The yield paddy of red rice and black rice on jajar legowo planting system with application of several nitrogen sources

Wikka Sasvita1*, T Sabrina2 and C Hanum2

1 Postgraduate of Agrotechnology, Agriculture Faculty, University of North Sumatera, Jalan Prof. A. Sofyann No.3 Kampus USU Padang Bulan. Medan 20115
2 Agrotechnology Department, Agriculture Faculty, University of North Sumatera, Jalan Prof. A. Sofyann No.3 Kampus USU Padang Bulan. Medan 20115

*E-mail: wikkasasvita10@gmail.com

Abstract. The purpose of the research was to analyze the yield paddy of red rice and black rice to influence jajar legowo planting system with application of several nitrogen sources. The research was conducted in Binjai, The Province North Sumatera. The method was using Randomized Block Design with two factors and 3 replications, applied in to 4 jajar legowo planting system and 3 nitrogen sources. The results of the research showed that factor jajar legowo planting system does not have significant effect on grain weight per sample and weight of 1000 grains paddy of red rice and black rice. Giving nitrogen sources have significant effect on grain weight per sample paddy of red rice.

1. Introduction

Black rice and red rice has not been a staple food such as white rice, although both colored rice has a high nutritional value. Black rice efficacious increase body resistance to disease, slow aging and antioxidant. Red rice efficacious prevent gastrointestinal disease, vitamin B1 and minerals higher than white rice [1].

The nitrogen content is required for optimal growth varied between 2 and 5% of the dry weight of the plant. When inventories are in sub-optimal conditions, growth retardation, nitrogen moves from the leaves mature and re-do the translocation into new growth areas. Typical symptoms of nitrogen deficiency, as can be seen in the increase aging old leaves [2].

This research aimed to analyze the yield paddy of red rice and black rice to influence jajar legowo planting system with application of several nitrogen sources.

2. Materials and Methods

The research was conducted in Binjai, Province of North Sumatera. The research using Randomized Block Design with two factors. The first factor is planting system (monoculture, parallel, hallway and fence) and the second factor is nitrogen source contain 3 treatments viz: 100% urea, 100% azolla and 50% urea + 50% azolla.
Application nitrogen source are given by spreading around paddy of red rice and black rice according to treatment. The observed variables were grain weight per sample (g) and weight of 1000 grains (g). Data is taken after harvest. The data analyzed statistically was using F-test and then proceed by Duncan Multiple Range Test at 5% level.

3. Results and Discussion

3.1 Grain Weight Per Sample (g)

The nitrogen source significantly affected grain weight per sample of red rice paddy, whereas planting system and the interaction of planting system with nitrogen source did not show any significant difference based on the result of F-Test. Table 1 shows different test of grain weight per sample red rice paddy with planting system and several nitrogen sources.

Nitrogen source with the highest grain weight per sample of red rice paddy were obtained in 50% urea + 50% azolla with 15.00 g, while the lowest of nitrogen source was 100% urea with 7.55 g (Table 1). This shows that nitrogen source of 50% urea + 50% azolla is nitrogen source that response to grain weight per sample of red rice paddy when compared with other nitrogen sources. The use of azolla organic fertilizer can reduce the use of inorganic fertilizers. Azolla can bind free nitrogen from the air so as to conserve the use of urea fertilizer. In addition to acting as an organic material, azolla growing on paddy can suppress weed growth [3].

Planting system did not show significant difference. Planting system has no significant effect on grain weight per sample of red rice paddy. Legowo plant spacing model gives better results, this situation allegedly caused by two things: the number of productive tillers and number of population. The number of productive tillers and number of population are component that greatly affects the overall the yield paddy. If other yield components remain, the more the number of productive tillers and number of population, the higher the yield paddy [4].

Table 1. Grain weight per sample red rice paddy with planting system and several nitrogen sources

| Planting System | Nitrogen Source | Average |
|-----------------|----------------|---------|
|                 | N1 (100% Urea) |                      |
| P1 (monoculture)| 10.30          | 12.81   |
| P2 (parallel)  | 5.60           | 19.02   |
| P3 (hallway)   | 6.94           | 10.71   |
| P4 (fence)     | 7.38           | 15.00 a |

Explanation: The numbers followed by the same letter on the same row is not different significant based on Duncan Multiple Range Test at 5% level.

The planting system, nitrogen sources and the interaction of planting system with nitrogen sources did not show any significant differences affected grain weight per sample of black rice paddy based on the result of F-Test. Table 2 shows different test of grain weight per sample black rice paddy with planting system and several nitrogen sources.

Planting system with the highest grain weight per sample of black rice paddy obtained at planting system fence with 100% urea nitrogen source with 12.08 g, the lowest was planting system monoculture with 50% urea + 50% azolla nitrogen source with 2.42 g (Table 2).
Table 2. Grain weight per sample black rice paddy with planting system and several nitrogen sources

| Planting System | Nitrogen Source |          |          | Average |
|-----------------|-----------------|----------|----------|---------|
|                 | N1 (100% Urea)  | N2 (100% Azolla) | N3 (50% Urea + 50% Azolla) |        |
| P1 (monoculture)| 3,16            | 2,99     | 2,42     | 2,86    |
| P2 (parallel)   | 5,12            | 2,65     | 4,25     | 4,00    |
| P3 (hallway)    | 3,58            | 5,78     | 6,06     | 5,14    |
| P4 (fence)      | 12,08           | 4,42     | 5,91     | 7,47    |
| Average         | 5,99            | 3,96     | 4,66     |         |

Planting system did not show any significant difference. Planting system has no significant effect on grain weight per sample of black rice paddy. Plant spacing will increase the capture of solar radiation by the canopy of paddy, thereby increasing the number of productive tillers, grain weight per panicle and plant dry weight. The number of productive tillers associated with the paddy produced. Small numbers of tillers can decrease the yield paddy because panicles produced very few [5]. Nitrogen source and the interaction of planting system with nitrogen source did not show a significant difference. Nitrogen source has no significant effect on grain weight per sample black rice paddy. N nutrient is a limiting factor on the growth of paddy fields. The yield paddy without N fertilizer under genetic potential, especially if low soil N content. In conditions of low soil N nutrient content, the paddy are very responsive to fertilization [6].

3.2 Weight of 1000 grains (g)

The planting system, nitrogen sources and interaction of planting system with nitrogen sources did not show any significant differences affected weight of 1000 grains of red rice paddy based on the result of F-test. Table 3 shows different test of weight of 1000 grains red rice paddy with planting system and several nitrogen sources. Planting system with the highest weight of 1000 grains of red rice paddy obtained at planting system monoculture with 100% urea nitrogen source with 33.30 g, the lowest was planting system hallway with 100% azolla nitrogen source with 25.90 g (Table 3).

Increase of the yield growth and production paddy were carried out on test the effectiveness of urea fertilizer obtained from N element contained in the urea fertilizer can play a role in supporting the growth of vegetative and generative paddy, so plants grow better, because the nutrients required by plants can be met in accordance with the phases of growth so that the agronomic efficiency can be implemented [7]. Nutrients are an important component for plants especially macro nutrients such as nutrients N, P and K in sufficient quantities and balanced because it can affect plant growth both during vegetative growth phase, as well as the generative phase [8].

Table 3. Weight of 1000 grains red rice paddy with planting system and several nitrogen sources

| Planting System | Nitrogen Source |          |          | Average |
|-----------------|-----------------|----------|----------|---------|
|                 | N1 (100% Urea)  | N2 (100% Azolla) | N3 (50% Urea + 50% Azolla) |        |
| P1 (monoculture)| 33,30           | 31,13    | 29.06    | 31,16   |
| P2 (parallel)   | 27,70           | 27,06    | 29,10    | 27,95   |
| P3 (hallway)    | 30,83           | 25,90    | 30,23    | 28,98   |
| P4 (fence)      | 27,86           | 30,26    | 27,66    | 28,60   |
| Average         | 29,92           | 28,59    | 29,01    |         |

The result of F-test showed that the planting system, nitrogen sources and the interaction of
planting system with nitrogen sources did not show any significant differences affected weight of 1000 grains of black rice paddy. Table 4 shows different test of weight of 1000 grains black rice paddy with planting system and several nitrogen sources.

Table 4. Weight of 1000 grains black rice paddy with planting system and several nitrogen sources

| Planting System | N1 (100% Urea) | N2 (100% Azolla) | N3 (50% Urea + 50% Azolla) | Average |
|-----------------|----------------|-----------------|-----------------------------|---------|
| P1 (monoculture)| 29.63          | 22.56           | 32.03                       | 28.07   |
| P2 (parallel)   | 24.56          | 23.73           | 27.63                       | 25.31   |
| P3 (hallway)    | 25.60          | 24.20           | 28.56                       | 26.12   |
| P4 (fence)      | 23.86          | 24.70           | 22.66                       | 23.74   |
| Average         | 25.91          | 23.80           | 27.72                       |         |

Planting system with the highest weight of 1000 grains of black rice paddy obtained at planting system monoculture with 50% urea + 50% azolla nitrogen source with 32.03 g, the lowest was planting system monoculture with 100% azolla nitrogen source with 22.56 g (Table 4).

Weight of 1000 grains has a great value, which indicates the quality of the seeds and the results are stored assimilates. Weight of 1000 grains that has a low value indicates a lower seed quality. The results available assimilates on seed development will affect grain weight [9]. Jajar legowo planting method potentially increase the yield grain, because in addition to the population is higher than in the way of planting tiles, from plantations is also better orientation in the utilization of solar radiation. In addition, the increase in the yield grain will be more apparent by choosing varieties adaptive, in tightly planting conditions [10].

4. Conclusion

Factor of planting system does not have a significant effect on grain weight per sample and weight of 1000 grains paddy of red rice and black rice. Giving nitrogen sources have a significant effect on grain weight per sample of red rice paddy. Planting system monoculture is the highest planting system in increasing weight of 1000 grains paddy of red rice and black rice. 100% urea and 50% urea + 50% azolla is the best nitrogen source in raising grain weight per sample and weight of 1000 grains paddy of red rice and black rice.

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