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# Effect of Using Herbicide 10% *Ethyl pyrazosulfuron* on Growth of Rojolele Srinuk Variety (*Oryza sativa L. Var. Rojolele Srinuk*) in Langensari Village Subdistrict Tarogong Kaler

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### Abstract

Weeds are nuisance plants that grow in unwanted areas and inhibit the growth of paddy rice cultivation, which can reduce the quantity of rice yield. Therefore, weeds need to be controlled. This study aims to determine: 1) the effect of using 10% *Ethyl pyrazosulfuron* herbicide on the growth of Rojolele Srinuk variety of paddy rice (*Oryza sativa L. var. Rojolele Srinuk*) and 2) the correct dose of 10% *Ethyl pyrazosulfuron* herbicide for the growth of Rojolele Srinuk variety of paddy rice. This research was conducted in Langensari Village, Tarogong Kaler District. The research was conducted from November 2022 to February 2023. This study used a Randomized Group Design (RGD) with seven treatments and four repetitions, including 10% *Ethyl pyrazosulfuron* herbicide treatment at a dose of 150 g/ha (0.18 g/12 m<sup>2</sup>), 225 g/ha (0.27 g/12 m<sup>2</sup>), 300 g/ha (0.36 g/12 m<sup>2</sup>), 375 g/ha (0.45 g/12 m<sup>2</sup>), 450 g/ha (0.54 g/12 m<sup>2</sup>), manual weeding and control. The results showed that the use of 10% *Ethyl pyrazosulfuron* herbicide at a dose of 150 g/ha (0.18 g/12 m<sup>2</sup>) - 450 g/ha (0.54 g/12 m<sup>2</sup>) did not cause phytotoxicity or symptoms of poisoning to Rojolele Srinuk variety of paddy rice plants. Then, the use of the herbicide *Ethyl pyrazosulfuron* 10% affects the number of tillers of rice paddy varieties Rojolele Srinuk. The most effective dose of 10% *Ethyl pyrazosulfuron* herbicide in the growth of Rojolele Srinuk rice paddy is a dose of 450 g/ha (0.54 g/12 m<sup>2</sup>).

Keywords: Ethyl pyrazosulfuron, Growth, Herbicide, Rice, Weed



## 1. Introduction

The productivity of rice from year to year has decreased, while the population has increased from year to year. According to Statistics Indonesia (2018), the projected population of Indonesia in 2030 amounted to 294.1 million, and in 2045 amounted to 391.0 million people. Based on this, with an increase in population, the need for staple foods, one of which is rice, is increasing. The Central Bureau of Statistics (2020) revealed that based on the ASF survey in 2019, the rice harvest area decreased by 700.05 hectares (6.15 percent) compared to 2018, and rice production decreased by 2.63 million tons (7.75 percent) compared to 2018 rice production.

In the process of planting paddy rice, there are often other plants that grow, or we can call them weeds. Weeds can interfere with cultivated plants to reduce agricultural production, hence the need for weed control. Weed control is carried out in the place of cultivated plants (Winarsih, 2008).

Weed control can be done mechanically and chemically (Winarsih, 2008). Mechanical weed control is usually done manually using human labor. Chemical weed control is a way of controlling weeds using chemicals, which can also be called herbicides, but does not interfere with the main crop or cultivated plants (Winarsih, 2008).

According to research (Sumekar *et al.* 2023) explain that the application of 10% Ethyl *pyrazosulfuron* herbicide at a dose of 150 g/ha-450 g/ha can control weeds and does not cause phytotoxicity or plant poisoning in Ciherang rice paddies. Herbicides made from 10% Ethyl *pyrazosulfuron* are also able to control broadleaf weeds, weeds, grasses, and sedges in rice, for example, *Eleusine indica*, *Cyperus serotinus*, and *Echinochloa colona*. Besides that, this herbicide also has broad-

### 1. Research Methods

The research method used in this research is an experimental method with a quantitative approach. The research design used was a non-factorial Randomized Group Design (RAK). This research was conducted with seven treatments as follows:

Based on the above treatments, there are seven treatments. The experimental plot units consisted of

spectrum activity. It can be absorbed by the roots and translocated throughout the plant by controlling the synthesis of amino acids - *acetohydroxyacid synthase* AHAS (PPDB, 2023).

Over time, many paddy rice plants in Indonesia, such as the Ciherang variety and the new Rojolele variety or Rojolele Srinuk. The Rojolele Srinuk rice variety is a result of a rojolele mutant that was officially released in 2019 after six years of research that began in 2013. The Rojolele Srinuk variety does not collapse easily because the rice is lower and more resistant to pest attacks (Government of Klaten Regency, 2020).

Previously, the rojolele rice variety had problems in its growth, namely the growth period of the paddy, which was quite long. Then, improvements were made to the rojolele variety with gamma radiation at a dose of 200 gray. After going through several stages of testing required by the Ministry of Agriculture for six years, a new variety of Rojolele Srinuk was produced, which is superior. The development of the Rojolele Srinuk rice variety is the result of research cooperation between the Klaten Regency government and the National Nuclear Energy Agency (BATAN), which began in 2013-2019 and finally in 2020 was the first harvest for Rojolele Srinuk rice (Pratomo *et al.* 2022). This Rojolele Srinuk variety has obtained a variety release permit in accordance with the Decree of the Minister of Agriculture of the Republic of Indonesia, Number 481/HK.540/C/10/2019, on October 21, 2019 (BATAN, 2019).

Research on the efficacy of weed control with herbicides made from 10% Ethyl *pyrazosulfuron* against paddy rice has been conducted on the Ciherang rice variety.

## 2. Materials and Methods

plots measuring 3 m x 4 m with a spacing of 25 cm x 25 cm or a distance between treatment plot units in the form of 20-30 cm wide galangan. Grouping is done based on field conditions. Determination of each treatment in a group is done in such a way that the distribution of weeds is evenly distributed or the conditions in the group are relatively uniform.

Table 1. Treatment dose of 10% *Ethyl pyrazosulfuron* herbicide

No	Code	Treatment	Dosage (g/ha)	Dosage (g/12 m) <sup>2</sup>
1	A	<i>Ethyl pyrazosulfuron</i> 10%	150 g/ha	0.18 g/12 m <sup>2</sup>
2	B	<i>Ethyl pyrazosulfuron</i> 10%	225 g/ha	0.27 g/12 m <sup>2</sup>
3	C	<i>Ethyl pyrazosulfuron</i> 10%	300 g/ha	0.36 g/12 m <sup>2</sup>
4	D	<i>Ethyl pyrazosulfuron</i> 10%	375 g/ha	0.45 g/12 m <sup>2</sup>
5	E	<i>Ethyl pyrazosulfuron</i> 10%	450 g/ha	0.54 g/12 m <sup>2</sup>
6	F	Manual weeding	-	-
7	G	Control (no weed control)	-	-

## 2. Time and Place of Research

This research was conducted from November 2022 to February 2023 in Langensari Village, Tarogong Kaler District, Garut Regency.

## 3. Population and Sample

The population used in this study consisted of all the rice plots on the research land. Since there were four repetitions and seven treatments, the number of samples needed was  $4 \times 7 = 28$  samples.

## 4. Data Collection Technique

In this study, the method used in data collection was experimental observation. The quantitative parameters measured were phytotoxicity (number), plant height (cm), and the number of tillers (number) of the Rojolele Srinuk variety of paddy rice. Phytotoxicity observation of paddy rice was conducted at the age of Rojolele Srinuk variety 1, 2, and 3 weeks after application (MSA), and observation of plant height and a number of tillers of paddy rice was conducted at the age of Rojolele Srinuk variety 3 and 6 weeks after application (MSA).

## 5. Tools and Materials

The tools used in this study are buckets, measuring cups, semiautomatic back sprays, T-jet nozzles, meters, analytical scales, quadratic scales, sticks, hoes, tractors, boxing tools, stationery, sacks, rapid ropes, cameras (HP), HVS paper, and scissors. The materials used in this research are Rojolele Srinuk variety rice seeds, herbicide K-KINGGOLD 10 WP active ingredient Ethyl pyrazosulfuron 10% doses of 150, 225, 300, 375, and 450 g/ha, water, soil, Nitrogen (N) compounds, Diphosphorus Pentoxide (P<sub>2</sub>O<sub>5</sub>) compounds, and Potassium Oxide (K<sub>2</sub>O) compounds.

## 6. Data Processing Technique

Data processing in this study uses quantitative analysis. This research method is based on concrete data, measured using statistics as a test tool for calculations, and based on the problems studied to produce a

conclusion. The data analysis used is a statistical test that must meet the test requirements, namely normality and homogeneity of data. The research data was processed with the help of *IBM SPSS Statistics 27 for Windows software*.

## 7. Research Stages

### \* Land processing

Processing aims to change the physical properties of the soil so that the initially hard layer becomes flat and muddy so that weeds will die and rot into humus, soil aeration becomes better, and the underground layer becomes water-saturated to save water. In this rice field, tillage, improvement, and arrangement of the rice field bunds and ditches are also carried out to keep them in good condition to facilitate irrigation arrangements so as not to waste water and facilitate plant maintenance.

### \* Preparation of experimental plots

The experimental plots in the study measured 3 m x 4 m.

### \* Planting

Planting in this study was by transplanting at the age of 14-21 days. The number of plants in each hole was 2-3 seedlings. The planting distance is 25 cm x 25 cm.

### \* Fertilization

At planting time, 30 kg N + 45 kg P O<sub>25</sub> + 45 K<sub>2</sub> O per ha. At 3 weeks after transplanting, 30 kg N per ha. At flower primordial, 30 kg N per ha or according to local recommendations.

### \* Maintenance

Maintenance is carried out as well as possible to ensure the achievement of the objectives of the tested herbicide efficacy experiment. If it was necessary to use certain pesticides for maintenance, the use of these pesticides was taken care of so that they did not interfere with the effect of the tested herbicides on the target weeds and the paddy rice crop so that the experiment's conclusions were not subject to error.

### \* Method and application

The herbicide application method and tools used were adapted to the nature, mode of action and formulation

of the herbicide being tested. For formulations dissolved in water, a *semiautomatic knapsack sprayer* and T-zet nozzles with a pressure of 1 kg/cm<sup>2</sup> (15-20 p.s.i) were used. The volume of water used was 500 L/ha.

**\* Time and number of applications**

*Preemergence* application of 10% Ethyl *pyrazosulfuron* herbicide at 0 to 5 days after planting, depending on weed growth. The application of 10% Ethyl *pyrazosulfuron* herbicide is done only once.

**\* Plant observation**

**\* Phytotoxicity**

The level of toxicity was assessed visually on the plant population in the plots, observed at 1, 2 and 3 MSA. Scoring of toxicity was as follows:

- 0 = No toxicity, 0 - 5% leaf shape or leaf color and or abnormal plant growth.
- 1 = Mild poisoning, > 5 - 20% leaf shape or leaf

color and or abnormal plant growth.

2 = Moderate toxicity, > 20 - 50% of leaf shape or leaf color and or plant growth is abnormal.

3 = Severe poisoning, > 50 - 75%, leaf shape or leaf color and or abnormal plant growth.

4 = Very heavy poisoning, > 75%, leaf shape or leaf color and or abnormal plant growth until the plant dies.

**\* Plant height**

Plant height observations were made on ten randomly sampled plants and measured at 3 and 6 weeks after application (MSA).

**\* Number of tillers**

The observation of the number of tillers is done by counting all tillers that grow normally and have fully opened leaves. This observation was made on 10 samples of plants taken randomly and measured at the age of rice 3 and 6 Weeks After Application (MSA).

**3. Results and Discussion**

**\* Phytotoxicity**

Phytotoxicity is the emergence of plant responses caused by herbicide application, often also called the level of plant poisoning (Widayat *et al.* 2022). Phytotoxicity observations of the plant population in

the plots were visually assessed. Visual observations were obtained through observation of leaf color with scoring from a range of 0 to 5 (Harahap *et al.* 2022).

Table 2. Phytotoxicity of rice paddy var. Rojolele Srinuk 1, 2, and 3 MSA (number)

Treatment	Dose (g/ha)	Dosage (g/12 m ) <sup>2</sup>	Observation		
			1 MSA	2 MSA	3 MSA
<i>Ethyl pyrazosulfuron</i> 10%	150	0.18	0	0	0
<i>Ethyl pyrazosulfuron</i> 10%	225	0.27	0	0	0
<i>Ethyl pyrazosulfuron</i> 10%	300	0.36	0	0	0
<i>Ethyl pyrazosulfuron</i> 10%	375	0.45	0	0	0
<i>Ethyl pyrazosulfuron</i> 10%	450	0.54	0	0	0

Observations were made on Rojolele Srinuk rice paddy at 1, 2, and 3 weeks after application (MSA). Based on visual observations of phytotoxicity, there are no symptoms of phytotoxicity or poisoning in Rojolele Srinuk rice paddies. It means that the herbicide *Ethyl pyrazosulfuron* 10% for all doses, namely 150 g/ha (0.18 g/12 m<sup>2</sup>), 225 g/ha (0.27 g/12 m<sup>2</sup>), 300 g/ha (0.36 g/12 m<sup>2</sup>), 375 g/ha (0.45 g/12 m<sup>2</sup>) and 450 g/ha (0.54 g/12 m<sup>2</sup>) is safe to use on rice field crops because there is no change in leaf color such as chlorosis, curling, or other abnormal

symptoms. This is because herbicides made from active *ethyl pyrazosulfuron* (10%) are systemic and selective, so they do not interfere with cultivated plants and only kill certain plants (Simanjuntak, 2016).

**\* Plant Height**

Observations of plant height were made on ten plant samples taken randomly and measured when the Rojolele Srinuk rice paddy was 3 and 6 weeks after application (MSA). The results of observing the height of paddy rice plants can be seen in the table below.

Table 3. Duncan test results of plant height of paddy rice var. Rojolele Srinuk 3 MSA (cm)

Treatment	Plant height (cm)
Manual weeding	24.98
<i>Ethyl pyrazosulfuron</i> 10% dosage 225 g/ha (0.27 g/12 m) <sup>2</sup>	25.10
Control	25.10
<i>Ethyl pyrazosulfuron</i> 10% at 375 g/ha (0.45 g/12 m) <sup>2</sup>	26.28
<i>Ethyl pyrazosulfuron</i> 10% at 300 g/ha (0.36 g/12 m) <sup>2</sup>	26.88
<i>Ethyl pyrazosulfuron</i> 10% at 150 g/ha (0.18 g/12 m) <sup>2</sup>	27.58
<i>Ethyl pyrazosulfuron</i> 10% at 450 g/ha (0.54 g/12 m) <sup>2</sup>	28.88

The numbers followed by different lowercase letters in the same column differ markedly according.

Table 4. Duncan test results of plant height of paddy rice var. Rojolele Srinuk 6 MSA (cm)

Treatment	Plant height (cm)
<i>Ethyl pyrazosulfuron</i> 10% at 300 g/ha (0.36 g/12 m) <sup>2</sup>	44.35 a
<i>Ethyl pyrazosulfuron</i> 10% dosage 225 g/ha (0.27 g/12 m) <sup>2</sup>	49.70 ab
<i>Ethyl pyrazosulfuron</i> 10% at 150 g/ha (0.18 g/12 m) <sup>2</sup>	49.78 ab
Manual weeding	51.48 b
Control	51.78 b
<i>Ethyl pyrazosulfuron</i> 10% at 375 g/ha (0.45 g/12 m) <sup>2</sup>	52.68 b
<i>Ethyl pyrazosulfuron</i> 10% at 450 g/ha (0.54 g/12 m) <sup>2</sup>	52.85 b

The numbers followed by different lowercase letters in the same column differ markedly according.

Based on the Duncan test table of average plant height above, it can be seen that the height of the Rojolele Srinuk variety of paddy rice at the age of 3 weeks after application (MSA) compared to the age of 6 weeks after application (MSA) has a significant difference. This study proves that the Rojolele Srinuk variety of paddy rice plants experience growth.

The treatment of herbicide *Ethyl pyrazosulfuron* 10% at a dose of 150 g/ha (0.18 g/12 m<sup>2</sup>) - 450 g/ha (0.54 g/12 m<sup>2</sup>) was effective in controlling weeds because it did not interfere with the growth of the height of the rice plant of the Rojolele Srinuk variety. As for the use of herbicide, *Ethyl pyrazosulfuron* 10% at a dose of 450 g/ha (0.54 g/12 m<sup>2</sup>) is the dose with the highest average in plant height at the age of 3 weeks after tillering (MSA) or six weeks after tillering (MSA). It shows that 10% *Ethyl pyrazosulfuron* herbicide at a dose of 450 g/ha (0.54 g/12 m)<sup>2</sup> is a better dose to increase the height of the Rojolele Srinuk variety rice

paddy. However, due to the characteristics of the rice plant variety, Rojolele Srinuk is trimmed to be lower than the parental Rojolele, which was originally 155 cm to 105 cm in rice plant height. As mentioned, the Rojolele Srinuk variety has the characteristics of a lower rice stem, is not easily collapsed, and is more resistant to pest attacks (Government of Klaten District, 2019). Based on this, the testing of plant height parameters with the ANOVA test showed that there was no effect of the use of 10% *Ethyl pyrazosulfuron* herbicide on the height of the Rojolele Srinuk variety paddy rice plant.

Regardless, this Rojolele Srinuk variety of paddy rice plantations grew well. Its paddy rice productivity evidences this, that in this study, it produced more rice productivity even though it used 10% *Ethyl pyrazosulfuron* herbicide at a low dose compared to the manual weeding treatment and the control, which produced less rice productivity.

\* **Number of pups**

The number of tillers is observed by counting all tillers that grow usually and have fully opened leaves. The observation of the number of tillers was conducted on ten samples of plants taken randomly and measured at

the age of 3 and 6 weeks after application (MSA). The observation results of the number of tillers of the Rojolele Srinuk variety can be seen in the table below.

Table 5. Duncan test results of the number of tillers of paddy rice var. Rojolele Srinuk 3 MSA (number)

Treatment	Number of tillers
<i>Ethyl pyrazosulfuron</i> 10% dosage 225 g/ha (0.27 g/12 m) <sup>2</sup>	4.38 a
<i>Ethyl pyrazosulfuron</i> 10% at 375 g/ha (0.45 g/12 m) <sup>2</sup>	5.73 ab
<i>Ethyl pyrazosulfuron</i> 10% at 300 g/ha (0.36 g/12 m) <sup>2</sup>	6.28 bc
Control	6.35 bc
Manual weeding	6.40 bc
<i>Ethyl pyrazosulfuron</i> 10% at 150 g/ha (0.18 g/12 m) <sup>2</sup>	6.62 bc
<i>Ethyl pyrazosulfuron</i> 10% at 450 g/ha (0.54 g/12 m) <sup>2</sup>	7.48 c

The numbers followed by different lowercase letters in the same column differ markedly according

Table 6. Duncan test results number of tillers of paddy rice var. Rojolele Srinuk 6 MSA (number)

Treatment	Number of tillers
<i>Ethyl pyrazosulfuron</i> 10% at 300 g/ha (0.36 g/12 m) <sup>2</sup>	13.40 a
<i>Ethyl pyrazosulfuron</i> 10% dosage 225 g/ha (0.27 g/12 m) <sup>2</sup>	16.45 ab
<i>Ethyl pyrazosulfuron</i> 10% at 150 g/ha (0.18 g/12 m) <sup>2</sup>	17.60 abc
Control	17.83 abc
Manual weeding	19.77 bc
<i>Ethyl pyrazosulfuron</i> 10% at 375 g/ha (0.45 g/12 m) <sup>2</sup>	20.25 bc
<i>Ethyl pyrazosulfuron</i> 10% at 450 g/ha (0.54 g/12 m) <sup>2</sup>	23.53 c

The numbers followed by different lowercase letters in the same column differ markedly according

#### 4. Conclusions

Based on the results of observations regarding the effect of the use of herbicide *Ethyl pyrazosulfuron* 10% on the growth of rice paddy varieties, Rojolele Srinuk can conclude that:

\* Herbicide *Ethyl pyrazosulfuron* 10% at a dose of 150 g/ha (0.18 g/12 m<sup>2</sup>) - 450 g/ha (0.54 g/12 m<sup>2</sup>) did not cause symptoms of plant toxicity or Phytotoxicity in rice paddy fields of Rojolele Srinuk variety.

\* There was an effect of using 10% *Ethyl pyrazosulfuron* herbicide on the number of tillers parameter of Rojolele Srinuk rice paddy. However, there is no effect of the use of herbicide

*Ethyl pyrazosulfuron* 10% on the parameter of plant height of rice paddy varieties Rojolele Srinuk.

The most effective dose of 10% *Ethyl pyrazosulfuron* herbicide in the growth of Rojolele Srinuk rice paddy is a dose of 450 g/ha (0.54 g/12 m<sup>2</sup>) because it can increase the number of tillers of Rojolele Srinuk rice paddy.

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