



## Effect of Transplanting Age and Spacing System on Growth and Yield of Rice Paddy (*Oryza sativa* L.) Ir 42 Variety

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### Abstract

The research was conducted in the paddy fields of the Nanjung Tani farmer group, Rawameneng Village, Blanakan District, Subang Regency, at a height of 25 m above sea level, from August 2022 to November 2022. This research aimed to study the effect of the interaction between the spacing system and the age at which the garden was moved on the growth and yield of glutinous rice. The environmental design used a completely randomized design (CRD) with a factorial pattern, the plant spacing treatment (j) consisted of 3 levels, namely j1 = Legowo 2 ; 1, j2 = 25 cm x 25 cm tiles, j3 = 4:1 thinning and the age of transplanting (u) consists of 4 levels, namely u1 = 10 HSS, u2 = 15 HSS, u3 = 20 HSS and u4 = 25 HSS. The results showed that the effect of transplanting age and spacing had an interaction effect on the number of tillers and the number of productive tillers, whereas on plant height, wet sample weight, dry sample weight, 1000 grain weight, empty grain weight, panicle length, number of seeds per panicle and tiles showed no interaction.

Keywords: Glutinous Rice, Transfer Age, Planting Spacing

## 1. Introduction

Indonesian crops should be able to maximize the agricultural sector in order to overcome the problem of the population's food needs, of course to be able to maximize available resources, especially agriculture, requires qualified agricultural technology. The use of agricultural technology in Indonesia is still very minimal, in general in rural areas farmers still farm using traditional methods and tools. This is one of the reasons why Indonesia is still importing rice at this time. According to BPS (2022), national rice productivity in 2022 is estimated at 52.26 ku/ha with total production of 55.67 million tons of GKG. Increasing rice productivity in Indonesia is still very possible if farmers continue to implement efficient and location-specific innovations. The use of local superior varieties that have high yields and are suitable for specific environments is one of the determinants of the success of rice cultivation. One of the local superior varieties is lowland rice (*Oryza sativa* L.) IR 42 variety which is planted by most farmers in Blanakan District, Subang Regency, West Java. IR 42 rice variety, the grain shape is round/fat. Even though the IR 42 rice variety is more susceptible to pests and diseases, especially brown planthoppers, farmers in the Blanakan District and surrounding areas still grow this type of rice because of its relatively higher productivity compared to other varieties.

## 2. Methods

The experiment was carried out in the rice fields of the Nanjung Tani Farmers Group, Rawameneng Village, Blanakan District, Subang Regency with a height of 25 m above sea level. The experiment was carried out from August 2022 to November 2022. The material used in this experiment was rice seeds of the IR 42 variety (Description of varieties in Appendix 2). The fertilizer used is Urea (46% N), SP-36 (36% P<sub>2</sub>O<sub>5</sub>), NPK 15-15-15, and to control rice pest organisms, contact and systemic pesticides are used. The herbicide used



is Penoxaprop-P-ethyl 60 OD + ethoxysulfuron 9 + isoxadifen 20, contact fungicide Propined 70 WP, systemic fungicide Tebukonazole 430 SC, insecticide used Imidachloropide 5 WP, Carbopuran 5 WP, Ethiprole 100 SC, Abamectin 18 EC and BPMC 500 EC. The tools used are tractors, hoes, stakes, raffia rope, buckets, measuring tapes, hand sprayers, rice threshers, digital scales, ovens, writing tools and Leaf Color Charts (BWD). This research was carried out with an experimental approach using a Split Plot Design (RPT) factorial pattern consisting of two factors, namely the first factor is Planting Distance (j) with 3 levels as the Main Plot (a factor that is less important) and the second factor is age transplanting (u) at 4 levels as sub-plots (factors that are more important), repeated three times, so that there are 36 units or plots placed randomly. The experimental unit plot measures 3m x 3m, so the total land required is 324 m<sup>2</sup>.

**Table 1.**List of Plant Spacing System Treatment Combinations and Planting Age

Planting Distance (h)	Seed Age (u)			
	U1 (10 hss)	U2 (15 hss)	U3 (20 hss)	U4 (25 hss)
Legowo 2 : 1 (j1)	U1 J 1	U2 J 1	U3 J 1	U4 J 1
Tiles 25cm x 25 cm (j2)	U1 J 2	U2 J 2	U3 J 2	U4 J 2
Thinning 4 :1 (j3)	U1 J 3	U 2J 3	U 3J 3	U4 J 3

HSS = day after sowing

**Table 2.**Variable Operationalization

No.	Variable Type	Sub Variable	Variable Indicator
1.	Independent Variable (Independent Variable)/ Treatment	1. Planting Age (u)	U1 = Age 10 HSS U2 = Age 15 HSS U3 = Age 20 HSS U4 = Age 25 HSS
		2. Plant Spacing System (j)	J1 = Legowo 2 : 1 J2 = Tiles 25 cm x 25 cm J3 = Thinning 4:1
2.	Response Variable (Dependent Variable)	1. Rice Plant Growth Characteristics	1. Plant height 2. Number of offspring
		1. Components of Rice Crops	1. Number of productive offspring 2. Number of Filled Grains per Panicle 3. Panicle length 4. Weight 1000 items 5. Sample wet weight 6. Sample dry weight 7. Empty grain weight 8. Tile weight

**Table 3.**List of Analysis of Various Split Plot Designs

Variety Source	DB	JK	KT	Fh	F0.05
Deuteronomy (r)	2	JK (r)	JKr/DBr	KTr/KTGalat	6.94
Plant spacing	2	JK (a)	JKt/DBt	KTt/KTGalat	6.94
Error (a)	4	JK (Error a)	JKJ/DBg	KTJ/KTGalat	-
Seed age	3	JK (b)	JKU/DBb	KTU/KTG error	3.16
Jartam x Seed Age	6	JK (ab)	JKJU/DBJU	KTJU/KTGalat	2.66
Error (b)	18	a(b-1)(n-1)	JKr/DBg	KTr/KTGalat	-
Total	35	Abn-1	-	-	-

Source: Toto Warsa and Cucu SA (1982)

Information : DB = Degrees of Freedom      JK = Sum of Squares      Fh = Fcount  
 KT = Middle Square      F<sub>0.05</sub> = F Table Rate 5%

### 3. Results and Discussion

#### 3.1 Observation of Plant Height

The results of the independent test analysis showed that the effect of planting distance on plant height showed significantly different results.

**Table 4.**Effect of Planting Distance and Seed Age on Plant Height

TREATMENT		Plant Height (CM)							
		2 WAP		3 WAP		4 WAP		5 WAP	
FACTOR	planting distance								
j1	Legowo 2 : 1	58.62	b	69.25	b	77.62	b	87.23	c
j2	25 cm x 25 cm	56.80	ab	67.40	ab	75.27	b	83.32	b
j3	Thinning 4 : 1	54.03	a	62.05	a	69.28	a	78.12	a
FACTOR	Seed age								
u1	10 HSS	55.89	a	64.11	a	72.18	a	78.24	a
u2	15 HSS	57.02	a	67.64	b	75.09	b	84.11	b
u3	20 HSS	55.76	a	65.44	a	73.49	ab	83.89	b
u4	25 HSS	57.27	a	67.73	b	75.47	b	85.31	b

Note: The average treatment number followed by the same letter in each column is not significantly different according to the Least Significant Difference test at the five percent significance level.

#### 3.2 Observation of the Number of Tillers

The results of the independent test analysis showed that the effect of planting distance on the number showed significantly different results.

**Table 5.**Effect of Planting Distance and Seed Age on Number of Tillers

TREATMENT		Number of Cubs							
		2 WAP		3 WAP		4 WAP		5 WAP	
FACTOR	planting distance								
j1	Legowo 2 : 1	16,13	A	16.62	a	18.05	a	17.07	a
j2	25 cm x 25 cm	16.32	A	18.87	b	22.00	b	20.48	a
j3	Thinning 4 : 1	17.60	A	20.00	c	26.97	c	27.05	b
FACTOR	Seed age								
u1	10 HSS	15.27	A	16.69	a	20.64	a	19.56	a
u2	15 HSS	18,20	B	19.51	b	23.33	b	22.11	b
u3	20 HSS	16,18	B	18.36	ab	22.29	ab	22.07	b
u4	25 HSS	17.09	B	19.42	ab	23.09	ab	22.40	b

Note: The average treatment number followed by the same letter in each column is not significantly different according to the Least Significant Difference test at the five percent significance level.

#### 3.3 Observation of the number of productive offspring

The results of the independent test analysis showed that the effect of planting distance and seed age on the number of productive seedlings showed significantly different results.

**Table 6.**Effect of Planting Distance and Seed Age on the Number of Productive Seedlings

TREATMENT		Productive Saplings	
FACTOR	planting distance		
j1	Legowo 2 : 1	53.08	a
j2	25 cm x 25 cm	78.08	b
j3	Thinning 4 : 1	67.83	ab
FACTOR	Seed age		
u1	10 HSS	58.67	a
u2	15 HSS	68.78	b
u3	20 HSS	68.56	b
u4	25 HSS	69.33	b

Note: The average treatment numbers followed by the same letter in the column are not significantly different according to the Least Significant Difference test at the five percent significance level.

### 3.4 Observation of Sample Basal Weight

The results of the independent test analysis showed that the effect of planting distance and seed age on the wet weight of treatment samples j2 (25cm x 25 cm) showed significantly different results, giving the highest results compared to other treatments and was not significantly different from treatments j1 and j3.

**Table 7.**Effect of Planting Distance and Seed Age on Sample Wet Weight

TREATMENT		Sample wet weight	
FACTOR	planting distance		
j1	Legowo 2 : 1	152.67	a
j2	25 cm x 25 cm	202.75	b
j3	Thinning 4 : 1	147.92	a
FACTOR	Seed age		
u1	10 HSS	150.11	a
u2	15 HSS	169.33	ab
u3	20 HSS	183.22	b
u4	25 HSS	168.44	ab

Note: The average treatment numbers followed by the same letter in the column are not significantly different according to the Least Significant Difference test at the five percent significance level.

### 3.5 Observation of sample dry weight

The results of the independent test analysis showed that the effect of planting distance and seed age on the dry weight of samples in the planting distance treatment (j) j3 (4:1 thinning) showed significantly different results and gave the highest results compared to other treatments.

**Table 8.**Effect of Planting Distance and Seed Age on Sample Dry Weight

TREATMENT		Sample dry weight (grams)	
FACTOR	planting distance		
j1	Legowo 2 : 1	99.50	A
j2	25 cm x 25 cm	118.08	B
j3	Thinning 4 : 1	139.17	C
FACTOR	Seed age		
u1	10 HSS	98.00	A
u2	15 HSS	129.56	B
u3	20 HSS	127.44	B
u4	25 HSS	120.67	B

Note: The average treatment numbers followed by the same letter in the column are not significantly different according to the Least Significant Difference test at the five percent significance level.

### 3.6 Observation of the Weight of 1000 Items

The results of the independent test analysis showed that the effect of planting distance on the weight of 1000 grains showed results that were not significantly different, just as seed age showed results that were not significantly different.

**Table 9.**Effect of Planting Distance and Seed Age on the Weight of 1000 Grains

TREATMENT		1000 Grains (grams)	
FACTOR	planting distance		
j1	Legowo 2 : 1	22.41	A
j2	25 cm x 25 cm	22.29	A
j3	Thinning 4 : 1	22.48	A
FACTOR	Seed age		
u1	10 HSS	21.60	a
u2	15 HSS	22.56	b
u3	20 HSS	22.49	b
u4	25 HSS	22.92	b

Note: The average treatment numbers followed by the same letter in the column are not significantly different according to the Least Significant Difference test at the five percent significance level.

### 3.7 Observation of Tile Weight

The results of the independent test analysis showed that the effect of planting distance on tile weight in the planting distance treatment (j) j2 (25 cm x 25 cm) showed significantly different results and gave the highest results compared to other treatments. Meanwhile, the age of the seeds (u) showed that the results were not significantly different.

**Table 10.**Effect of Planting Distance and Seed Age on the Weight of Tiles

TREATMENT		Tile Weight (kg)	
FACTOR	planting distance		
j1	Legowo 2 : 1	3.65	a
j2	25 cm x 25 cm	4.18	b
j3	Thinning 4 : 1	3.48	a
FACTOR	Seed age		
u1	10 HSS	3.58	a
u2	15 HSS	3.83	a
u3	20 HSS	3.89	a
u4	25 HSS	3.77	a

Note: The average treatment numbers followed by the same letter in the column are not significantly different according to the Least Significant Difference test at the five percent significance level.

### 3.8 Observation of the Number of Seeds per Panicle

The results of the independent test analysis showed that the effect of planting distance on the number of seeds per panicle showed that the results were not significantly different. Meanwhile, seed age (u) showed significantly different results. The u2 treatment (15 HSS) gave the highest results compared to other treatments.

**Table 11.**Effect of Planting Distance and Seed Age on the Number of Seeds per Panicle

TREATMENT		Number of seeds per panicle	
FACTOR	planting distance		
j1	Legowo 2 : 1	146.30	A
j2	25 cm x 25 cm	135.77	A
j3	Thinning 4 : 1	135.68	A
FACTOR	Seed age		
u1	10 HSS	123.78	A
u2	15 HSS	152.62	C
u3	20 HSS	138.02	B
u4	25 HSS	142.58	B

Note: The average treatment numbers followed by the same letter in the column are not significantly different according to the Least Significant Difference test at the five percent significance level.

## 4. Conclusion

The influence of planting distance and transplanting age gave an interaction effect at 2 WAP with the highest tiller yield in the 4 : 1 (j3) thinning treatment at planting age of 25

DAP (u4) and 4 WAP produced an interaction of number of tillers using the 2 : 1 row legowo system ( j1) at planting age 25 HSS (u4) produced the most tillers. And there was also an interaction in the number of the best productive seedlings in the 2:1 row legowo system with an age of 25 DAP, which was not significantly different from a planting distance of 25 cm x 25 cm at a plant age of 10 DAP. Plant height, wet sample weight, dry sample weight, 1000 grain weight, empty grain weight, panicle length and number of seeds per panicle did not show any interaction. From the independent test results, the highest tiling was obtained from the Legowo 2 : 1 (j1) planting distance treatment with a yield of 4.44 kg equivalent to 7.1 tons/ha, not significantly different from a planting distance of 25 cm x 25 cm with a yield of 4.24 kg equivalent to with 6.8 tonnes/ha. At 25 HSS (u4) the best tiles produced 4.21 kg, equivalent to 6.74 tonnes/ha. Treatments j1 and j3 with a planting age of 25 HSS showed the highest number of tillers and j1 with a planting age of 25 HSS showed the highest number of productive tillers. This shows a good interaction effect with the conditions of the research site, so it needs to be studied further on the environmental and climatic conditions. different to determine the interaction effect.

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