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The effectiveness of oxifluorfen 240 g/l herbicide against weeds, and its effect on growth and yield of shallots (*Allium ascalonicum* l.)

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Abstract
Weeds are plants that competitor with plants so that they inhibit growth which causes a decrease in onion production. In general, weed control is done by weeding which takes time, energy and money. The use of herbicides with the active ingredient Oxyfluorfen 240 g/l is the solution to this problem. The experiment was conducted at the Experimental Garden of the Faculty of Agriculture, Unpad Ciparanje, Jatinangor District, Sumedang Regency from March to June 2020. The purpose of this study was to determine the effectiveness of the herbicide tested in controlling weeds in shallot plantations so as to increase plant growth. This study used an experimental or experimental method of Randomized Block Design (RBD) which consisted of 7 treatments, each of which was repeated 4 times. Observation variables were weeds, growth, and yield of shallots. The results showed that the application of the Oxifluorfen 240 g/l herbicide starting at a dose of 2.00 l/ha was effective in controlling dominant weeds (*Cyperus rotundus, Cleome rutidosperma, Ageratum conyzoides, Commelina benghalensis, Alternanthera sessilis*), other weeds (*Mimosa invisa, Mimosa pudica, Eclipta prostrata, Amaranthus spinosus, Cynodon dactylon,* and *Eleucine indica*), and total weeds on shallot plants up to 6 weeks after application. Herbicide application starting at a dose of 2.00 l/ha gave better shallot yields than the control.

Keywords: weeds, oksifluorfen 240 g/l, shallot

Introduction

Shallots (*Allium ascalonicum* L.) is one of the horticultural commodities that has been intensively cultivated by farmers for a long time. Shallots function as a cooking spice and traditional medicinal ingredients because they contain allin and allicin. There were six main shallot-producing provinces in 2018 in a row, namely Central Java, East Java, West Nusa Tenggara, West Java, West Sumatra and South Sulawesi. Production from each of these provinces reached more than 90 thousand tons and in total the six provinces accounted for 93% of the total national production of shallots which reached 1.503 million tons. The average consumption of shallots for the Indonesian population reaches 23 kg/capita/year (BPS, 2019) [2].

Increasing the production of shallots must continue to be pursued. Efforts that can be made are by always paying attention to production facilities which are supporting factors in the cultivation business. As for the means of production factors, namely land area, fertilizer, labor, seeds and pesticides (Makruf *et al*., 2012) [6]. The technique of cultivating the growth of shallot bulbs will be more effective if there are no factors inhibiting the growth rate and the bulbs will be of good quality. One of the inhibiting factors for plant growth is weeds that are difficult to control.

Weeds on agricultural land will cause competition in using growth factors such as sunlight, nutrients, nutrients and others, this is because some weeds are hosts for pests and diseases, secrete allelopathic substances, reduce water discharge resulting in siltation. Losses due to weeds can reduce production yields, reduce yield quality, become alternative hosts for pests and pathogens, consume time and effort to cultivate the soil as well as production costs (Christia, 2016) [3]. Weed control must be carried out properly, namely during the critical period of the plant when the plant is sensitive to weeds. The critical period for shallots is 15-45 days. If it has reached or exceeded the economic threshold, the weed must be controlled immediately, if not controlled it will lose 50-80% yield (Moenandir, 2010) [7]. Weed control can be done in various ways, namely technical cultural control, manual weeding for planting areas less than one hectare, chemical and integrated. In large planting areas, weed control is generally carried out chemically using herbicides, the advantages of using herbicides are that it can save labor for weeding activities, control weeds that are difficult to weed, prevent root damage of cultivated plants, reduce erosion, save time and costs, see results faster. and reduce erosion (Prayogo *et. al*., 2017) [13].

Oxyfluorfen herbicide is a pre-emergent herbicide that is applied after the land is planted but before the weeds grow on the land with the aim of suppressing the growth of weeds that will grow at the same time as the growth of plants in cultivation (Ngawit, 2012) [9]. Oxyfluorphene herbicide 240 g/l is a broad-spectrum herbicide so that it can control broadleaf weeds and grass weeds by inhibiting the ACCase enzyme so that it can inhibit lipid synthesis causing weeds to experience chlorosis.

According to Moenandir (2010) [7] Oxyfluorfen is a selective contact herbicide that has been tested to control weeds in shallot plantation areas without poisoning cultivated plants. Oxyfluorfen herbicide caused more damage to weed shoots compared to ontro roots. When controlling using herbicides, it is necessary to pay attention to 6 Precise, namely the right dose, target, time, type,

concentration, and application. To find out the effectiveness of Oxyfluorfen herbicide in controlling weeds in shallot planting areas, it is necessary to conduct research.

Materials and Methods

This research was conducted in the experimental garden of the Faculty of Agriculture, Unpad Ciparanje, Jatinangor District, Sumedang Regency. The height of the research site is 750 meters above sea level with Inceptisols soil type, pH 6.22, and climate type C (classification according to Schmidt and Ferguson, 1951). The time of the study was carried out from March to June 2020. The materials used for research purposes were shallot seeds of Bima Brebes cultivar, herbicide Golok 240 EC (active ingredient Oxifluorfen 240 g/l), urea fertilizer, TSP, and KCl. While the tools used for research purposes are semi-automatic back spray and T-jet nozzle, measuring cup, pipette, analytical scale, and oven.

The method used in this study was an experimental method with a Randomized Block Design consisting of 6 treatments and repeated 4 times, so that 24 experimental units were obtained. The plot unit consists of two plots measuring 1 m x 6 m.

The treatments in this experiment are as follows

Table 1

Code	Treatment	Dose (l/ha)
A	Oksifluorfen 240 g/l	1.50
B	Oksifluorfen 240 g/l	2.00
C	Oksifluorfen 240 g/l	2.50
D	Oksifluorfen 240 g/l	3.00
E	Manual Weeding	-
F	Control	-

The effect of the experiment on plant growth was analyzed by analysis of variance with the F test at a 95% confidence level. If the treatment shows a significant effect, the analysis is continued with Duncan's Multiple Distance Test at a 95% confidence level.

Experimental Observation

1. Dominant weed dry weight

To determine the effectiveness of the herbicide Oxifluorfen 240 g/l against the target weeds, weed samples were taken for each species and total weeds, which were carried out at 3 and 6 weeks after application. The weeds of each species were separated and then dried in a drying oven at a temperature of 800C for 24 hours and then the dry weight was weighed.

2. Phytotoxicity

The level of toxicity was assessed visually on the plant population in the tile plots. Observations were made 1, 2, 3 weeks after application. The scoring of plant poisoning was as follows (Komisi Pestisida, 1989) [5]:

0 = no poisoning, 0 - 5% leaf shape or leaf color and or plant growth is not normal

1= mild poisoning, > 5 – 20% leaf shape or leaf color and/or abnormal plant growth

2= moderate poisoning, > 20 – 50% leaf shape or leaf color and/or abnormal plant growth

3 = severe poisoning, > 50-75% leaf shape or leaf color and or plant growth is not normal

4 = very severe poisoning, > 75% leaf shape or leaf color and or plant growth is not normal until the plant dies

3. The height of the shallot plant

Parameters observed were plant height was carried out destructively once a week by measuring from the base of the leaf to the tip of the top leaf. Observations were made on 12 plant samples taken at random at the age of 3 and 6 weeks after planting.

4. Number of wet tubers

The number of wet tubers was counted as all fully formed wet bulbs. Observations were made on 12 plant samples taken at random in each experimental plot and counted after harvest.

5. The yield of shallot plants

Observation of shallot yields (stored dry or completely dry leaves) was carried out on two tile plots measuring 0.75 m x 4.0 m.

Results and Discussion

Dry Weight Weed *Cyperus rotundus*

The test results showed that the application of the herbicide Oxifluorfen 240 g/l starting at a dose of 2.00 l/ha could control *Cyperus rotundus* weeds until the observation 6 weeks after application as indicated by the dry weight of *Cyperus rotundus* weed biomass which was lower than the control (Table 1). . This indicates that the application of the herbicide Oxifluorfen 240 g/l at a dose of 2.00 l/ha to 3.00 l/ha is effective for controlling *Cyperus rotundus* weeds on shallot plants at the test site.

At the herbicide dose of Oxifluorfen 1.50 l/ha *Cyperus rotundus* cannot be controlled because the herbicide Oxifluorfen 240 g/l is a contact herbicide. Contact herbicides require large doses and solvent water so that the active ingredients are evenly distributed throughout the weed surface, so that better control is obtained (Gleason, 2015). *Cyperus rotundus* is a weed that is difficult to control because it produces tubers or rhizomes that regenerate very quickly and can survive in extreme conditions.

Table 2: Effect of Oxifluorfen herbicide application on *Cyperus rotundus*

Treatment	Dose (l/ha)	Dry Weight (g/0,25 m^2)	
		3 Weeks After Application	6 Weeks After Application
Oksifluorfen 240 g/l	1.50	5.20 a	5.38 a
Oksifluorfen 240 g/l	2.00	0.40 b	1.28 b
Oksifluorfen 240 g/l	2.50	0.00 b	0.20 bc
Oksifluorfen 240 g/l	3.00	0.00 b	0.00 c
Manual weeding	-	0.75 b	1.30 b
Control	-	5.83 a	6.95 a

Note: the average number followed by the same letter in the same column shows no significant difference in Duncan's test at a significance level of 5%.

Oxifluorfen 240 g/l herbicide is a pre-emergent herbicide with selective contact, meaning it kills certain weed species without poisoning cultivated plants. This herbicide is applied through the soil to control weeds before they grow. Oxifluorfen herbicides are absorbed by plant roots (weeds) will limit the translocation of nutrients into the plant body, as a result of which little material is used for growth,

thereby interfering with cell development and division. Oxifluorfen 240 g/l herbicide interferes with photosynthesis by inhibiting the enzyme Acetylcarboxylase (Acetyl-CoA) which catalyzes the formation of malonyl-CoA (Abadi, 2013) [1].

Dry Weight Weed *Cleome rutidospermae*

The results of observations and data analysis showed that the application of the herbicide Oxifluorfen 240 g/l at a dose of 2.0 l/ha – 3.0 l/ha and manual weeding was significantly different compared to the herbicide treatment of 1.50 l/ha and control at 3 and 6 weeks after application (Table 2). The application of the herbicide Oxifluorphene 240 g/l starting at a dose of 2.0 l/ha gave a lower dry weight of *Cleome rutidospermae* weeds than the control at observations 3 and 6 weeks after application. This means that the application of herbicide at a dose of 2.0 l/ha has been effective in controlling *Cleome rutidospermae* weeds in the study area.

Oxyfluorphene herbicide is a type of pre-emergence herbicide or before the plant grows and after growing which is able to slow down and suppress the growth and development of seeds from weeds and newly growing weeds that enter through the leaves and then damage the work of the ACCase enzyme (Acetyl Coa Carboxylase) so that it can interfere with the process. lipid synthesis (Monaco *et al*., 2002).

Table 3: Effect of Oxifluorfen herbicide application on *Cleome rutidospermae*

Treatment	Dose (l/ha)	Dry Weight (g/0,25 m^2)	
		3 Weeks After Application	6 Weeks After Application
Oksifluorfen 240 g/l	1.50	3.60 ab	3.53 ab
Oksifluorfen 240 g/l	2.00	0.90 c	1.90 b
Oksifluorfen 240 g/l	2.50	1.65 bc	2.40 b
Oksifluorfen 240 g/l	3.00	1.58 bc	2.38 b
Manual weeding	-	1.30 bc	1.33 b
Control	-	5.35 a	6.80 a

Note: the average number followed by the same letter in the same column shows no significant difference in Duncan's test at a significance level of 5%.

Dry Weight Weed *Ageratum conyzoides*

Observations at 3 weeks after application showed that the application of the herbicide Oxifluorfen 240 g/l at a dose of 2.0 l/ha gave a lower dry weight of Ageratum conyzoides weed and was significantly different from the control but not significantly different from the higher dose application.

In the observation 6 weeks after application, the application of Oxifluorphene hericide 240 g/l at a dose of 2.0 l/ha was significantly different from the control, but significantly different from the application of a higher dose at a dose of 3.0 l/ha (Table 3). This shows that the application of the herbicide Oxifluorfen 240 g/l is effective in controlling Ageratum conyzoides weeds until 6 weeks after the application starts at a dose of 2.5 l/ha.

Table 4: Effect of Oxifluorfen herbicide application on *Ageratum conyzoides*

Treatment	Dose (l/ha)	Dry Weight (g/0,25 m^2)	
		3 Weeks After Application	6 Weeks After Application
Oksifluorfen 240 g/l	1.50	2.75 ab	4.62 ab
Oksifluorfen 240 g/l	2.00	1.25 b	2.40 bc
Oksifluorfen 240 g/l	2.50	1.88 b	2.15 c
Oksifluorfen 240 g/l	3.00	1.98 b	2.20 c
Manual weeding	-	2.00 b	2.28 c
Control	-	5.65 a	7.10 a

Note: the average number followed by the same letter in the same column shows no significant difference in Duncan's test at a significance level of 5%.

Dry Weight Weed *Commelina benghalensis*

The results of observations and analysis showed that the application of the Oxifluorfen 240 g/l herbicide at a dose of 2.5 l/ha-3.0 l/ha could suppress the dry weight of Commelina benghalensis weeds to 6 MSA and was significantly different from the control and treatment with higher herbicide doses. high (Table 4). This indicated that the application of the Oxifluorfen 240 g/l herbicide was effective to control the weed Commelina benghalensis at a dose of 2.5 l/ha.

Table 5: Effect of Oxifluorfen herbicide application on *Commelina benghalensis*

Treatment	Dose (l/ha)	Dry Weight (g/0,25 m^2)	
		3 Weeks After Application	6 Weeks After Application
Oksifluorfen 240 g/l	1.50	3.46 ab	3.50 a
Oksifluorfen 240 g/l	2.00	1.01 b	3.00 ab
Oksifluorfen 240 g/l	2.50	1.01 b	2.33 bc
Oksifluorfen 240 g/l	3.00	0.86 b	0.26 c
Manual weeding	-	0.61 b	1.20 bc
Control	-	4.46 a	3.44 b

Note: the average number followed by the same letter in the same column shows no significant difference in Duncan's test at a significance level of 5%.

The results of research by Ramalingan *et.al.* (2013) stated that broadleaf weeds can be effectively controlled by the herbicide oxyfluorphene 240 g/l. The study also showed that the application of pre-growing Oxifluorfen at higher doses of 2.00 l/ha – 4.00 l/ha gave more impressive control of broadleaf weeds. Adnan et.al (2012) also suggested that the higher the dose of the active ingredient used in each herbicide treatment, the higher the percentage value of weed control produced. In Eko and Fadilah's research (2017) the use of the oxyfluorphene herbicide at a dose of 480 g of the active ingredient ha/l can reduce the dry weight of grass and broadleaf weeds by 92.36 g.

Dry Weight Weed *Alternanthera sessilis*

The test results showed that the application of Oxifluorfen herbicide starting at a dose of 1.50 l/ha could control Alternanthera sessillis weeds, until the observation 6 weeks after application indicated by dry weight of Alternanthera sessillis weed biomass was not different from manual control but was significantly lower than control (without weeding) (Table 5). Oxyfluorphene herbicide application at a dose of 2.0 l/ha - 3.0 l/ha did not give significantly different control results. This indicates that the application of the herbicide Oxifluorfen 240 g/l at a dose of 1.50 l/ha has been effective in controlling weeds Alternanthera sessillis on shallot plants at the study site. Oxyfluorfen herbicide application was able to increase plant height and number of leaves by inhibiting growth and reducing competition between weeds and shallots so that plant growth was more optimal. Oxyfluorphene 240 g/l herbicide was significantly effective in controlling puzzle weeds and broadleaf weeds, but not significantly in controlling grass weeds. One of the determining factors for the effectiveness of herbicides is the active time of the herbicide in the soil or called persistence. Oxyfluorphene herbicide persistence in soil can last about 2 to 3 months so that it can suppress weed growth on land for a long time (Purnomo and Hasjim, 2020) [12].

Table 6: Effect of the application of the Oxifluorfen 240 g/l herbicide on *Alternanthera sessilis*

Treatment	Dose (l/ha)	Dry Weight (g/0,25 m^2)	
		3 Weeks After Application	6 Weeks After Application
Oksifluorfen 240 g/l	1.50	1.57 b	3.39 b
Oksifluorfen 240 g/l	2.00	1.21 b	2.34 b
Oksifluorfen 240 g/l	2.50	1.44 b	3.15 b
Oksifluorfen 240 g/l	3.00	1.17 b	2.47 b
Manual weeding	-	2.64 b	3.99 b
Control	-	8.14 a	11.64 a

Note: the average number followed by the same letter in the same column shows no significant difference in Duncan's test at a significance level of 5%.

Dry Weight Other Weed

In this study, other weeds are *Mimosa invisa*, *Mimosa pudica*, *Eclipta prostrata*, *Amaranthus spinosus*, *Cynodon dactylon*, and *Eulicine indica*. From the analysis data on observations 3 weeks after application, it can be seen that the application of the herbicide Oxifluorfen 240 g/l at a dose of 1.5-3.0 l/ha gave lower dry weight of other weeds and was significantly different from the control but not different. Evident with the application of higher doses and manual weeding. The same results were shown at the observation 6 weeks after application (Table 6). This shows that the application of the herbicide Oxifluorfen 240 g/l is effective in controlling other weeds starting at a dose of 1.50 l/ha until 6 weeks after application.

Table 7: Effect of application of the Oxifluorfen 240 g/l herbicide on dry weight of other weeds

Treatment	Dose (l/ha)	Dry Weight (g/0,25 m^2)	
		3 Weeks After Application	6 Weeks After Application
Oksifluorfen 240 g/l	1.50	3.68 b	4.44 b
Oksifluorfen 240 g/l	2.00	2.35 b	3.65 b
Oksifluorfen 240 g/l	2.50	2.84 b	3.23 b
Oksifluorfen 240 g/l	3.00	2.25 b	3.13 b
Manual weeding	-	3.75 b	4.10 b
Control	-	8.09 a	10.66 a

Note: the average number followed by the same letter in the same column shows no significant difference in Duncan's test at a significance level of 5%.

Total Weed Dry Weight

The total dry weight of weeds was calculated from the total dry weight of weeds at the study site. The test results showed that the observation 3 weeks after the application of the Oxifluorfen 240 g/l herbicide at a dose of 1.5 l/ha could suppress the total dry weight of weeds in shallot plantations and was significantly different from the control, but not significantly higher than manual weeding and weeding. herbicide treatment at higher doses. The application of the Oxifluorphene 240 g/l herbicide at a dose of 2.00 l/ha was effective in controlling total weeds, this can be seen from the dry weight produced not different from manual weeding treatment but lower and significantly different from no weeding / control (Table 7). The same results as in the observation 3 weeks after application occurred in the observations 6 weeks after application, the application of the Oxifluorfen 240 g/l herbicide starting at a dose of 2.0 l/ha gave the total dry weight of weeds not different from manual weeding but significantly different from without weeding /control. This shows that the application of the Oxifluorfen 240 g/l herbicide starting at a dose of 2.0 l/ha is effective in controlling total weeds on shallot plants up to 6 weeks after application. Suradinata *et al.* (2015) showed that the treatment without the application of herbicides gave the

highest weed biomass weight, namely 31.63 g and 11.50 g per plot, respectively, and was significantly different from other treatments. While the treatment with oxyfluorphene herbicide concentration of 2.5 g/l gave the lowest weed biomass of 7.86 g and 2.10 g per plot, respectively. This indicates that the higher the concentration of the herbicide oxyfluorfen, the less weed cover in the experimental plot, so that the weed biomass produced is relatively small.

Table 8: Effect of the application of the herbicide Oxifluorfen 240 g/l on the total dry weight of weeds

Treatment	Dose (l/ha)	Dry Weight (g/0,25 m^2)	
		3 Weeks After Application	6 Weeks After Application
Oksifluorfen 240 g/l	1.50	25.63 b	32.40 b
Oksifluorfen 240 g/l	2.00	7.56 c	15.10 c
Oksifluorfen 240 g/l	2.50	11.34 c	17.55 c
Oksifluorfen 240 g/l	3.00	11.09 c	12.24 c
Manual weeding	-	6.16 c	11.10 c
Control	-	36.11 a	40.36 a

Note: the average number followed by the same letter in the same column shows no significant difference in Duncan's test at a significance level of 5%.

Herbicide with active ingredient oxyfluorfen which reacts in contact, is slightly translocated to other plant parts. Thus, oxyfluorfen particles are absorbed in the soil by plant roots and translocated to other plant parts, causing poisoning and inhibiting weed growth. This happens because oxyfluorfen works to inhibit electron transport in photosystem II in the photosynthesis process (Tjitrosudirdjo and Wiratmodjo, 1989) [15].

Shallot Plant Phytotoxicity

The results of observations on phytotoxicity at the age of shallot plants 1, 2, and 3 weeks after application can be seen in Table 8. From these data, it can be seen that the observation 1 week after the application of the Oxifluorfen 240 g/l herbicide dose of 3.00 l/ha caused mild poisoning of onion plants. Application of this dose resulted in onion poisoning around 6 - 7%. On further observations, the poisoning of shallot plants decreased and at 3 weeks after application the poisoning had disappeared and the plants were able to recover. These data indicate that the application of the Oxifluorfen 240 g/l herbicide starting at a dose of 1.50-2.50 l/ha did not cause symptoms of poisoning in shallot plants (Table 12).

Table 9: The level of poisoning of shallot plants due to oxyfluorphene herbicide treatment

Treatment	Dose (l/ha)	Poisoning Level (%)		
		1 Weeks After Application	2 Weeks After Application	3 Weeks After Application
Oksifluorfen 240 g/l	1.50	0	0	0
Oksifluorfen 240 g/l	2.00	0	0	0
Oksifluorfen 240 g/l	2.50	0	0	0
Oksifluorfen 240 g/l	3.00	1	1	0

Perkasa *et.al.* (2015) [10] showed that shallots applied with the herbicide oxyfluorfen at a dose of 1.5 g/l to 3.0 g/l experienced mild poisoning, but this did not inhibit physiological and metabolic activities in plant tissue cells because they were able to tolerate toxic to the herbicide molecules. Plant growth is inhibited when the growing point tissue (meristem) is damaged.

Shallot Plant Height

The results of observations on plant height on Oxifluorfen 240 g/l herbicide treatment can be seen in Table 9, the results of observations 2, 4, and 6 weeks after application of control plant height were not significantly different from the application of Oxifluorfen 240 g/l herbicide at a dose of 1.50 l/ha, 2.00 l/ha, and a dose of 3.00 l/ha, except with the application of herbicides at a dose of 2.50 l/ha and manual weeding. In certain conditions where weeds overshadow the plant, it will cause the plant height to be higher but the stems are small and weak. According to Suradinata *et al.* (2015) that at the age of 35-45 days after planting showed that the administration of the herbicide oxyfluorfen at a dose of 2.5 l/ha gave the highest plant height compared to other treatments. This shows that the use of herbicides is able to suppress weed growth so that shallot plants can grow well. Oxyfluorphene herbicide is a systemic herbicide capable of killing weeds to the roots so that weed growth is suppressed.

Table 10: Effect of Oxifluorfen 240 g/l herbicide application on shallot plant height

Treatment	Dose (L/Ha)	Shallot Plant Height (Cm)		
		1 Weeks After Application	2 Weeks After Application	3 Weeks After Application
Oksifluorfen 240 g/l	1.50	20.34 ab	30.03 a	38.65 ab
Oksifluorfen 240 g/l	2.00	20.40 ab	30.53 a	38.27 ab
Oksifluorfen 240 g/l	2.50	21.06 a	31.29 a	38.84 a
Oksifluorfen 240 g/l	3.00	20.48 ab	30.30 a	38.66 ab
Manual weeding	-	20.93 a	30.85 a	39.01a
Control	-	19.54 b	30.00 a	37.08 b

Note: the average number followed by the same letter in the same column shows no significant difference in Duncan's test at a significance level of 5%.

Number of Bulbs and Yield of Shallot

The number of onion bulbs as a result of treatment with Oxifluorfen 240 g/l herbicide can be seen in Table 10. From the table it can be seen that the lowest number of bulbs was obtained from the plots without weeding/control, but not significantly different from the number of bulbs produced by the application treatment. herbicide dose of 1.50 l/ha. Herbicide treatment with Oxifluorfen 240 g/l at a dose of 2.0 l/ha gave optimal shallot yields, but was not significantly different from manual weeding. The highest yield was obtained with the herbicide oxyfluorfen dose of 3.0 l/ha.

The yield of shallots due to the application of the Oxifluorfen 240 g/l herbicide was in line with the number of tubers, i.e. low yields were obtained with the herbicide application at a dose of 1.50 l/ha and without weeding/control. Yield of plants from manual weeding treatment and application of Oxifluorfen 240 g/l herbicide starting at a dose of 2.00 l/ha to a dose of 3.00 l/ha was higher than onion crop yields from treatment without weeding and application of Oxifluorfen 240 g/l herbicide dose 1.5 l/ha. The number of tubers and yields was inversely proportional to the total dry weight of weeds, where in plots that produced high dry weight of weeds (without weeding and application of herbicide at a dose of 1.50 l/ha), resulted in low number of bulbs and yields of shallots.

Based on the research of Permana *et al.* (2018) herbicide treatment of 2.5 g/l gave the highest weights of fresh and dry tubers per clump of 44.23 g and 35.84 g and significantly different from other treatments. The higher the herbicide dose, the relatively small weed growth and the smaller the percentage of weed biomass. This is in accordance with the opinion of Jumin (1992) that if a plant is stressed by water, temperature, light or nutrients, it causes disruption of plant growth. Therefore, the amount of herbicide applied greatly affects the level of weed suppression which in turn affects the high yield component of shallots. Oxyfluorfen herbicide has a fast action and causes inhibition of the photosynthesis process and damage to cell membranes and all organs so that weeds experience chlorosis and look burnt which eventually weeds die. Lipid hydroxide which is the way herbicides work will destroy cell membranes causing the cytoplasm to break into intracellular parts so that the leaves will wilt and turn yellow quickly.

Table 11: Effect of the application of the herbicide Oxifluorfen 240 g/l on the number of bulbs and shallot yield

Treatment	Dose (l/ha)	Number of Bulbs (Fruit/clump)	Yield (g/3 m^2)	Yield (ton/ha)
Oksifluorfen 240 g/l	1.50	4.61 bc	2126.13 b	7.09
Oksifluorfen 240 g/l	2.00	5.06 ab	2602.88 a	8.68
Oksifluorfen 240 g/l	2.50	5.58 a	2672.25 a	8.91
Oksifluorfen 240 g/l	3.00	5.29 ab	2782.38 a	9.27
Manual weeding	-	5.81 a	2724.25 a	9.08
Control	-	3.15 c	1860.13 b	6.20

Note: the average number followed by the same letter in the same column shows no significant difference in Duncan's test at a significance level of 5%

Conclusion

1. Oxifluorphene 240 g/l herbicide application starting at 2.00 l/ha was effective in controlling dominant weeds (*Cyperus rotundus, Cleome rutidosperma, Ageratum conyzoides, Commelina benghalensis, Alternanthera sessilis*) and other weeds (*Mimosa invisa, Mimosa pudica, Ecaranth prostrata,, Cynodon dactylon,* and *Eulicine indica*) and total weeds on shallot plants up to 6 weeks after application.
2. Oxifluorphene 240 g/l herbicide application starting at a dose of 2.00 l/ha gave better shallot yields compared to controls. Oxifluorphene herbicide 240 g/l 2.00 l/ha up to a dose of 3.00 l/ha also did not cause toxicity to shallots at 3 weeks after application.

References

1. Abadi IJ, Sebayang HT, widaryanto E. Pengaruh Jarak Tanam dan Teknik Pengendalian Gulma pada Pertumbuhan dan Hasil Tanaman Ubi Jalar (*Ipomoea batatas* L.). Jurnal Produksi Tanaman,2013:1(2):8-16.
2. BPS. Indonesia Dalam Angka, Biro Pusat Statistik Indonesia, Jakarta Kementrian Pertanian. Data lima tahun terakhir 2015-2019, diakses dari, 2011. https://www.pertanian.go.id/home/?show=page&act=view&id=61 pada tanggal, 2020.
3. Christia Agatha, Sembodo, dan Hidayat Kuswanta. Pengaruh Jenis dan Tingkat Kerapatan Gulma Terhadap Pertumbuhan dan Produksi Kedelai (Glycine max [L]. Merr). Jurnal Agrotek Tropika,2016:4(1):22-28.
4. Jumin HB. Ekologi Tanaman suatu Pendekatan Fisiologi, Rajawali Press, Jakarta, 1992.
5. Komisi Pestisida. Pengujian Lapangan Efikasi Herbisida pada Tanaman Padi. Deptan RI. Jakarta. 142 hlm, 1989.
6. Makruf E, Yulie Oktavia dan Eka WP. Faktor-faktor yang Mempengaruhi Produksi Padi Sawah di Kabupaten Seluma. Balai Pengkajian Teknologi Pertanian (BPTP) Bengkulu, 2012.
7. Moenandir J. Ilmu Gulma. Universitas Brawijaya Press: Malang, 2010, 78 -87.
8. Monacco TJ, Weller SC, Ashton FM. *Weed Science: Principle and Practice-Fourth Edition*. John Wiley & Son, Inc: New York, 2002.
9. Ngawit K. Jurnal Online: Degradasi Herbisida Turunan 2, 4-D Amine Oleh Bakteri Pelarut Fosfat Dan Efek Residunya Terhadap Bawang Merah Yang Diberi Pupuk Kandang. NTB: Universitas Mataram, 2012.
10. Perkasa AY, Munif Ghulamndhi, Dwi Guntoro. Pengendalian Gulma Pada Tanaman Bawang Merah Menggunakan Herbisida. Jurnal Holtikultura, 2015.
11. Permana J, Widaryanto E, Wicaksono P. Penggunaan Herbisida Oksifluorfen dan Pendhimentalin pada Pertanaman Bawang Merah. *Jurnal Produksi Tanaman*,2018:6(4):561-568.
12. Purnama Eko W dan Hasjim S. Efektivitas dan selektivitas beberapa bahan aktif herbisida untuk mengendalikan gulma pada dua varietas tanaman kacang panjang (Vigna sesquipedalis. L). Jurnal Proteksi Tanaman Tropis,2020:1(2):48-54.
13. Prayogo Dio, Sebayang Husni T, dan Nugroho Agung. 2017. Pengaruh Pengendalian Gulma Pada Pertumbuhan dan Hasil Tanaman Kedelai (Glycine max [L.] Merril). Jurnal Produksi Tanaman Vol.5 No 1:24-32.
14. Ramalingam SP, Chinnagounder C, Perumal M. *et al*. Evaluation of New Formulation Of Oxyfluorfen (23.5 % EC) for Weed Control Efficacy and Bulb Yield in Onion. American Journal of Plant,2013:4(4):890-895.

15. Tjitrosoedirdjo Utomo dan Wiratmodjo. Pengelolaan Gulma di Perkebunan. Grammedia, Jakarta, 1998.