**IBJ**
*Indonesian Biodiversity Journal*
*http://ejurnal-mapalus-unima.ac.id/index.php/ibj*

*indonesian. biodivers. j.*
VoL.3 No.1: 1-14
ISSN : 2722-2659

# The Effect Of Combination Of Technology Of Planting And Control Of Weeds On The Dominant Value Of Weeds And Rice Productivity

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*Received : Januari 20, 2022* *Accepted April 12, 2022*

**Abstract**

The problem currently arises in lowland rice cultivation is the presence of nuisance plants, namely weeds which can reduce crop yields by up to 90%. Therefore, it is necessary to find a way out by testing several weed control technologies that farmers can use. The objectives of the study were (1) to determine the effect of technology for planting methods, namely Tabela in arrays, evenly spaced tables, and evenly distributed tables, on the growth and production of lowland rice, (2) To determine the effect of weed control technology using herbicides with active ingredients metsulfuron-methyl and 2,4 -D on the growth and production of lowland rice and (3) To determine the effect of the Combination of planting technology and weed control technology on the growth and production of lowland rice. The experiment was carried out using a Randomized Block Design (RAK) as the environmental design. The treatment design was a split-plot design: Main Plot, Planting Method Technology (T): T1 = Array Tables, T2 = Distance Tables, T3 = Tables Spread Evenly. Sub-plots, Weed Control Technology (G): G1 = Herbicide with active ingredient mtsulfuron methyl, G2 = Herbicide with active ingredient 2,4-D, G3 = Combination of mtsulfuron methyl and 2,4-D. Thus there were nine treatments, each treatment was repeated three times, so there were 27 experimental units. One experimental plot measuring 4 x 6 m. The placement of all treatments in the experimental plot was done randomly. The dominant weed species observed were Paspalum disticum, Fibristylis litoralis, Marsilea crenata, Cyperus iria and Echinochloa colonum. The dominant weed species in all treatment combinations observed at 21 DAP were Paspalum distichum, Echinochloa crusgalli, Marsilea crenata, Lersia hexandra and Fimbristylis litoralis. There was no difference in rice production in all treatment combinations. The difference in production only occurred in the average planting method, where the highest production occurred in the T1 treatment.

**Keywords:** Weeds, Organic Fertilizer, Planting Technology

## INTRODUCTION

The problem currently arises in lowland rice cultivation is the presence of nuisance plants, namely weeds which can reduce crop yields by up to 90% (Naharia, 0. 2005; 2006). Therefore, it is necessary to find a way out by testing several weed control technologies that farmers can do. Based on empirical data obtained in previous studies, one of the obstacles farmers face is the

indonesian. biodivers. j.
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ISSN : 2722-2659

appropriate and easy weed control method. Labor in the agricultural sector in Minahasa Regency is currently another problem that needs attention and a solution. Conventional lowland rice cultivation using the transplanting system and using a lot of energy for seeding and transplanting can also delay harvest time. Therefore, it is necessary to research the technology of planting methods that can reduce labor without reducing the quality and quantity of the harvest.

Weed and Vegetation Analysis

Weeds are plants that grow around cultivated plants, and their presence is not desired. The presence of weeds can cause losses to cultivated plants due to competition between cultivated plants and weeds. The existence of weeds, of course, cannot be avoided and will always grow around cultivated plants, including in paddy fields. Weeds in agricultural land can occur naturally or through errors in agronomic actions such as spacing, fertilization, tillage, and other agronomic practices. For example, in the use of spacing, if we use a spacing that is too wide, which was originally intended to provide space for movement between plants, it will provide more space for weed growth if not properly cared for. Meanwhile, the use of inappropriate fertilizer doses will stimulate weed growth. Complete and intensive tillage will cause weed seeds to rise to the soil surface to stimulate the breaking of dormancy and seed germination.

The exact growing requirements such as light, nutrients, water, CO2 gas, and space cause associations between weeds and cultivated plants. The associated weeds will compete for the materials needed, nutrients, light, air, and others. This competition will be even tighter if the material being contested is not sufficient for the needs used together. The existence of weeds in lowland rice cultivation is fundamental to study because in addition to reducing crop yields, it also reduces harvest quality; therefore, control measures are needed so that detrimental things due to the presence of weeds do not occur. In weed control, the first step that must be taken is to identify utilizing vegetation analysis to determine the dynamics of weed populations. We can find out which weeds are dominant with vegetation analysis, making it easier to control them.

Weed Competition with Cultivated Crops

Weeds in swah rice fields are unavoidable, thus enabling competition between the two. Due to competition, the growth of rice plants is hampered, and the yield is reduced. Pudjogonarto et al. (2001) showed that losses due to weeds in lowland rice reached 36.5%, even in other studies, up to 70%. Weeds that are always around paddy fields will influence a result of competition between the two interacting with each other. Weeds equipped with an extensive root system will quickly absorb water and nutrients to grow faster until they eventually form a lush canopy. A dense canopy will quickly fill the space/space and suppress the paddy fields around it (Naharia O, 2005). Weed competition with cultivated plants, including lowland rice, especially in light, CO2, nutrients, growing space/space, and allelopathy.

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**Light**

Competition for taking light between weeds and cultivated plants occurs when both shade each other. Therefore, if weeds absorb more light than the cultivated plants they cover, the growth of the cultivated plants will be hampered.

**CO2**

Like competition for light, weeds also can assimilate more CO2. In an agricultural cultivation practice such as corn, the photosynthesis process will decrease if the environmental conditions are sunny and there is sufficient water. Still, no wind is blowing that can provide new CO2. This is important because there will be competition for CO2 in a dense canopy.

**Nutrient**

Weeds and corn plants that grow together in a bed and are allowed to grow without weeding or controlling will cause crop yields to decrease due to competition for nutrients.

**Water**

If a place is in a state of minimal water availability, competition between weeds and cultivated plants tends to be very high. Suppose the number of weeds is more than the cultivated plants (no control is carried out), accompanied by the distance between the weeds and adjacent cultivated plants. In that case, it is possible for there to be more intense competition for water. If weeds have broad and deep roots, they will absorb the most water.

**The place**

Errors in determining the spacing and arrangement of plants will benefit weeds in providing space to grow. If this is allowed, the competition between weeds and cultivated plants will be inevitable. The competition at the beginning of growth will reduce the yield quantity, while competition before harvest will affect the yield quality.

**Allelopathy**

Allelopathy is a chemical substance released by certain weeds that can harm or interfere with the growth of surrounding plants. The presence of allelopathy released by weeds will cause disturbances to plants such as abnormal germination, inhibition of root elongation, changes in root cells, and inhibition of absorption of N and K elements.

## MATERIALS AND METHOD

### Research Place and Time

This research was carried out from August to December 2019 on rice fields owned by farmers in South Tondano District, Minahasa Regency, North Sulawesi Province.

### Materials and tools

The materials used in this study were: JR-64 rice varieties, fertilizers (organic fertilizers made from local raw materials for the first year and in the second year combined with inorganic fertilizers), and herbicides. The tools used include oven, pH meter, EC meter, measuring flask, ulcur glass, volumetric pipette, cup, balance, catheter, and ring sample.

### Research design

The research was carried out using a Randomized Block Design (RAK) as the environmental design. The treatment design was a split-plot design: Main Plot, Planting Technology (T): T1 = Array T2 = Spacing Tables, T3 = Evenly Spread Tables. Sub-plots, Weed Control Technology (G): G1 = Herbicide with active ingredient mtsulfuron methyl, G2 = Herbicide with active ingredient 2,4-D, G3 = Combination of metsulfuron methyl and 2,4-D. Thus there were nine treatments, each treatment was repeated three times, so there were 27 experimental units. One experimental plot measuring 4 x 6 m. The placement of all treatments in the experimental plot was done randomly.

## RESULTS AND DISCUSSION

### Early Weed Vegetation Analysis

Initial vegetation analysis was carried out before tillage for land preparation before planting. Weed sampling was carried out using the quadrant method with nine throws. Nine quadrants are assumed to represent the weed population in the study area. According to the analysis, the initial weed observation was dominated by little leaf weeds or grass weeds, namely Paspalum district, with an absolute density of 319 and a mutual frequency of 9. From Table 1, it can be seen that in the initial weed vegetation analysis, there were nine species of broad-leaved weeds, four species of weeds or grass weeds, and four species of weeds. The results of the vegetation analysis showed that the dominant weed in the research area was a grass weed, namely Paspalum disticum with an NJD of 25.95, followed by a puzzle weed, namely Fimbrylis litoralis with an NJD of 14.00, and a broadleaf weed, namely Marsilea crenata with an NJD of 13. ,51. The three weed species with the lowest dominant number values were Ludwigia angustifolia with NJD 1.72, Ludwigia hyssopifolia with NJD 1.45, and Alternanthera sessilis with NJD 1.23. The diversity of weed species in the initial weed observation indicates that the land holds a lot of weed seeds, so for the effectiveness of weed control, an in-depth study of the diversity and types of weeds is required, preceded by a vegetation analysis.

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VoL.3 No.1: 1-14
ISSN : 2722-2659

Table 1. Analysis of Early Weed Vegetation

| No | Species | KM | KN % | FM | FN % | BKM gr | BKN % | NJD % |
|---|---|---|---|---|---|---|---|---|
| Broad leaves | | | | | | | | |
| 1 | *M. crenata* | 11 | 1,77 | 5 | 4,67 | 23,12 | 9,24 | 5,23 |
| 2 | *L. octovalvis* | 98 | 15,76 | 9 | 8,41 | 21,24 | 8,49 | 10,89 |
| 3 | *L. flava* | 32 | 5,14 | 9 | 8,41 | 4,20 | 1,68 | 5,08 |
| 4 | *I. aquatica* | 12 | 1,93 | 6 | 5,61 | 0,90 | 0,36 | 2,63 |
| 5 | *M. vaginalis* | 15 | 2,41 | 7 | 6,54 | 8,90 | 3,56 | 4,17 |
| 6 | *L. adscendens* | 13 | 2,09 | 5 | 4,67 | 3,50 | 1,40 | 2,72 |
| 7 | *A. sessilis* | 6 | 0,96 | 3 | 2,80 | 1,00 | 0,40 | 1,39 |
| 8 | *L. angustifolia* | 7 | 1,13 | 5 | 4,67 | 0,89 | 0,36 | 2,05 |
| 9 | *L. hyssopifolia* | 5 | 0,80 | 4 | 3,74 | 1,23 | 0,49 | 1,68 |
| Grass | | | | | | | | |
| 10 | *P. disticum* | 319 | 51,29 | 9 | 8,41 | 45,24 | 18,09 | 25,93 |
| 11 | *E. crusgalli* | 5 | 0,80 | 5 | 4,67 | 12,56 | 5,02 | 3,50 |
| 12 | *L. hexandra* | 16 | 2,57 | 9 | 8,41 | 5,60 | 2,24 | 4,41 |
| 13 | *E. colonum* | 32 | 5,14 | 9 | 8,41 | 17,30 | 6,92 | 6,82 |
| Riddle | | | | | | | | |
| 14 | *F. litoralis* | 4 | 0,64 | 4 | 3,74 | 54,67 | 21,86 | 8,75 |
| 15 | *C. iria* | 5 | 0,80 | 4 | 3,74 | 32,98 | 13,19 | 5,91 |
| 16 | *S. juncoides* | 9 | 1,45 | 5 | 4,67 | 9,98 | 3,99 | 3,37 |
| 17 | *C. difformis* | 33 | 5,31 | 9 | 8,41 | 6,80 | 2,72 | 5,48 |
| | | 622 | 100,00 | 107 | 100,00 | 250,11 | 100,00 | 100,00 |

**Weed Vegetation Analysis 21 DAP on T1G1 Treatment**

Table 2 shows that in the weed vegetation analysis carried out at 21 DAP for the T1G1 treatment combination, there were two types of weeds with absolute density values of more than one hundred, namely *broadleaf weeds*, *Marsilea crenata* and *Paspalum disticum*. From the results of the analysis, it was found that the dominant number was found in the type of narrow leaf weed or grass weed, namely Paspalum disticum with an NJD of 16.10, the second dominant order was a broadleaf weed, namely Marsilea crenata with an NJD of 15.26, and the third dominant order of species puzzle weed, namely Fibristilis litoralis with an NJD of 12.98.

Table 2 shows that the five dominant weeds observed at 21 DAP for T1G1 treatment were *Paspalum disticum* with NJD 16.10, *Marsilea crenata* with NJD 15.26, *Fimbristylis litoralis* with NJD 12.98, *Cyperus iria* with NJD 9.66 and *Echinochloa crusgalli* with ND 6.57. Figure 2 shows the histogram of the five types of weeds with the highest dominant number values.

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Table 2. Analysis of the Dominant Amount of 21 DAP in T1G1 treatment

| No | Spesies | KM | KN % | FM | FN % | BKM gr | BKN % | NJD % |
|---|---|---|---|---|---|---|---|---|
| **Broad leaves** | | | | | | | | |
| 1 | *M. crenata* | 192 | 32,00 | 9 | 8,57 | 12,34 | 5,20 | **15,26** |
| 2 | *L. octovalvis* | 20 | 3,33 | 7 | 6,67 | 16,45 | 6,93 | **5,64** |
| 3 | *L. flava* | 22 | 3,67 | 9 | 8,57 | 7,20 | 3,03 | **5,09** |
| 4 | *I. aquatica* | 8 | 1,33 | 5 | 4,76 | 4,20 | 1,77 | **2,62** |
| 5 | *M. vaginalis* | 24 | 4,00 | 9 | 8,57 | 7,30 | 3,08 | **5,22** |
| 6 | *L. adscendens* | 16 | 2,67 | 8 | 7,62 | 3,50 | 1,47 | **3,92** |
| 7 | *L. hyssopifolia* | 4 | 0,67 | 3 | 2,86 | 1,23 | 0,52 | **1,35** |
| **Grass** | | | | | | | | |
| 8 | *P. disticum* | 124 | 20,67 | 9 | 8,57 | 45,24 | 19,06 | **16,10** |
| 9 | *E. crusgalli* | 35 | 5,83 | 9 | 8,57 | 12,56 | 5,29 | **6,57** |
| 10 | *L. hexandra* | 39 | 6,50 | 9 | 8,57 | 5,60 | 2,36 | **5,81** |
| 11 | *E. colonum* | 22 | 3,67 | 7 | 6,67 | 17,30 | 7,29 | **5,87** |
| **Teki** | | | | | | | | |
| 12 | *F. litoralis* | 44 | 7,33 | **9** | 8,57 | 54,67 | 23,03 | **12,98** |
| 13 | *C. iria* | 39 | 6,50 | **9** | 8,57 | 32,98 | 13,90 | **9,66** |
| 14 | *S. juncoides* | 9 | 1,50 | **2** | 1,90 | 9,98 | 4,20 | **2,54** |
| 15 | *C. difformis* | 2 | 0,33 | **1** | 0,95 | 6,80 | 2,86 | **1,38** |
| | | **600** | **100,00** | **105** | **100,00** | **237,35** | **100,00** | **100,00** |

**Analysis of Weed Vegetation 21 DAP on T1G2 Treatment**

From observations made at 21 DAP in the T1G2 treatment, two types of gulam were found with absolute density values of more than one hundred; the two types of weeds included broad dau weeds, namely *Marsilea crenata* and *Ludwigia octovalvis* (Table 3).

Table 3. Analysis of the Dominant Amount of 21 DAP in T1G2 treatment

| No | Species | KM | KN % | FM | FN % | BKM gr | BKN % | NJD % |
|---|---|---|---|---|---|---|---|---|
| Broad leaves | | | | | | | | |
| 1 | *M. crenata* | 192 | 20,85 | 9 | 8,57 | 23,26 | 7,24 | 12,22 |
| 2 | *L. octovalvis* | 256 | 27,80 | 7 | 6,67 | 45,65 | 14,21 | 16,22 |
| 3 | *L. flava* | 58 | 6,30 | 9 | 8,57 | 34,54 | 10,75 | 8,54 |
| 4 | *I. aquatica* | 24 | 2,61 | 5 | 4,76 | 7,89 | 2,46 | 3,27 |
| 5 | *M. vaginalis* | 47 | 5,10 | 9 | 8,57 | 7,30 | 2,27 | 5,32 |
| 6 | *L. adscendens* | 66 | 7,17 | 8 | 7,62 | 23,54 | 7,33 | 7,37 |
| 7 | *L. hyssopifolia* | 33 | 3,58 | 3 | 2,86 | 21,21 | 6,60 | 4,35 |
| Grass | | | | | | | | |
| 8 | *P. disticum* | 31 | 3,37 | 9 | 8,57 | 9,34 | 2,91 | 4,95 |
| 9 | *E. crusgalli* | 22 | 2,39 | 9 | 8,57 | 8,50 | 2,65 | 4,54 |
| 10 | *L. hexandra* | 19 | 2,06 | 9 | 8,57 | 4,56 | 1,42 | 4,02 |
| 11 | *E. colonum* | 10 | 1,09 | 7 | 6,67 | 6,56 | 2,04 | 3,26 |
| Teki | | | | | | | | |
| 12 | *F. litoralis* | 39 | 4,23 | 9 | 8,57 | 38,90 | 12,11 | 8,31 |
| 13 | *C. iria* | 55 | 5,97 | 9 | 8,57 | 45,67 | 14,22 | 9,59 |
| 14 | *S. juncoides* | 23 | 2,50 | 2 | 1,90 | 11,30 | 3,52 | 2,64 |
| 15 | *C. difformis* | 46 | 4,99 | 1 | 0,95 | 32,98 | 10,27 | 5,40 |
| | | 921 | 100,00 | 105 | 100,00 | 321,20 | 100,00 | 100,00 |

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ISSN : 2722-2659

**Analysis of Weed Vegetation 21 DAP on T1G3 Treatment**

From the results of observations of 21 DAP on the combination treatment T1G3 (Table 4), it was found that the five dominant weeds were broadleaf and grass weeds. The dominant number values in Table 12 that the five types of weeds are *Marsilea crenata* with NJD 15.19, *Paspalum disticum* with NJD 13.79, *Echinochloa crusgalli* with NJD 8.69, *Ludwigia octovalvis* with NJD 8.46, and *Leersia hexaandra* with NJD 8.41.

Table 4. Analysis of the Dominant Amount of 21 DAP in T1G3 treatment

| No | Species | KM | KN % | FM | FN % | BKM gr | BKN % | NJD % |
|---|---|---|---|---|---|---|---|---|
| **Broad leaves** | | | | | | | | |
| 1 | *M. crenata* | 39 | 24,84 | 9 | 8,57 | 6,70 | 12,17 | **15,19** |
| 2 | *L. octovalvis* | 6 | 3,82 | 7 | 6,67 | 8,20 | 14,89 | **8,46** |
| 3 | *L. flava* | 4 | 2,55 | 9 | 8,57 | 2,10 | 3,81 | **4,98** |
| 4 | *I. aquatica* | 3 | 1,91 | 5 | 4,76 | 1,20 | 2,18 | **2,95** |
| 5 | *M. vaginalis* | 9 | 5,73 | 9 | 8,57 | 2,60 | 4,72 | **6,34** |
| 6 | *L. adscendens* | 9 | 5,73 | 8 | 7,62 | 3,18 | 5,78 | **6,38** |
| 7 | *L. hyssopifolia* | 4 | 2,55 | 3 | 2,86 | 1,10 | 2,00 | **2,47** |
| **Grass** | | | | | | | | |
| 8 | *P. disticum* | 31 | 19,75 | 9 | 8,57 | 7,19 | 13,06 | **13,79** |
| 9 | *E. crusgalli* | 11 | 7,01 | 9 | 8,57 | 5,78 | 10,50 | **8,69** |
| 10 | *L. hexandra* | 10 | 6,37 | 9 | 8,57 | 5,67 | 10,30 | **8,41** |
| 11 | *E. colonum* | 7 | 4,46 | 7 | 6,67 | 4,56 | 8,28 | **6,47** |
| **Teki** | | | | | | | | |
| 12 | *F. litoralis* | 11 | 7,01 | **9** | 8,57 | 1,98 | 3,60 | **6,39** |
| 13 | *C. iria* | 9 | 5,73 | **9** | 8,57 | 3,01 | 5,47 | **6,59** |
| 14 | *S. juncoides* | 2 | 1,27 | **2** | 1,90 | 0,80 | 1,45 | **1,54** |
| 15 | *C. difformis* | 2 | 1,27 | **1** | 0,95 | 0,99 | 1,80 | **1,34** |
| | | **157** | **100,00** | **105** | **100,00** | **55,06** | **100,00** | **100,00** |

**Analysis of Weed Vegetation 21 DAP on T2G1 Treatment**

The data in Table 5 shows that from 9 times of sampling using quadrants, there is one type of weed with an absolute density of more than one hundred, namely Marsila crenata weed. The analysis of the dominant number value showed that five types of weeds with dominant number values were found broadleaf weeds, little leaf weeds, and puzzle weeds. In Table 4, it can be seen that the five types of weeds with the highest dominance values were *Paspalum disticum* with NJD 14.05, *Marsilea crenata* with NJD 13.87, *Fimbristylis litoralis* 12.69, *Cyperus iria* with NJD 9.38 and *Echinochloa crusgalli* with NJD 6, 51 (table 5)

IBJ
Indonesian Biodiversity Journal
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Table 5. Analysis of the Dominant Amount of 21 DAP in T2G1 . treatment

| No | Species | KM | KN % | FM | FN % | BKM gr | BKN % | NJD % |
|---|---|---|---|---|---|---|---|---|
| **Broad leaves** | | | | | | | | |
| 1 | *M. crenata* | 174 | 28,57 | 9 | 7,83 | 12,34 | 5,20 | **13,87** |
| 2 | *L. octovalvis* | 33 | 5,42 | 7 | 6,09 | 16,45 | 6,93 | **6,15** |
| 3 | *L. flava* | 42 | 6,90 | 9 | 7,83 | 7,20 | 3,03 | **5,92** |
| 4 | *I. aquatica* | 11 | 1,81 | 6 | 5,22 | 4,20 | 1,77 | **2,93** |
| 5 | *M. vaginalis* | 26 | 4,27 | 9 | 7,83 | 7,30 | 3,08 | **5,06** |
| 6 | *L. adscendens* | 19 | 3,12 | 9 | 7,83 | 3,50 | 1,47 | **4,14** |
| 7 | *L. hyssopifolia* | 6 | 0,99 | 5 | 4,35 | 1,23 | 0,52 | **1,95** |
| **Grass** | | | | | | | | |
| 8 | *P. disticum* | 93 | 15,27 | 9 | 7,83 | 45,24 | 19,06 | **14,05** |
| 9 | *E. crusgalli* | 39 | 6,40 | 9 | 7,83 | 12,56 | 5,29 | **6,51** |
| 10 | *L. hexandra* | 39 | 6,40 | 9 | 7,83 | 5,60 | 2,36 | **5,53** |
| 11 | *E. colonum* | 22 | 3,61 | 7 | 6,09 | 17,30 | 7,29 | **5,66** |
| **Teki** | | | | | | | | |
| 12 | *F. litoralis* | 44 | 7,22 | **9** | 7,83 | 54,67 | 23,03 | **12,69** |
| 13 | *C. iria* | 39 | 6,40 | **9** | 7,83 | 32,98 | 13,90 | **9,38** |
| 14 | *S. juncoides* | 16 | 2,63 | **6** | 5,22 | 9,98 | 4,20 | **4,02** |
| 15 | *C. difformis* | 6 | 0,99 | **3** | 2,61 | 6,80 | 2,86 | **2,15** |
| | | **609** | **100,00** | **115** | **100,00** | **237,35** | **100,00** | **100,00** |

**Analysis of Weed Vegetation 21 DAP on T2G2 Treatment**

Table 6. Analysis of the Dominant Amount of 21 DAP in T2G2 treatment

| No | Spesies | KM | KN % | FM | FN % | BKM gr | BKN % | NJD % |
|---|---|---|---|---|---|---|---|---|
| **Broad leaves** | | | | | | | | |
| 1 | *M. crenata* | 48 | 9,49 | 9 | 8,57 | 6,89 | 5,22 | **7,76** |
| 2 | *L. octovalvis* | 8 | 1,58 | 6 | 5,71 | 16,45 | 12,46 | **6,59** |
| 3 | *L. flava* | 9 | 1,78 | 5 | 4,76 | 7,20 | 5,45 | **4,00** |
| 4 | *I. aquatica* | 5 | 0,99 | 4 | 3,81 | 4,20 | 3,18 | **2,66** |
| 5 | *M. vaginalis* | 9 | 1,78 | 7 | 6,67 | 7,30 | 5,53 | **4,66** |
| 6 | *L. adscendens* | 8 | 1,58 | 6 | 5,71 | 3,50 | 2,65 | **3,32** |
| 7 | *L. hyssopifolia* | 5 | 0,99 | 4 | 3,81 | 1,23 | 0,93 | **1,91** |
| **Grass** | | | | | | | | |
| 10 | *P. disticum* | 209 | 41,30 | 9 | 8,57 | 23,98 | 18,16 | **22,68** |
| 11 | *E. crusgalli* | 47 | 9,29 | 9 | 8,57 | 20,23 | 15,32 | **11,06** |
| 12 | *L. hexandra* | 63 | 12,45 | 9 | 8,57 | 7,89 | 5,98 | **9,00** |
| 13 | *E. colonum* | 29 | 5,73 | 9 | 8,57 | 10,02 | 7,59 | **7,30** |
| **Teki** | | | | | | | | |
| 14 | *F. litoralis* | 13 | 2,57 | 9 | 8,57 | 5,67 | 4,29 | **5,15** |
| 15 | *C. iria* | 30 | 5,93 | 9 | 8,57 | 9,98 | 7,56 | **7,35** |
| 16 | *S. juncoides* | 9 | 1,78 | 5 | 4,76 | 3,45 | 2,61 | **3,05** |
| 17 | *C. difformis* | 14 | 2,77 | 5 | 4,76 | 4,03 | 3,05 | **3,53** |
| | | **506** | **100,00** | **105** | **100,00** | **132,02** | **100,00** | **100,00** |

Table 6 shows that from observations with nine sampling times, it was found that the type of grass weed, namely Paspalum disticum, had the highest absolute density value of 209. This

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VoL.3 No.1: 1-14
ISSN : 2722-2659

indicates that in the Combination of T2G2 treatments, the weeds can adapt and grow well . This is evidenced through the analysis of the dominant number in Table 17 that Paspalum disticum obtained the highest dominant number of 22.68. The five dominant weed species were *Paspalum disticum* with NJD 22.68, *Echinochloa crusgalli* with NJD 11.06, *Leersia hexandra* with NJD 9.00, *Marsilea crenata* with NJD, and *Cyperus iria* with NJD 7.35.

From the analysis results, it was found that the weeds with the highest dominant number at 21 DAP treatment T2G3 were *Paspalum disticum* with NJD 18.39, *Echinochloa crusgalli* with NJD 12.08, *Marsilea crenata* with NJD 11.75, *Ludwigia adcenens* with NJD 8.88 and *Cyperus jealous* with NJD 7.15.

Table 7. Analysis of the Dominant Amount of 21 DAP in T2G3 treatment

| No | Spesies | KM | KN % | FM | FN % | BKM gr | BKN % | NJD % |
|---|---|---|---|---|---|---|---|---|
| **Daun Lebar** | | | | | | | | |
| 1 | *M. crenata* | 47 | 17,87 | 9 | 9,47 | 6,45 | 7,91 | **11,75** |
| 2 | *L. octovalvis* | 11 | 4,18 | 7 | 7,37 | 4,32 | 5,30 | **5,62** |
| 3 | *L. flava* | 10 | 3,80 | 7 | 7,37 | 7,45 | 9,14 | **6,77** |
| 4 | *I. aquatica* | 5 | 1,90 | 4 | 4,21 | 1,30 | 1,60 | **2,57** |
| 5 | *M. vaginalis* | 12 | 4,56 | 9 | 9,47 | 5,67 | 6,96 | **7,00** |
| 6 | *L. adscendens* | 16 | 6,08 | 8 | 8,42 | 9,90 | 12,15 | **8,88** |
| 7 | *L. hyssopifolia* | 4 | 1,52 | 2 | 2,11 | 0,65 | 0,80 | **1,47** |
| **Rumput** | | | | | | | | |
| 10 | *P. disticum* | 70 | 26,62 | 9 | 9,47 | 15,56 | 19,09 | **18,39** |
| 11 | *E. crusgalli* | 35 | 13,31 | 9 | 9,47 | 10,98 | 13,47 | **12,08** |
| 12 | *L. hexandra* | 13 | 4,94 | 7 | 7,37 | 3,57 | 4,38 | **5,56** |
| 13 | *E. colonum* | 8 | 3,04 | 6 | 6,32 | 7,77 | 9,53 | **6,30** |
| **Teki** | | | | | | | | |
| 14 | *F. litoralis* | 10 | 3,80 | **5** | 5,26 | 1,23 | 1,51 | **3,52** |
| 15 | *C. iria* | 16 | 6,08 | **8** | 8,42 | 5,67 | 6,96 | **7,15** |
| 16 | *S. juncoides* | 3 | 1,14 | **3** | 3,16 | 0,87 | 1,07 | **1,79** |
| 17 | *C. difformis* | 3 | 1,14 | **2** | 2,11 | 0,11 | 0,13 | **1,13** |
| | | **263** | **100,00** | **95** | **100,00** | **81,50** | **100,00** | **100,00** |

**Analysis of Weed Vegetation 21 DAP on T3G1 Treatment**

Table 8 shows that the five types of weeds with the highest dominant number values were *Paspalum disticum* with NJD 13.30, *Marsilea crenata* with NJD 11.45, *Fibristilis litoralis* with NJDn9.78, *Echinochloa crusgalli* with NJD 9.66 and *Echinochloa Colonum* with NJD 8.22.

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Table 8. Analysis of the Dominant Amount of 21 DAP in T3G1 treatment

| No | Spesies | KM | KN % | FM | FN % | BKM gr | BKN % | NJD % |
|---|---|---|---|---|---|---|---|---|
| **Daun Lebar** | | | | | | | | |
| 1 | *M. crenata* | 34 | 15,67 | 9 | 8,57 | 6,04 | 10,12 | **11,45** |
| 2 | *L. octovalvis* | 8 | 3,69 | 7 | 6,67 | 7,65 | 12,82 | **7,73** |
| 3 | *L. flava* | 10 | 4,61 | 9 | 8,57 | 2,45 | 4,11 | **5,76** |
| 4 | *I. aquatica* | 4 | 1,84 | 5 | 4,76 | 0,54 | 0,91 | **2,50** |
| 5 | *M. vaginalis* | 11 | 5,07 | 9 | 8,57 | 3,75 | 6,29 | **6,64** |
| 6 | *L. adscendens* | 9 | 4,15 | 8 | 7,62 | 4,56 | 7,64 | **6,47** |
| 7 | *L. hyssopifolia* | 5 | 2,30 | 3 | 2,86 | 1,11 | 1,86 | **2,34** |
| **Rumput** | | | | | | | | |
| 10 | *P. disticum* | 53 | 24,42 | 9 | 8,57 | 4,12 | 6,91 | **13,30** |
| 11 | *E. crusgalli* | 18 | 8,29 | 9 | 8,57 | 7,23 | 12,12 | **9,66** |
| 12 | *L. hexandra* | 13 | 5,99 | 9 | 8,57 | 2,23 | 3,74 | **6,10** |
| 13 | *E. colonum* | 14 | 6,45 | 7 | 6,67 | 6,89 | 11,55 | **8,22** |
| **Teki** | | | | | | | | |
| 14 | *F. litoralis* | 20 | 9,22 | **9** | 8,57 | 6,89 | 11,55 | **9,78** |
| 15 | *C. iria* | 12 | 5,53 | **9** | 8,57 | 4,32 | 7,24 | **7,11** |
| 16 | *S. juncoides* | 4 | 1,84 | **2** | 1,90 | 1,34 | 2,25 | **2,00** |
| 17 | *C. difformis* | 2 | 0,92 | **1** | 0,95 | 0,54 | 0,91 | **0,93** |
| | | **217** | **100,00** | **105** | **100,00** | **59,66** | **100,00** | **100,00** |

**Analysis of Weed Vegetation 21 DAP on T3G2 Treatment**

Table 9 shows that at 21 DAT observations for the T3G2 treatment, the weed species with the highest dominant number value were as follows: *Marsilea crenata* with a dominant number value of 20.61 and then *Paspalum disticum* with a dominant number value of 15.01.

Table 9. Analysis of the Dominant Amount of 21 DAP in T3G2 treatment

| No | Spesies | KM | KN % | FM | FN % | BKM gr | BKN % | NJD % |
|---|---|---|---|---|---|---|---|---|
| **Daun Lebar** | | | | | | | | |
| 1 | *M. crenata* | 109 | 30,70 | 9 | 9,38 | 21,00 | 21,76 | **20,61** |
| 2 | *L. octovalvis* | 15 | 4,23 | 6 | 6,25 | 5,40 | 5,60 | **5,36** |
| 3 | *L. flava* | 15 | 4,23 | 9 | 9,38 | 4,32 | 4,48 | **6,03** |
| 4 | *I. aquatica* | 3 | 0,85 | 3 | 3,13 | 0,20 | 0,21 | **1,39** |
| 5 | *M. vaginalis* | 24 | 6,76 | 9 | 9,38 | 4,87 | 5,05 | **7,06** |
| 6 | *L. adscendens* | 21 | 5,92 | 8 | 8,33 | 5,10 | 5,28 | **6,51** |
| 7 | *L. hyssopifolia* | 14 | 3,94 | 6 | 6,25 | 3,78 | 3,92 | **4,70** |
| **Rumput** | | | | | | | | |
| 10 | *P. disticum* | 64 | 18,03 | 9 | 9,38 | 17,00 | 17,62 | **15,01** |
| 11 | *E. crusgalli* | 14 | 3,94 | 9 | 9,38 | 5,20 | 5,39 | **6,24** |
| 12 | *L. hexandra* | 11 | 3,10 | 6 | 6,25 | 1,68 | 1,74 | **3,70** |
| 13 | *E. colonum* | 8 | 2,25 | 5 | 5,21 | 6,67 | 6,91 | **4,79** |
| **Teki** | | | | | | | | |
| 14 | *F. litoralis* | 16 | 4,51 | **6** | 6,25 | 6,56 | 6,80 | **5,85** |
| 15 | *C. iria* | 28 | 7,89 | **6** | 6,25 | 8,98 | 9,31 | **7,81** |
| 16 | *S. juncoides* | 9 | 2,54 | **1** | 1,04 | 3,87 | 4,01 | **2,53** |
| 17 | *C. difformis* | 4 | 1,13 | **4** | 4,17 | 1,87 | 1,94 | **2,41** |
| | | **355** | **100,00** | **96** | **100,00** | **96,50** | **100,00** | **100,00** |

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**Analysis of Weed Vegetation 21 DAP on T3G3 Treatment**

The data in Table 10 shows that the results of the weed vegetation analysis carried out 21 DAP in the T3G3 treatment contained five types of weeds with the highest dominant number value, namely *Paspalum disticum* with NJD !8.54, *Echinochloa crusgalli* with NJD 13.37, *Masilea crenata* with NJD 11.44, *Leersia hexadra* with NJD 8.53 and *Fimbristilis litoralis* with NJD 7.17.

Table 10. Analysis of the Dominant Amount of 21 DAP in T3G3 treatment

| No | Species | KM | KN % | FM | FN % | BKM gr | BKN % | NJD % |
|---|---|---|---|---|---|---|---|---|
| **Daun Lebar** | | | | | | | | |
| 1 | *M. crenata* | 43 | 15,81 | 9 | 9,09 | 6,45 | 9,42 | **11,44** |
| 2 | *L. octovalvis* | 10 | 3,68 | 9 | 9,09 | 5,80 | 8,47 | **7,08** |
| 3 | *L. flava* | 10 | 3,68 | 7 | 7,07 | 4,54 | 6,63 | **5,79** |
| 4 | *I. aquatica* | 4 | 1,47 | 4 | 4,04 | 1,32 | 1,93 | **2,48** |
| 5 | *M. vaginalis* | 15 | 5,51 | 8 | 8,08 | 5,23 | 7,64 | **7,08** |
| 6 | *L. adscendens* | 8 | 2,94 | 5 | 5,05 | 3,98 | 5,81 | **4,60** |
| 7 | *L. hyssopifolia* | 2 | 0,74 | 2 | 2,02 | 0,12 | 0,18 | **0,98** |
| **Rumput** | | | | | | | | |
| 10 | *P. disticum* | 82 | 30,15 | 9 | 9,09 | 11,21 | 16,37 | **18,54** |
| 11 | *E. crusgalli* | 27 | 9,93 | 9 | 9,09 | 14,45 | 21,10 | **13,37** |
| 12 | *L. hexandra* | 26 | 9,56 | 9 | 9,09 | 4,76 | 6,95 | **8,53** |
| 13 | *E. colonum* | 12 | 4,41 | 7 | 7,07 | 4,98 | 7,27 | **6,25** |
| **Teki** | | | | | | | | |
| 14 | *F. litoralis* | 21 | 7,72 | **9** | 9,09 | 3,21 | 4,69 | **7,17** |
| 15 | *C. iria* | 7 | 2,57 | **7** | 7,07 | 2,22 | 3,24 | **4,30** |
| 16 | *S. juncoides* | 3 | 1,10 | **3** | 3,03 | 0,12 | 0,18 | **1,44** |
| 17 | *C. difformis* | 2 | 0,74 | **2** | 2,02 | 0,10 | 0,15 | **0,97** |
| | | **272** | **100,00** | **99** | **100,00** | **68,49** | **100,00** | **100,00** |

**2. Growth Parameters**

**Number of tillers**

The data in Table 11 shows that for observing the number of tillers at 21 DAP the parameters were not different for the three weed control treatments. Differences occurred at 35 DAP, 46 DAP and 77 DAP where the highest number of tillers were in T1 treatment, except for 77 DAP where the highest number of tillers was in T2 treatment.

Table 11. Number of tillers in the treatment method of planting (T)

| Treatments | Numbers of seed/tillers | | | | |
|---|---|---|---|---|---|
| | 21 HST | 35 HST | 46 HST | 60 HST | 77 HST |
| T1 | 11.8 | 19.9$^{a}$ | 14.8$^{a}$ | 13.7 | 12.3$^{a}$ |
| T2 | 12.9 | 15.2$^{ab}$ | 12.8$^{b}$ | 12.1 | 12.8$^{b}$ |
| T3 | 11.3 | 14.2$^{b}$ | 12.6$^{b}$ | 12.1 | 12.4$^{b}$ |

Numbers in the same column followed by the same letter are not significantly different at the level of 0.05 BNT

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Table 12. Number of tillers in the weed control treatment (G)

| Treatments | Numbers of seed/tillers | | | | |
|---|---|---|---|---|---|
| | 21 HST | 35 HST | 46 HST | 60 HST | 77 HST |
| G1 | 11.7ab | 12.8 | 12.8a | 11.6 | 11.8 |
| G2 | 13.3a | 13.4 | 11.4b | 11.4 | 11.7 |
| G3 | 11.1b | 14.3 | 11.0b | 11.0 | 11.5 |

The observations in Table 12 showed that the number of tillers at 21 DAP and 46 DAP for the sugar control treatment was different, where the highest number of tillers was in G2 treatment. In comparison, there was no difference in the number of tillers at 35 DAP, 60 DAP, and 77 DAP.

Table 13. Number of tillers in treatment interactions

| Treatments | Numbers of seed/tillers | | | | |
|---|---|---|---|---|---|
| | 21 HST | 35 HST | 46 HST | 60 HST | 77 HST |
| T1G1 | 11.4 | 18.2 | 15.8 | 14.9 | 15.4 |
| T1G2 | 13.7 | 18.3 | 13.9 | 12.9 | 13.7 |
| T1G3 | 10.5 | 17.3 | 14.7 | 13.2 | 13.7 |
| T2G1 | 12.2 | 15.9 | 13.4 | 12.8 | 13.4 |
| T2G2 | 14.7 | 15.9 | 12.7 | 12.3 | 13.2 |
| T2G3 | 12.1 | 13.7 | 12.3 | 11.3 | 11.8 |
| T3G1 | 11.5 | 14.8 | 13.4 | 12.7 | 12.5 |
| T3G2 | 11.8 | 15.4 | 12.7 | 12.8 | 13.2 |
| T3G3 | 10.6 | 12.3 | 11.7 | 10.8 | 11.6 |

Table 13 shows that for the observation of the number of tillers in all treatment combinations either at 21 DAP, 35 DAP, 46 DAP, 60 DAP, and 77 DAP, there was no difference.

Table 14. Plant height on planting method (T)

| Treatments | Plant Height (cm) | | | | |
|---|---|---|---|---|---|
| | 21 HST | 35 HST | 46 HST | 60 HST | 77 HST |
| T1 | 36.5b | 53.6a | 64.9a | 88.3b | 94.5 |
| T2 | 39.5ab | 48.3b | 61.8b | 93.0a | 94.2 |
| T3 | 42.3a | 46.2a | 64.5a | 89.1b | 90.0 |

Numbers in the same column followed by the same letter are not significantly different at the level of 0.05 BNT

Table 14 shows that the observations of plant height parameters carried out at 21 DAP and 35 DAP, 46 DAP and 60 DAP for the treatment of planting methods differed. The highest plant height value was found in treatment T2 for observation at 21 DAP, while for observations at 35 DAP and 46 DAP the highest plant height value was in treatment T1, and at observation 60 DAP the highest value was in treatment T2.

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Table 15. Plant height in the weed control treatment (cm)

| Treatments | Plant Height (cm) | | | | |
|---|---|---|---|---|---|
| | 21 HST | 35 HST | 46 HST | 60 HST | 77 HST |
| G1 | 42.1a | 53.1a | 62.3b | 90.4ab | 94.1 |
| G2 | 39.1b | 53.8a | 65.6a | 92.5a | 95.3 |
| G3 | 37.1c | 51.1b | 63.4ab | 87.5b | 89.3 |

Numbers in the same column followed by the same letter are not significantly different at the level of 0.05 BNT

Table 15 shows that observations made at 21 DAP, 35 DAP, 46 DAP, and 60 DAP showed differences. The highest plants were found in G1 treatment for 21 DAP and G2 for 35 DAP, 46 DAP, and 60 DAP observations. At 77 DAT observations, there was no difference.

Table 16. Plant height on treatment interaction (cm)

| Treatments | Plant Height (cm) | | | | |
|---|---|---|---|---|---|
| | 21 HST | 35 HST | 46 HST | 60 HST | 77 HST |
| T1G1 | 36.5cd | 54.8b | 65.9ab | 87.7 | 96.6 |
| T1G2 | 38.7b | 54.9b | 65.1ab | 92.1 | 95.0 |
| T1G3 | 34.2d | 51.0c | 63.7ab | 85.1 | 91.9 |
| T2G1 | 39.0 b | 38.4d | 63.8c | 93.8 | 94.8 |
| T2G2 | 40.3b | 54.3b | 67.6a | 94.6 | 96.7 |
| T2G3 | 39.3b | 52.0b | 64.1ab | 90.7 | 91.2 |
| T3G1 | 50.8a | 66.1a | 67.2a | 89.7 | 90.9 |
| T3G2 | 38.2bc | 52.1b | 64.1ab | 90.8 | 94.3 |
| T3G3 | 37.7 | 50.4c | 62.3b | 86.7 | 84.8 |

Numbers in the same column followed by the same letter are not significantly different at the level of 0.05 BNT

Table 16 shows that the Combination of treatments at 21 DAP, 35 DAP, and 46 DAP observations showed differences. The highest plants were found in the Combination of T3G1 treatments, 21 DAP, 35 DAP, and 46 DAP observations.

**Production Parameters**

The data in Table 17 shows that there are no differences in production in all treatment combinations. The difference only occurs in the average treatment method of planting.

Table 17. Rice production in treatment combinations (kg/ha in 14% moisture content)

| | Weed Control | | | Average |
|---|---|---|---|---|
| How to Plant | G1 | G2 | G3 | |
| T1 | 5167.3 | 5123.6 | 4723.0 | 5004.7 a |
| T2 | 4814.3 | 4725.7 | 4565.3 | 4701.7 b |
| T3 | 4597.7 | 4665.3 | 4571.0 | 4611.3 b |
| Average | 4859.8 | 4838.2 | 4619.8 | |

Numbers in the same column followed by the same letter are not significantly different at the level of 0.05 BNT

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## CONCLUSION

From the results of the study, it can be concluded that:

1. The dominant weed species in the initial weed vegetation analysis were: Paspalum disticum, Fimbristylis litoralis, Marsilea crenata, Cyperus iria, and Echinochl;oa crusgalli.
2. The dominant weed species observed 21 days after planting were: Paspalum disticum, Fimbristylis litoralis, Echinochloa crusgali, Ludwigia octovalvis and Leersia hexaandra.
3. There was no difference in rice production in all treatment combinations; the difference in production only occurred in the average treatment method of planting, where the highest production was in the treatment of the table cropping method.

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