth of sweet corn due to alachlor herbicide with quartz media

Variable of growth	Alachlor concentration (ppm) 0,0	0,003	0,03	0,3	3,00	30	300	3000
Root length	11,84	11,32	10,87	9,77	9,58	8,75	6,60	5,53
% of control	*100,00*	*85,60*	*91,80*	*82,51*	*80,91*	*73,90*	*55,74*	*46,70*
% of depression	0,00	4,40	8,20	17,49	19,09	26,30	44,26	53,30
Shoot length	16,52	16,01	15,51	14,51	13,58	12,47	11,06	6,61
% of control	100,00	96,91	93,88	87,82	82,19	75,46	66,92	39,97
% of depression	0,00	3,09	6,12	12,18	17,81	24,54	33,08	60,03
Root dry weigth	30,04	29,52	29,92	28,05	27,44	25,01	16,51	12,66
% of control	100,00	98,26	96,27	93,40	91,34	83,25	54,94	42,12
% of depression	0,00	1,84	3,73	6,60	8,66	16,75	45,06	57,88
Shoot dry weigth	39,81	39,43	39,10	38,78	37,78	36,81	27,21	15,26
% of control	100,00	99,04	98,21	97,41	94,89	92,46	68,34	38,31
% of depression	0,00	0,96	1,89	2,59	5,11	7,54	31,66	61,69

Notes : 0 = no growth

Table 4. Depression of root length, shoot length, root dry weigth, shoot dry weigth of nut sedge due to alachlor herbicide with quartz media

Variable of growth	Alachlor concentration (ppm)							
	0,0	0,003	0,03	0,30	3,00	30,0	300,0	3000
Root length	3,38	2,76	2,01	1,30	0,65	0,31	0	0
% of control	100,00	81,36	59,17	38,46	19,23	8,87	0	0
% of depression	0,00	18,64	40,83	62,54	80,73	91,13	100	100
Shoot length	9,93	8,15	6,96	5,73	4,00	0,74	0	0
% of control	100,00	82,07	70,09	57,70	40,38	7,55	0	0
% of depression	0,00	17,93	29,81	42,30	59,62	92,45	100	100
Root dry weigth	4,40	4,00	2,51	2,00	0,60	0,10	0	0
% of control	100	90,90	56,81	45,45	12,83	2,03	0	0
% of depression	0,00	9,10	43,19	54,54	87,17	97,97	100	100
Shoot dry weigth	6,80	6,43	5,81	3,76	1,61	0,80	0	0
% of control	100	94,55	85,57	55,29	23,50	11,76	0	0
% of depression	0,00	5,45	14,43	44,71	76,50	88,24	100	100

Notes: 0 = no growth

Based on trial result shown on Tabel 3 and Tabel 4. have distinctly shown to inhibit the growth of nutsedge application alachlor quiote enough with low concentration, while the other side for sweet corn need much more concentrations.

Its mean alachlor have proven as selective herbicide for sweet corn grown. The degree selectivity alachlor on sweet corn and nutsedge due to there is role in plants its self . In this case factor influence are the different of plant morphology, biophysics and biochemistry reaction (Moenandir , 1988; Ashton and Craft, 1973).

CONCLUSION

Aplication alachlor to control nutsedge with grown to gether with sweet corn can be used on low rate 3,0 ppm (2.6×10^{-3} kg ha^{-1}).
Alachlor has proven as selective herbicides for sweet corn to control nut-sedge weed.

SUGGESTION

At the current time alachlor (LASSO) not produced any more, to looking for other selectives herbisida for control nutsedge. Futher more research need to be conducted to finding effective herbicide on sweet corn and other vegetables and food crops.

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