Growth test and production of several local upland rice varieties in Gorontalo Province

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Abstract. Gorontalo province is one of the provinces that have a large source of genetic diversity in local rice, especially upland rice. The low productivity and the less available of seed at the farmer level causes a lack of interest in developing upland rice. The main constraints of rice cultivation on these areas are drought and pest and disease attacks. Then the need for the development of local varieties to obtain new superior rice varieties is necessary. The purpose of this study is to look at the potential for growth and production of Gorontalo local rice that can be expected to be used to improve genetic resources that are genotyping amphibians. The research method used a Randomized Block Design in testing three local rice cultivars. Cultivars used were, Maraya, Bukungo, and Ponda. Each treatment was repeated three times resulted in nine experimental units would be obtained. The results show that the Ponda variety showed the highest results compared to other treatments on plant height parameter. Based on LSD tests shows that the number of tillers in each variety is significantly different. Ponda variety shows the highest number of tillers compared to other local rice varieties.

1. Introduction
Food security is the main government program to provide food needs in Indonesia. The program includes adequate and high-quality food availability and tracts. The target of food security program is to increase national rice production so that rice needs can be fulfilled from within the country.

One of the factors that caused the decline in rice production in Indonesia is the occurrence of unpredictable changes of weather. For example, the onset of the dry season is long so there was a crop failure on farmers’ land. One way that can be done to improve the production and productivity of rice is the development of the local rice which has the result of high harvest and good quality. Gorontalo Province is a province that makes the agricultural sector as the mainstay sector that has a wealth of genetic resources in the form of the diversity of upland rice cultivars. Cultivars of local excellence were created conventionally by farmers in the generations through various efforts and instincts in
holding by cultivates natural populations (genetic diversity) to obtain superior characters and adapting to both local agroecology. From the results of interviews with local farmers, it is known that the average productivity of local rice Gorontalo only ranges from 1.3 tons/ha.

Local rice has an important role as a source of germplasm which is an asset of the genetic located in rice breeding. The province of Gorontalo is one of the provinces that have a source of genetic diversity of local rice that many, especially upland rice. Cultivars are scattered in specific various regions and have been cultivated for generations and have adapted to specific environmental conditions. Benny et al. [1] stated that the cultivars of local rice are a very valuable asset if managed well.

The objectives of the research is to study the potential of the local rice in Gorontalo which can be expected to be used for the improvement of genetic resources that are amphibian.

2. Materials and method
The research was set based on the randomized block design with three local cultivars, Maraya, Bokungo, and Ponda as treatment and planted on dry land. Each treatment was repeated three times as many as 15 units of experimental plot. Harvesting was done when the grain has yellowed but is still fresh, indicating that the rice seed is ripe, at the age of 25-30 days since the formation of the grains. The rice was cut using sickles serrations, 30 - 40 cm above the soil surface. Post-harvest was carried out using a thresher following with cleansing in the rice field and drying the grain using blower. The rice grain then milled and stored. The drying was conducted to reduce the water content of rice up to 14%. The observation parameters to be examined were the plant height and the number of tillers.

3. Results and discussion

3.1. Plant height
The average plant height of several Gorontalo rice varieties can be seen in figure 1 below:

Figure 1. Average Plant Height (cm) of Gorontalo Local Upland Rice Age 28, 42, 56, 70, and 84 Days After Sowing (DAS)

Figure 1 shows that increase in plant height is observed in each treatment. The highest plant height of the local Gorontalo upland rice plant at the age of 84 DAS was shown by the Ponda variety (102.81 cm) and was not significantly different. According to Silitonga et al. [2] criteria for rice plants based on the Characterization and Evaluation System of Rice Plants are categorized as short <90 cm,
medium criteria 90-125 cm, and height criteria > 125 cm. From this category, Ponda varieties are classified as rice with medium height [2].

While the lowest local upland rice plant height was the treatment of variety Bokungo V3 (84.90 cm). This is because the Ponda variety is tolerant of extreme environmental conditions such as drought conditions. The red Ponda variety had a 72.5% higher seed percentage compared to other varieties, followed by the Bokungo and Bulotonu varieties that could live in a room without light for 7 days with the percentage of seed damage 2 and 3, so this variety is categorized as a tolerant variety [3]. Apart from that, the various Red Ponda varieties are able to maintain metabolism in normal germs, apart from the limited water available. Genetic composition difference is one of the causes of diversity of crop appearance. The genetic program is expressed in a variety of plant properties that include the form and function of plants that produce diversity [4].

3.2. Number of tillers

The average number of tillers of several Gorontalo rice varieties can be seen in Table 1 at the age of 28 DAS, 56 DAS, 42 DAS, 70 DAS and 84 DAS below:

| Varieties         | 28 DAS | 42 DAS | 56 DAS | 70 DAS | 84 DAS |
|-------------------|--------|--------|--------|--------|--------|
| Ponda Varieties   | 9.07a  | 10.13a | 11.00a | 12.40a | 12.80a |
| Maraya Varieties  | 7.53bc | 8.27bc | 9.13bc | 10.27ab| 10.60ab|
| Bokungo Varieties | 7.00c  | 7.73c  | 8.27c  | 8.87b  | 9.00b  |
| LSD _α = 0.05_    | 1.13   | 1.36   | 1.42   | 2.58   | 2.24   |

Information: Numbers followed by different letters mean that they are significantly different and very significantly different at the levels of _α = 0.05_.

Table 1 explains that the treatment of Ponda variety at the age of 28 DAS and 56 DAS was significantly different from other treatments. At the age of 42 DAS, the treatment of Ponda varieties was very significantly different from other treatments while at the age of 70 DAS and 84 DAS the treatment of the Ponda Variety was significantly different from the treatment of the Bokungo Variety but not significantly different from the Maraya Variety this is because the Ponda variety has better growth compared to other varieties. In addition, the varieties of Ponda is more tolerant of extreme environmental conditions. The red Ponda variety has a higher seed percentage of 72.5% compared to other varieties, followed by Bokungo varieties that can live in a room without light for 7 days with a percentage seed damage 2%, so this variety is categorized as a tolerant variety [3]. Genetic composition difference is one of the causes of diversity of crop appearance.

Ponda variety produce the highest number of tillers compared to the other two upland rice varieties. According to Sarwanto [5], the ability of a plant to produce productive tillers is related to the number of panicles per clump, ie high productive tillers will produce a high number of panicles [5]. In addition, Gardner et al. [6], the number of tillers will be maximal if the plant has good genetic traits coupled with favourable environmental factors or in accordance with plant growth and development [6].

The genetic Program is expressed in a variety of plant properties that include the form and function of plants that produce diversity. On the main stem and the saplings form a clump in the vegetative phase and form panicle in the generative phase [4].
4. Conclusion

This study found that the Ponda variety is a local Gorontalo rice variety that has the potential to be developed into a superior variety of Gorontalo because it has a higher number of tillers and a higher planting height than other varieties.

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