Agripreneur, 11 (2) (2022) pp. 70-77
Published by: IOCSCIENCE
Agripreneur : Jurnal Pertanian Agribisnis
Journal homepage: www.iocscience.org/ejournal/index.php/Agripreneur

EFFECT OF DOSAGE AND INTERVAL OF GLYPHOSATE AND OXYFLUORPHEN HERBICIDE ON THE GROWTH AND RESULTS OF SOYBEAN (Glicyne max L. Merr)

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Abstract

This study aims to study and determine the effect of the application of glyphosate and oxyfluorfen to suppress weed growth on soybean plantations with different application doses and time intervals. The research was conducted in February - May 2009 in Jatikerto Village, Malang. This research was designed using a randomized design. factorial group (RAK) factorial, two treatment factors with 3 replications: Factor I (percentage of herbicide doses) P1: 25% glyphosate herbicide + 75% oxyfluorfen herbicide, P2: 50% glyphosate herbicide + 50% oxyfluorfen herbicide, P3: 75 % glyphosate herbicide + 25% oxyfluorfen herbicide. Factor II (application time interval): H1: glyphosate and oxyfluorfen mixed, H2: oxyfluorfen herbicide spraying followed by glyphosate herbicide without time interval, H3: spraying oxyfluorfen herbicide one day later followed by glyphosate herbicide. Observation of weeds was carried out by means of vegetation analysis at the age of 0, 14, 28, 42, 56 days after spraying. The experimental results showed that the percentage of glyphosate + oxyfluorfen herbicide doses and the time interval of spraying had an effect on the variables of plant height, number of leaves, leaf area and total plant dry weight. The combined treatment of 25% gifphosphate herbicide + 75% oxyfluorfen by mixing the two types of herbicides resulted in better plant growth results when compared to other combination treatments. The effect of the treatment on crop yield/land area showed that the percentage dose treatment had no significant effect on yield/plant variables, but the day interval treatment in the herbicide mixing treatment (H1) was able to increase the yield/plant 24,983% from the one day interval treatment. Mixing two types of glyphosate and oxyfluorfen herbicides with various dosage percentages was able to increase the growth and yield of soybean plants.

Keywords: Spraying, Glyphosate, Oxifluorfen, Soybean.

1. Introduction

Soybean production (Glycine max L.) in Indonesia has decreased, in 2006 it only reached 746,611 tons and in 2007 it was only 608,000 tons, causing imports of 1.3 million tons in 2007, therefore efforts to increase soybean production in Indonesia need attention. considering the potential of the land is quite large, technology and other resources are quite available. Factors that cause a decrease in soybean yields in Indonesia include the problem of drought, high intensity of rain during harvest, floods, pest attacks and what is no less important is the existence of competition in weeds. If the maintenance is less intensive, the soybean plants will compete with weeds, resulting in decreased yields, so it is necessary to control weeds.

Weed control with one type of herbicide is not efficient. Such control causes several types of resistant weeds which are increasingly difficult to control in the future and cause a shift in weeds. To prevent and minimize the opportunity for weed growth in the soybean area, more than one type of herbicide is used. One of several methods of chemical weed control is the use of a combination of glyphosate and oxyfluorfen herbicides. Mixing of herbicides can be done with the condition that the two herbicides have different active ingredients and have the same acid-base properties so that when they are mixed no precipitate or reaction occurs.

Glyphosate and oxyfluorfen herbicides have a good level of effectiveness in controlling weeds on soybean plants. Glyphosate is a non-selective and systemic herbicide that can control most of the perennial weeds. The advantage of glyphosate herbicides is that they kill weeds by inhibiting the synthesis of aromatic amino acids needed to form protein in plants. Glyphosate has a high absorption rate on soil particles, thereby reducing the leaching effect or loss of herbicides from the soil surface so that they are not harmful to the environment. Oxifluorfen is a pre-emergence herbicide that has contact and non-systemic properties. Oxyfluorphene herbicides are very effective in controlling broadleaf weeds and some types of grasses. but less able to control grunting (Cynodon dactylon) and teki (Cyperus rotundus). In the plant body, these herbicides are toxic to living plant cells. In addition, the herbicide oxyfluorfen has the ability to inhibit respiration and photosynthesis as a result of which cell division and development and the translocation of food materials to the meristematic areas of roots and stems are disrupted.

2. Methods

2.1 Location and Time

The research was conducted in Jatiketo Village, Malang Regency, + 303 m asl, Alfisol soil type, soil pH: 5.5 - 6.7; minimum temperature 18 - 210 C maximum temperature 30-330 C, average rainfall 100 mm / month, since February - May 2009.

2.2 Tools and materials

The tools used in this study included hoes, hammers, rulers, LAMs, ovens, sprayers, ovens, measuring cups, square squares and analytical scales. The materials used in this study include Urea (45% N), SP36 (36% P2O5) and KCl (60% K2O). Furadan 3G pesticide akocytrin 50 EC. Herbicide with the active ingredient glyphosate 5 l ha-1 and herbicide with the active ingredient oxyfluorfen 1.5 l ha-1.

2.3 Research methods

This study was designed in a factorial randomized block design (RAK factorial) with two treatment factors: Factor I (percentage of herbicide doses) P1: 25% glyphosate herbicide + 75% oxyfluorfen herbicide P2: 50% glyphosate herbicide + 50% oxyfluorfen herbicide P3: 75 % glyphosate herbicide + 25% oxyfluorfen herbicide Factor II (application time interval) H1: Glyphosate and oxyfluorphen herbicide mixed H2: Oxyfluorphen herbicide spraying followed by glyphosate herbicide without time interval. H3: Spraying oxyfluorfen herbicide one day later followed by glyphosate herbicide.

2.4 Research Implementation

The research was carried out with the following activities: Land preparation, Herbicide application preparation, Planting, Fertilizing, Plant Maintenance (Embroidery, Watering, Pest and disease control, Weeding, Harvesting).

2.5 Observation

Observation of plant growth characteristics and yields was carried out destructively by taking 2 sample plants for each treatment combination. Observations were made at intervals of 15 days, when the plants were 15, 30, 45, 60, 75 hst and harvested. The observed plant growth characteristics included: number of leaves, plant height, total plant dry weight. The yield components observed included: Total number of pods, Weight of 100 seeds and Dry weight of seeds/plant.

2.6 Data analysis

The data obtained were analyzed using analysis of variance and the F test was carried out at the 5% level. If the test results show a significant difference, then proceed with the Duncan's distance test (UJD) at the 5% level.

3. Results and Discussion

3.1 Observation of soybean plants

a. Plant height

The results of the analysis of variance on the variables Plant height were affected by the interaction of the percentage doses of glyphosate + oxyfluorfen and the time interval of spraying at 15 days after planting and did not differ significantly between 60 days and 75 days.

Table 1. Average plant height due to treatment interactions at 15.60 and 75 hst.

	Average plant height		
Treatment	15	60	75
P1H1	9,700 ab	78.7	91.5
P1H2	11,133c	83.7	93.33
P1H3	10.167 abc	67.5	82.67
P2H1	9.733 ab	55.5	85
P2H2	9.467 ab	84.3	97.67
P2H3	9,367a	79.7	94.5
P3H1	10,433 bc	76.5	89
P3H2	9,767 ab	83.3	89,83
P3H3	9.167 a	85.7	89,83
		mr	mr

Description: Numbers followed by the same letter in the same column were not significantly different in Duncan's range test (UJD) level of 5% - P1: 25% glyphosate herbicide + 75% oxyfluorfen herbicide P2: 50% glyphosate herbicide + 50% oxyfluorfen herbicide P3 : 75% glyphosate herbicide + 25% oxyfluorfen herbicide. H1: Mix. H2: two times spraying without interval. H3: two times spraying one day interval.

The percentage dose of herbicide (P) treatment had a significant effect at the age of 30 HST and the spraying time interval was not significantly different. The time interval of spraying had a significant effect at the age of 45 hst with the percentage of herbicide doses not significantly different for each treatment.

Table 2. Average plant height as a result of the percentage dose treatment of glyphosate herbicide + oxyfluorfen herbicide and the time interval of spraying at 60 and 75 hst.

Treatment	Average plant height	
	30	45
P1	23,878b	56,589
P2	21,564 a	54,389
P3	22,360 ab	54,022
		mr
H1	22,451	55,744 ab
H2	23,351	56,978b

H3	22	52,278 a
	mr	

Description: Numbers followed by the same letter in the same column were not significantly different in Duncan's range test (UJD) level of 5% - P1: 25% glyphosate herbicide + 75% oxyfluorfen herbicide P2: 50% glyphosate herbicide + 50% oxyfluorfen herbicide P3 : 75% glyphosate herbicide + 25% oxyfluorfen herbicide. H1: Mix. H2: two times spraying without interval. H3: two times spraying one day interval.

The table above shows the 30 DAP observation on plant height variables in the hebicide percentage dose (P) treatment. The highest yield was in the 25% glyphosate herbicide + 75% oxyfluorphene (P1) herbicide treatment, which was 23,878, which was not significantly different from the 75% glyphosate + 25% herbicide treatment. oxyfluorfen (P3) herbicide. the lowest yield was in the treatment of 50% glyphosate herbicide + 50% oxyfluorfen (P2) herbicide which was 21,564. whereas in the spraying time interval treatment the highest yield was in the treatment of two applications without time interval (H2) which was not significantly different from the treatment of mixing the two herbicides (H1) and the lowest yield was in the treatment of two applications with one day interval (H3).

b. Number of leaves

Analysis of variance on the number of leaves/plants variable showed the interaction between the percentage of herbicide doses and the time interval of spraying at 45 and 75 days after observation, while the observations at 15, 30 and 60 days were not significantly different.

Table 3. The average number of leaves/plants due to the interaction of the percentage of doses of herbicide glyphosate + oxyfluorfen and the time interval of spraying.

Treatment	Average number of leaves/plant	
	45	75
P1H1	14,567 abc	11,867bcd
P1H2	16,067c	12,000bcd
P1H3	15,033 abc	10,500b
P2H1	15,500 bc	10,583b
P2H2	13,767a	8.333 a
P2H3	13,867a	10,767 bc
P3H1	14,300 ab	10,533b
P3H2	13,567 a	12,903 cds
P3H3	13,567 a	13,533d

Description: Numbers followed by the same letter in the same column were not significantly different in Duncan's range test (UJD) level of 5% - P1: 25% glyphosate herbicide + 75% oxyfluorfen herbicide P2: 50% glyphosate herbicide + 50% oxyfluorfen herbicide P3 : 75% glyphosate herbicide + 25% oxyfluorfen herbicide. H1: Mix. H2: two times spraying without interval. H3: two times spraying one day interval.

The variable number of leaves at 45 hst observation showed that the lowest number of leaves/plants was in the treatment of 75% glyphosate herbicide + 25% oxyfluorfen herbicide and twice one day interval spraying (P3H3) which was 13,567 which was not significantly different from the P3H2, P2H3, P2H2, P1H3 treatments. and P3H1 while the highest number of leaves/plants was obtained in the treatment of 25% glyphosate herbicide + 75% oxyfluorfen herbicide and two sprayings without time intervals (P1H2) which was 16,067

which was not significantly different from the P1H1, P1H3 and P2H1 treatments. In the 75 hst observation the lowest number of leaves/plants in the treatment of 50% glyphosate herbicide + 50% oxyfluorfen herbicide and two sprayings without time interval (P2H2) was 8.

c. Total plant dry weight

The results of the analysis of variance of total plant dry weight were influenced by the interaction of the doses of glyphosate + oxyfluorfen herbicide and the time interval of spraying at 30 HST and were not significantly different at 15 HST and 45 HST. at 30 hst showed that there was an interaction between the percentage of hebicide doses (P) and the herbicide spraying time interval (H). From the results of the 30 hst observation, the interaction between the treatment of 25% glyphosate herbicide + 75% oxyfluorfen herbicide and two sprayings without time intervals (P1H2) had the lowest total plant dry weight of 1,197 and the highest total plant dry weight in the treatment combination of 50% glyphosate herbicide + 50 % oxyfluorfen herbicide and two sprays without time interval (P2H2) is 2,873.

Table 4. Average total plant dry weight (g) due to the interaction of glyphosate + oxyfluorfen herbicide treatments and spraying time intervals at 15.30 and 45 hst.

Treatment	Average total plant dry weight (g)		
	15	30	75
P1H1	0.35	1,670 ab	12,18
P1H2	0.36	1.197a	10.66
P1H3	0.26	1,590 ab	11.55
P2H1	0.31	1.447 ab	11.69
P2H2	0.4	2,873c	11,13
P2H3	0.26	1,290 ab	10.34
P3H1	0.31	1.607 ab	9,973
P3H2	0.32	1,873b	9,967
P3H3	0.3	1,540 ab	9,557
	mr		mr

Description : - Numbers followed by the same letter in the same column, not significantly different in Duncan's range test (UJD) level 5% - P1: 25% glyphosate herbicide + 75% oxyfluorfen herbicide P2: 50% glyphosate herbicide + 50% oxyfluorfen herbicide P3 : 75% glyphosate herbicide + 25% oxyfluorfen herbicide. H1: Mix. H2: two times spraying without interval. H3: two times spraying one day interval

3.2 Harvest observation

a. Number of pods

The effect of treatment on the number of pods/plants was obtained from the analysis of variance. The results of the statistical analysis showed that there was a significant interaction between the percentage doses of glyphosate + oxyfluorfen (P) and the time interval of spraying (H).

Table 5. The average number of pods/plants in various combinations of treatments at the harvest age of 90 hst

Treatment	Number of pods/plants
	Age 90 hst
P1H1	61.87 cds

P1H2	44.123 ab
P1H3	53,200 bc
P2H1	73,993d
P2H2	60,773 cds
P2H3	45.123 ab
P3H1	38,620 a
P3H2	53,457 bc
P3H3	50,750 abc

Note : - Numbers followed by the same letter in the same column were not significantly different in Duncan's range test (UJD) level of 5% - P1: 25% glyphosate herbicide + 75% oxyfluorfen herbicide P2: 50% glyphosate herbicide + 50% oxyfluorfen herbicide P3 : 75% glyphosate herbicide + 25% oxyfluorfen herbicide. H1: Mix. H2: two times spraying without interval. H3: two times spraying one day interval.

The combination of applying 50% glyphosate herbicide + 50% oxyfluorfen herbicide and mixing the two types of herbicide (P2H1) produced the highest number of pods, namely 73,993 pods/plant and the treatment of 75% glyphosate herbicide + 25% oxyfluorfen herbicide and mixing the two types of herbicide (P3H1) had the lowest number of pods was 38,620.

b. Seed/plant dry weight

The effect of treatment on seed/plant dry weight was obtained from analysis of variance. The results of statistical analysis on dry weight/plant variables showed that there was no interaction between the percentage of herbicide doses (P) and the time interval of spraying (H). but the spraying time interval (H) was significantly different.

Table 6. Average dry weight of seeds/plants (g) at various treatments, percentage of herbicide doses and time intervals at 90 hst harvest.

Treatment	Average dry weight of seeds/plants(g)
	90 hst
P1	9,897
P2	10,909
P3	10.144
	mr
H1	11,141 b
H2	10,896b
H3	8,914 a

Description: Numbers followed by the same letter in the same column were not significantly different in Duncan's range test (UJD) level of 5% - P1: 25% glyphosate herbicide + 75% oxyfluorfen herbicide P2: 50% glyphosate herbicide + 50% oxyfluorfen herbicide P3 : 75% glyphosate herbicide + 25% oxyfluorfen herbicide. H1: Mix. H2: two times spraying without interval. H3: two times spraying one day interval.

The interval treatment of herbicide spraying was significantly different in the seed/plant dry weight variable, the highest seed/plant dry weight was the treatment of mixing the two types of herbicides glyphosate and oxyfluorphen (H1) which was 11.141, not significantly different from the treatment of two applications without time interval (H2) which was 10.896 while the lowest treatment was the treatment of two applications with an interval of one day (H3) which was 8,914.

c. Weight 100 seeds

The results of the analysis of variance on the variable weight of 100 seeds were not significantly different in each treatment combination or in each treatment, both the percentage of herbicide doses and the time interval of spraying.

Treatment	weight of 100 seeds
	Age 90 hst
P1H1	10,9
P1H2	10,8
P1H3	11.05
P2H1	10,733
P2H2	11,1
P2H3	11,4
P3H1	10,917
P3H2	11,667
P3H3	11,467
	mr

Description: Numbers followed by the same letter in the same column were not significantly different in Duncan's range test (UJD) level of 5% - P1: 25% glyphosate herbicide + 75% oxyfluorfen herbicide P2: 50% glyphosate herbicide + 50% oxyfluorfen herbicide P3 : 75% glyphosate herbicide + 25% oxyfluorfen herbicide. H1: Mix. H2: two times spraying without interval. H3: two times spraying one day interval.

In observing the dry weight of seeds/plants, there was no interaction between the percentage doses of glyphosate herbicide + oxyfluorfen herbicide with herbicide application time intervals, but only significantly different time interval treatments (H). The highest seed/plant dry weight was in the herbicide mixing treatment (H1). This was due to the relationship between weed dry weight and the resulting low seed/plant weight. Meanwhile, the variable weight of 100 seeds was not significantly different in all treatments.

4. Conclusion

The effect of treatment on yield/land area showed that the dose percentage treatment had no significant effect on the yield/plant variables, but the day interval treatment on the mixed herbicide treatment was able to increase the yield/plant 24,983% and was able to suppress weed dry weight by 75,657% from the one-day interval treatment. Mixing two types of glyphosate and oxyfluorfen herbicides with various dosage percentages was able to suppress weed growth and increase the growth and yield of soybean plants.

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