THE EFFICACY OF A COMBINATION HERBICIDE ACTIVE INGREDIENT METSULFURON METHYL, ETHYL CHLORIMURONE, SODIUM (2,4-DICHLOROPHENOXY) ACETATE IN THE SUCCESSION OF RICE WEEDS WITH DIFFERENT DOSES OF COW MANURE

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Abstract

Field experiments were conducted in Godean Subdistrict, Yogyakarta Special Region in June-August 2018, with Regosol soil type to evaluate the efficacy of the combination of active ingredients herbiicide Methyl Metsulfuron, Ethyl Chlorimurone and Nattrium Salt against rice weed succecy grown at various doses of cow manure
The research was carried out by using a complete randomized block design as treatment was five doses of cow manure which were 0 tons / ha, 5 tons / ha, 10ton / ha, 15 tons / ha and 20 tons / ha and control without application of herbicides and cow manure . Experimental results showed that a combination of Methyl Metsulfuron, Ethyl Chlorimurone and Nattrium Salt. They were applied at their labels recommended doses at the 2- to 3-leaf
That weeds grown on the control are Monochoria sp, Ludwigia sp; Spenochlea sp Mimosa invisa, Echinochloa Sp, E. cruss galii, C. iria, and Fimbritilis.
The higher the dose of cow manure shows the more fertile weed growth. There is a shift in weeds that can be controlled by herbicides with the same dose between low doses of cow manure and high doses. The herbicide application tested was effective in controlling broad leaf weeds at various doses of cow manure. The higher the dose of cow manure, the lower the efficiency of weed control.

Keyword : herbicide, succession, weed, paddy.

INTRODUCTION

Rice or paddy (*Oryza sativa* L) has not only been the staple food for more than half of the humanity (Fischer, 1998) but also shaped the culture, diet and economy of the majority of the world's population, especially the east and south-east Asian continents. Its production primarily depends on good agronomic practices, and the most consistent and the highest yields of the crop can be harvested in irrigated systems (Singha, 2013) . Good agronomic practices include the effective fertilization, water and weed management, lower plant densities and sustainability of the farmers.

The use of cow manure as organic fertilizer, is commonly used as a basic fertilizer on rice plants. Cow manure as fertilizer not only can be used for large quantities but also rich in nutrients, especially nitrogen, phosphate and potassium. Cow manure organic fertilizer will increase soil fertility while increasing rice growth and yield by creating ideal soil conditions for

rice plants. Ideal soil conditions for rice plants also result in more fertile weed growth. The presence of weed seeds carried by cow manure which originally experienced dormancy, was able to break its dormancy due to favorable growing conditions

Weedy rice generally includes species of genus *Oryza* which grows naturally and vigorously in and around rice fields (Suh et al., 1997). Therefore, it is very hard to control weedy rice in cultivated rice area since it is classified in the same genus and species as cultivated rice (Choudhary et al., 2011)

The growth of weeds brings problems to the growth and yield of rice. The reduction in production caused by the situation is economically more important than a decrease in production due to insects, fungi, or other disruptive organisms (Savary et al. 2000). Loss of production due to weeds around the world is estimated to reach 10% -15%, even can reach 86% if without control. Nationally, production decreases as the result of weed disturbance reaches 15% -42% for upland rice and upland rice 47-87% (Pitoyo, 2006). IRRI (1992) reported that in rice plants, weed control costs accounted for 50% of total production costs. Weedy rice seeds can contaminate the harvested grain (Karim *et al.,* 2004).

Several weeds in rice crops can even result in very large yields of up to 100% of which (*Leersia hexandra* (60%), *E. colonum*) and *Paspalum distichum* (85%,), *E. crus-galli* reaching 100% (Rukmana and Sugandi, 1999). The Banejee and Mandal Research (2009) showed that the main weeds in rice planting cropping systems consisted of *E. colona* (30%), Cyperus formulated (20%), *M. vaginalis* (30%) and *L. parviflora* (20%).

One way to control weeds is by using the herbicides, herbicides are used because they are more effective and efficient than other methods. One herbicide for rice weeds is an active ingredient herbicide Sodium (2,4-Dichlorophenoxy) Acetate 75,6%, Methyl Metsulfuron 0.7%, Ethyl chlorimuron 0.7% and the other additional ingredients 23%. Pre-grown and after-growth herbicides that are selective to control weeds in rice plants, crops without crops and wet rice planting preparation Mixing the active ingredients of herbicides is intended to expand the spectrum of control.

The purpose of this study was to evaluate the efficacy of the combination of active ingredients herbiicide Methyl Metsulfuron, Ethyl Chlorimurone and Nattrium Salt against the rice weed succession grown at various doses of cow manure

MATERIAL AND METHODS

Field research was carried out in Godean, Sleman, Yogyakarta Special Region during June-September 2018. Based on soil chemical analysis, it is known that Godean Regosol is dominated by sand fraction. (Sand 87.7%, dust 8.0% and clay 4 , 30%); with pH 6.33, 1.22% organic C, 0.16 g kg / N, 15.89 g kg / P, 0.38 g kg / K ,. The experiment was conducted in a randomized complete block design (RCBD) with five doses of cow manure which were 0 tons / ha, 5 tons / ha, 10ton / ha, 15 tons / ha and 20 tons / ha and control without application of herbicides and cow manure (un treatment).

Rice plants of Ciherang cultivars were planted by transplanting, seedling age 21 days after dispersing. Fertilization of rice plants is done by means and dosage of farmers (Urea 150 kg / ha and NPK 350 kg / ha). Herbicides used are herbicides with three active ingredient combinations of Metsulfuron Methyl, Ethyl Chlorimurone, Sodium (2,4-Dichlorophenoxy) Acetate with the Ally pls 7 WP trademark. Application of herbicide was carried out 12 days after planting using a deflector nozzle was used to deliver 300 l / ha of herbicide solution. The dosage

of herbicide used is recommended dosage. Spray calibration was carried out by methods carried out by Caseley (1994) and Turner and Gillbanks (2003).

Vegetation analysis method using destructive method, sampling was carried out using the quadratic method (1m x 1m) taken systematically in each sample plot, 3 replications. Destructive weed sampling was taken at the age of 14 days after application of herbicide (DAA), 28 DAA, 42 DAA and 56 DAA.

The data collected were weed population per species, weed dry weight per species, weed press frequency, species. Weed dry weight was obtained by using an oven at a temperature of 75^{o}C to a constant weight of approximately 4 days. (Felix and Owen, 1999). The data obtained is used to calculate Sum Dominance Ratio (SDR), and Community Coefficient (CC).

SDR is calculated using the following formula (Sukarwo, 1991)

$$\text{SDR of a sp.} = \frac{\text{relatif density+relative frequency+ elatif dominance}}{3}$$

Relative density, relative frequency and relative dominance were measured from the following:

$$\text{Relative density of a sp.} = \frac{\text{Absolute density of a sp}}{total\ absolute\ density\ of\ all\ spp}$$

$$\text{Relative dominance of a sp.} = \frac{\text{Absolute dominace of a sp.}}{total\ absolute\ dominance\ of\ all\ spp}$$

$$\text{Relative frequency of a sp.} = \frac{\text{Absolute frequwncy value of a sp}}{total\ frequency\ value\ of\ all\ spp}$$

Absolute density of a species was equal to total number of plants of that species in the sample plot, absolute dominance of a species was the total biomass of that species in the sample plot.

$$\text{Absolute frequency of a species} = \frac{\text{number of plot containing the sp}}{total\ sample\ plots}$$

Community coefficient (CC) was computed as suggested by Tjitrosoedirdjo et al. (1984) and Bonham (1989)

$$CC = \left(\frac{2W}{a} + b\right) \text{ X } 100\ \%$$

CC=community coefficient,
W = total of the lowest SDR value of all species from each community:
A = total of all SDR values from the first community and
B = total of all SDR values from the second community.
CC values indicated homogeneity of weed

Community coefficient values indicated homogeneity or similarity among the weed communities. According to Bonham (1989) CC value >71% (good to excellent homogeneity) is a required condition for carrying out weed control experiment. communities among the herbicides. Bonham (1989) divided vegetation condition into 5 classes, namely, excellent (91-100%), good (71-90%), fair (56-70%), poor (45-55%) and unacceptable (<45%).
The data were analyzed by using SAS package (SAS Institute Inc., 1996) for analysis of variance (ANOVA) and significant differences were tested using Tukey's studentized range test at the 5% level of probability.

RESULT AND DISCUSSION

The results of weed vegetation analysis before the application of cow manure as organic fertilizer organic fertilizer is 2-4 leafy E. Cusgalii (30.23%) is dominant weed, followed by L. chinensis with 2-3 (28.11%) Ludwigia sp. (19.50%), Cyperus sp, (9.32%) and Fimbritilis

(7.43%) and L octovalvis sp. (5.41%). While the results of weed vegetation analysis before the application of herbysis can be seen in table 1. From the table it can be seen that weeds that appear on various doses of cow dung are E. cruss galii. L. chinensis (gramine) 2-4 leaves, C. rotundus (sedges) 2-3 leaves and L.octovalvis (wide leaves) 2 leaves.

Table 1. Weed populations before application of herbicides at various doses of cow manure as organic fertilizer.

Treatmen (cow manure)	Population and number of leaves							
	ECGHI		LFCHI		CYPIR		LUDOC	
	Pop	leaves	Pop	leaves	Pop	leaves	Pop	Leaves
doses 0 ton/ha	21.0 b	2-2	10.2 b	2-3	5,0 a	2-3	2.4 a	2
doses 5 ton/ha	19.2 b	2-4	12.6 b	2-3	7.3 a	2-3	4.0 a	2-3
doses 10 ton/ha	24.0 b	2-4	8.7 c	2-3	4.4 a	1-3	3.2 a	2-4
doses 15 ton/ha	33.8 a	2-3	12.4 b	2-4	5.0 a	2-3	2.4 a	2
doses 20 ton/ha	29.0 a	2-4	15.4 b	2-4	5.0 a	2-1	3.6 a	3
Untreatment	30.0 a	2-4	18.6 a	2-3	4,2 a	1-2	2.3 a	3

Note : pop: Population, Leaves; number of leaves, Note : ECGHI (*E. Crusgalii)*, LFCHI (*L. Chinensi)s.,* CYPIR : (*C. iria)*, LUDOC (*L. octovalvis*)

Population E. cruss galii and I. Chinensis showed a different population between cow dung treatment, the higher the dose of cow dung, the higher the population of both weed species, but the community coefficient (CC) between treatments showed greater than 71% = good to excellent homogeneity / (Bonham (1989). At the beginning of the growth of rice plants (14 HAS) there were still E. crusgalii, L. chiensis, c. Iria and L. octovelvis in un treatment, whereas in other treatments there were no weeds found in the observation before herbicide application (Table 1) thus It is known that at various doses of cow dung as herbicide organic fertilizer applied effectively to control weeds up to 14 DAA.

Tablel 2.Sum Dominance Ratio 14 DAA, Rice weeds at various doses of organic fertilizer due to herbicide applications

Treatmen (cow manure)	Sum dominance ratio (%)							
	ECGHI	LFCHI	FIMMI	CYPIR	CYPDI	LUDOC	MOOVA	MASMI
doses 0 ton/ha	0	0	0	0	0	0	0	0
doses 5 ton/ha	0	0	0	0	0	0	0	0
doses 10 ton/ha	0	0	0	0	0	0	0	0
doses 15 ton/ha	0	0	0	0	0	0	0	0
doses 20 ton/ha	0	0	0	0	0	0	0	0
Untreatment	39,26	35	0	22,60	0	3,14	0	0

Note : ECGHI (*E. Crusgalii)*, LFCHI (*L. Chinensi)s* FIMMI (*Fimbritilis sp).,* CYPIR : (*C. iria)*, LUDOC (*L. octovalvis*) CYPD (*C. differmis)* MOOVA : (*M. vaginalis)* MASMI (*M. minuta)*

Percentage of weed control Abbot formula

$$\text{Abbot : \% control} = \left(\frac{N_{UT}=N_t}{N_{UT}}\right) X\ 100\ \%$$

(N_{UT} = number of weeds in Untreated plot at specific timing, N_T = number of weeds in treated plot at specific timing)

It was confirmed that the weed control percentage in various doses of cow dung treatment was 100% of the EWRC (European Weeds Research Society) scoring was very good weed control. In 28 HAA weeds of E. crusgalii, L. chinensis and Fimbritilis sp began to be known for their presence in fertilization of 20 ton/ha, on the land E. crusgalii, was a dominant weed followed by L. chinensis and Fimbritilis sp.

Table 3.Sum Dominance Ratio 28 DAA, Rice weeds at various doses of organic fertilizer due to herbicide applications

Treatmen (cow manure)	Sum dominance ratio (%)							
	ECGHI	LFCHI	FIMMI	CYPIR	CYPDI	LUDOC	MOOVA	MASMI
doses 0 ton/ha	0	0	0	0	0	0	**0**	0
doses 5 ton/ha	0	0	0	0	0	0	**0**	0
doses 10 ton/ha	0	0	0	0	0	0	**0**	0
doses 15 ton/ha	0	0	0	0	0	0	0	0
doses 20 ton/ha	45,70	25,0	15	0	0	0	0	0
Untreatment	30,56	12,5	10,1	25	10,76	7,88	7,88	3,2

Note : ECGHI (*E. Crusgalii)*, LFCHI (*L. Chinensi)s* FIMMI (*Fimbritilis sp).,* CYPIR : (*C. iria)*, CYPDI, LUDOC (*L. octovalvis*), (*C. difformis)* MOOVA : (*M. vaginalis)* MASMI (*M. minuta)*

Herbicide application in the treatment of cow manure doses of 0 kg / ha tot 15ton / ha gave a very good weed control (100%), whereas in the treatment of cow manure fertilization at a dose of 20 ton / ha for E. crusgalii the control percentage was 95%, L .Chinensis 97.5% and Fimbritilis 90%. Weed control in 20 ton / ha fertilization treatment is still classified as good.

Tabel 4.Sum Dominance Ratio 42 DAA, Rice weeds at various doses of organic fertilizer due to herbicide applications

Treatmen (cow manure)	Sum dominance ratio (%)							
	ECGHI	LFCHI	FIMMI	CYPIR	CYPDI	LUDOC	MOOVA	MASMI
doses 0 ton/ha	0	0	0	0	0	0	0	0
doses 5 ton/ha	0	0	0	0	0	0	0	0
doses 10 ton/ha	50,00	25,50	0	24,50	0	0	0	0
doses 15 ton/ha	30,20	21,40	15,30	21,4	4,70	0	0	7
doses 20 ton/ha	27,80	20,30	15,69	12.70	12,60	0	0	0
Untreatment	35,75	10,44	9,67	28,5	9,33	2,21	2,21	4,3

Note : ECGHI (*E. Crusgalii)*, LFCHI (*L. Chinensi)s* FIMMI (*Fimbritilis sp).,* CYPIR : (*C. iria)*, CYPDI (*C. difformis),* LUDOC (*L. octovalvis*), MOOVA : (*M. vaginalis)* MASMI (*M. minuta)*

E. crusgalii, L. chinensis and C. iria began to be known about the presence of cow manure fertilizer at a dose of 10 ton / ha 42 DAA. 65.34%) so that the two communities can be different, while the weed comity in the treatment of cow manure dosage 10 ton / ha, 15 ton / ha and 20 ton/ha has a value >71 (average 86.56%) so that it has the community is the same, and between these communities with treatment of 0 ton/ha and 5 ton/ha have values above 71% (89.32%) so both are said to be different communities.

Tabel 5.Sum Dominance Ratio 56 HAA, Rice weeds at various doses of organic fertilizer due to herbicide applications

Treatmen	Sum dominance ratio (%)

(cow manure)	ECGHI	LFCHI	FIMMI	CYPIR	CYPDI	LUDOC	MOOVA	MASMI
doses 0 ton/ha	0	0	0	0	0	0	0	0
doses 5 ton/ha	0	0	0	0	0	0	0	0
doses 10 ton/ha	60,00	24,50	0	15,50	0	0	0	0
doses 15 ton/ha	40,20	21,40	15,30	11,4	4,70	0	0	7
doses 20 ton/ha	27,80	20,30	15,69	12.80	12,60	0	0	0
Untreatment	30.25	10,18	10.15	30,67	10,11	5.34	5.34	4,30

Note : ECGHI (*E. Crusgalii)*, LFCHI (*L. Chinensi)s* FIMMI (*Fimbritilis sp).,* CYPIR : (*C. iria)*, CYPDI (*C. differmis),* LUDOC (*L. octovalvis*) MOOVA : (*M. vaginalis)* MASMI (*M. minuta)*

In 56 DAA SDR weeds of rice plants showed results that were not much different from 42 DAA. Application of herbicides on various treatments of cowy manure doses shows that there is a shift in rice weeds that grow. At the beginning of the growth of herbicide application it was able to suppress weed growth (Table 2) or weed control percentage 100% weed died perfectly, this was seen from the presence of weeds before the application of herbicides in all treatment plots (Table 1). In subsequent growth weeds begin to grow, especially in the treatment of doses of cow manure that is higher than 10 ton / ha.

The availability of herbicides to be absorbed by the soil depends on clay and organic mater. Soil that has clay and soil organic matter content is the greater the adsorbs of the adsorbed herbicides and the fewer the amount in the soil solution. Then the greater the content of clay and soil organic matter the greater the dose needed to control weeds.

The herbicides that are applied to the soil that are given organic ingredients are increasingly greater, with the same dose of effective control getting smaller (Table 2.3, and 4) on the condition of cow manure which is given in small amounts, the herbicide applied is effective for controlling weeds, but in conditions of cow dung given at high doses, the application of the same dose of herbicide is not effective in controlling weeds, especially E. crsagalii, L. chinensis and C. iria. As for the broadleaf weeds the applied herbicide is effective to control it.

CONCLUSION

The higher the dose of cow manure shows the more fertile weed growth. There is a shift in weeds that can be controlled by herbicides with the same dose between low doses of cow manure and high doses. The herbicide application tested was effective in controlling broad leaf weeds at various doses of cow manure. The higher the dose of cow manure, the lower the efficiency of weed control.

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