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Abstract. One effort to obtain the superior rice genotypes, namely by selecting several local genotypes of Gogo Rice. This research aims to determine the diversity of components of production and production of some local south East Sulawesi Rice genotypes, the collection Faculty of Agriculture UHO. The planting material used is 8 (eight) local and southeast Sulawesi Rice genotypes. The study used the group's randomized design, comprising 8 (eight) treatments (genotypes) and three repeats. To eight local Gogo Rice genotypes tested are: 1) yellow Loiyo genotypes, 2) White Loiyo genotypes, 3) Waburi-Buri genotypes, 4) Black genotypes, 5) Ngalaru genotypes, 6) of the Ungurunu genotypes, 7) Pae Momea genotypes, and 8) genotypes of Tinangge. The results showed the diversity of harvest age, the number of productive tillers, the amount of content grain, the total amount of grain, harvest index, the weight of 1000 grains, and the production of dried grain harvest from Gogo Rice genotypes in the test. From the eight locally southeast Sulawesi Rice genotypes tested. Two genotypes have high production potentials (on average of Gogo rice production), Ngalaru genotypes, and Tinangge genotypes, with the output of each 4.08 and 3.28 tons ha^{-1}.

1. Introduction

Rice is the primary food source for most of the population in Indonesia [1]. The demand for rice becomes increasingly higher as the population increases [2]. According to [3], an increase in Indonesia's population from 2010 to 2014 reached 1.40%. The availability of rice is quite a problem to concern. This is due to the conversion of agricultural land to non-agricultural land. Also, due to the existence of a long dry season, late planting time, and the economic crisis, which caused rice price increases [4]. One effort to overcome this problem is by expanding the rice planting area on dry land. The increase in national rice production can be cultivated through an extensibility program [5]. The effort that can be made through the program is by planting Gogo rice in non-irrigation land. Gogo Rice able to produce on marginal land that has a low fertility rate and dry climate [6].

Gogo Rice commodities have relatively less attention because the productivity is still relatively low, which averages 3.1 ton ha-1 in the years 2013 and 2014, compared with the productivity of rice paddy field in the same year that averages 4.55 tons ha-1 [3]. Indonesia has dry land of about 148 million ha (78%) and wetlands (wetland) around 40.20 million (22%) of 188.20 million ha total land area in Indonesia. It is a prospect for the development of rice on dry land that is Gogo Rice because the contribution of the Rice Gogo to the national rice production is still relatively low, so the development is still being sought.

Dryland has a small water availability so that the rice planted in dryland should have a nature tolerant of drought. [7] Rice Gogo (Oryza sativa L.) is one of the potential food crops to be developed because, in the coming years, the role of Gogo Rice in the provision of national rice becomes increasingly essential. This is due to the decrease in paddy fields and the indication of the narrowing of wetlands in Indonesia (8,127,264 ha to 8,112,103 ha) in 2012-2013 [3].

The dryland area that has the potential for the development of upland rice (Oryza sativa L.) is Southeast Sulawesi. The area of dryland that can be planted with upland rice in this area reaches 351,424 ha. Dryland area that has been used for upland rice cultivation in Southeast Sulawesi is 6,858 Ha (1.95% of available land) spread across Regencies/Cities, namely Buton, Muna, North Konawe, North Buton, South Konawe, Bombana, BauBau, North Kolaka, Konawe, Konawe Islands, East Kolaka and Wakatobi [8]. Southeast Sulawesi also has local upland rice germplasm that has traditionally been cultivated and cultivated by farmers in various districts [9]. Furthermore, [4] states that superior genotypes as a result of plant breeding activities are one of the critical technologies in increasing rice yield.

At present, the contribution of upland rice to national rice is still relatively low. Due to the limited local superior upland rice seeds, so many farmers still plant local genotypes with low production rates. Also, the lack of seed breeders causes the availability of superior seeds is still limited. The lack of information about local upland rice which has a high diversity of yield potential encourages research on the diversity of yields of some of the Southeast Sulawesi upland rice genotypes that aims to obtain information on genotypes that have high yield ability and is useful as a basis for breeding programs for assembly of new high yielding varieties [10].

2. Methods

This research was carried out in the Field Laboratory and in the Agronomy Unit Laboratory of the Department of Agriculture, Faculty of Agriculture, Halu Oleo University (FP-UHO). The planting material used is the potential upland rice genotype from several regions in Southeast Sulawesi, which was collected at the UHO Faculty of Agriculture.

The study used a randomized block design (RBD). The treatments tested were 8 (eight) Southeast Sulawesi local upland rice genotypes, namely Waburi-Buri, Tinangge, Pae Ndowatu Hitam, Pae Momea, Yellow Loiyo, White Loiyo, Ngalaru, and Ungurunu. Each treatment was repeated 3 (three) times to obtain 24 experimental units. Stages of research in general, namely: land preparation and land management, making beds and labeling, preparing seeds, liming, planting, fertilizing, maintaining, and harvesting.

2.1. Research variable

Observations were conducted against six (6) samples of plants per tile. The observed variables include: 1) flowering Age (Day), 2) Harvest Age (Day), 3) Number of productive tillers (tiller), 4) Number of contents grain per clump (grain), 5) Number of grain per clump (grain), 6) Harvest Index (%).

2.2. Data analysis

The observation data is analyzed using various printing according to the draft used, followed by separation of mean value using Duncan Multiple Range Test (DMRT) method at a 95% trust level.

3. Results and discussion

3.1. Flowering age, harvest age and number of productive tillers

The observation result (table 1) shows the local South East Sulawesi Rice genotypes tested to have a noticeable difference in terms of harvest age and the number of productive tillers.

Table 1. The average age of flowering and harvest age of local gogo rice genotypes.

Treatment	Average		
	(HST)	(HST)	(tillers)
Loiyo Kuning	108.01 a	137.70 bc	3.25 c
Loiyo Putih	116.67 a	159.00 ab	4.67 b
Waburi-buri	116.67 a	160.33 ab	4.14 b
Pae Ndowatu Hitam	117.67 a	165.67 a	2.83 c
Ngalaru	115.33 a	146.67 ab	6.53 a
Ungurunu	105.86 a	133.93 c	2.22 d
Pae Momea	117.33 a	164.33 ab	2.89 c
Tinangge	116.33 a	147.33 ab	6.17 a

The flowering age of Gogo Rice tested is not different, although the genotyping has a faster flowering age is the Ungurunu genotyping with an average flowering time of 105.86 days after planting (HST), and the least flowering genotyping Is the black genotypes Pae Ndowatu 117.67 HST. Genotyping, which has the fastest harvest time, is Ungurunu genotypes with an average of 133.93 HST, although it does not differ in real with the yellow Loiyo genotypes (137.70 HST). Genotyping, which has the most extended harvest age, is the black genotypes Pae Ndowatu 165.67 HST and does not differ in real with the genotypes Pae Momea, Waburi-Buri, Loiyo Kuning, Tinangge, and Ngalaru.

The observation also showed that the most prolific number of productive tillers was produced by Ngalaru genotypes (6.53 tiller), which differed from Tinangge (6.17 tiller). Meanwhile, genotypes that have the lowest amount of productive tillers are Ungurunu genotypes, with an average of 2.22 tillers.

Crop productivity depends on the influence of plant genetic factor interactions with the environment, and management through a physiological process in the form of plant growth [11]. Based on the results of the study (table 1), there is a uniformity in the age of flowering among rice genotypes in the test. Bonat genotyping ungurunu (105.86 HST) and Loiyo Kuning (108.01 HST) is the fastest lifespan flowering of Genotypes. While genotypes that have the average age-old flowering are Pae ndowatu Hitam (117,67 HST). The relatively quick flowering age on Gogo rice is generally better. Because genotypes with relatively fast flowering age will usually also have an increasingly rapid harvest age, and vice versa (Table 1).

Based on the research results, Ungurunu genotypes have the fastest harvest age (133.93 HST), followed by yellow Loiyo genotypes (137.70 HST). While the latest harvest age is the black genotypes Pae Ndowatu Hitam (165.67 HST). The criteria of the harvest age are divided into five, namely inner age, middle age, early maturity, very early maturity, and ultra-early age [12]. The results showed that Gogo Rice genotypes tested to be aged in (Harvest age > 151 HST) until medium-aged (Harvest Age 125-150 HST). This is because the genetic factor [13,14] is also influenced by the environment at the time of research, resulting in the difference between genotyping and the relatively long harvest age. Rainfall at the beginning of the study reaches 485.6 mm decreased at the time of crop growth before flowering up to 141.8 mm. Rainfall is slightly increased to 269.0 mm at the flowering time, which then decreases again at the time of cooking until the harvest is 65.6 mm. This contributes to each genotyping showing different harvest life due to various interactions and adaptations to the environmental situation. Harvest age is one component of the result because the age of harvest becomes a determining component in calculating the harvest intensity or harvest frequency in one year [15].

Productive tillers per clump are determinants of the number of panicles. Thus productive tillers are one of the result components that directly affect the low-yield height of the grain [16]. Panicles are the place where the grain of rice stems, and most of them develop into grains. These spikelets are borne on the primary and secondary branches. A higher number of panicles will produce more rice [17]. Observations (table 1) show that genotyping treatment has a real effect on the number of productive tillers. Ngalaru (6.53 tiller) and Tinangge genotypes (6.17 tiller) produce the highest number of tillers while Ungurunu genotypes (2.22 tiller) has the lowest amount of tillers.

Based on the IRRI classification [18], the tested genotypes have a relatively small number of productive tillers (5-9 seedlings). Furthermore, the difference in the number of saplings produced by each genotyping is caused by the ability of each genotyping to produce different tillers [17]. Climate and rainfall conditions also significantly affect the growth rate of plants, including in producing the number of tillers.

3.2. Number of contents grain per clump, total grain per clump and harvest index

The results of table 2 showed a noticeable difference in the amount of content grain per clump and total grain per clump, and the harvest index in the locally-southeast Sulawesi Rice genotyping was tested. The highest number of contents per clump is shown in the Ngalaru genotypes, with an average of 1444.33 grains. It does not differ from the apparent genotyping (1243.50) and Loiyo Putih (951.22). Genotype Waburi-Buri, Pae Ndowatu Hitam, and Pae Momea have the lowest number of contents grain per clumps of 434.28 grains, 474.94 grains, and 587.78 grains.

Observations of the total number of grain per clumps indicate that Tinangge genotyping is a genotyping that has a total grain amount per clump of an average of 2563.44 grains, which differs not real with Ngalaru (1989.06) and Loiyo Putih (1595.28). While genotypes that have the lowest total grain amount is Ungurunu genotyping with an average of 1007.69 grains per clump, which differs not real with the yellow Loiyo genotyping, Pae Momea, Pae Ndowatu Hitam and Waburi-Buri.

Table 2. The number of content grain, the total amount of grain, and crop index for local gogo rice genotypes Southeast Sulawesi.

Treatment	Average		
	Amount of seeds filled per family (whole grains)	Total number of grains per family (whole grains)	Harvest Index (%)
Loiyo Kuning	717.77 bc	1416.74 bc	33.45 bc
Loiyo Putih	951.22 ab	1595.28 ab	37.76 ab
Waburi-buri	434.28 c	1036.00 bc	25.69 c
Pae Ndowatu Hitam	474,.94 c	1123.33 bc	25.35 c
Ngalaru	1444.33 a	1989.06 ab	50.32 a
Ungurunu	731.68 bc	1007.69 c	37.08 ab
Pae Momea	587.78 c	1193.39 bc	32.48 c
Tinangge	1243.50 ab	2563.44 a	44.80 ab

The harvest index observation shows that Ngalaru genotypes are genotypes with the highest harvest indices of 50.32%, which differ not in the apparent genotypes, Loiyo Putih, and Ungurunu. The lowest harvest index obtained in the black genotypes Pae Ndowatu Hitam, Waburi-Buri, and Pae Momea were respectively 25.35%, 25.69%, and 32.48%.

Based on the observation results (table 2) indicates that genotyping treatment has a very noticeable effect on the amount of content grain per clump. Genotypes that produce the most abundant content grain per clumps are Ngalaru genotypes (1,444 grains) and Tinangge genotypes (1243.50), while the fewest are the Waburi-Buri genotypes (434 grains). The difference in the number of filled grains is caused, apart from differences in environmental conditions and genetic influences, also influenced by genetic interactions with the environment. However, the level of grain content is more influenced by genetic factors, while the influence of the environment is not too significant, among them can be due to abnormal environmental conditions such as disease pests. [19].

Total grain per clump is the sum of the amount of content grain and the amount of empty grain. The observation showed that genotyping treatment was a real effect on the variable amount of total grain per clump. Genotyping Tinangge has a total number of grain per the highest of 2563.44 grains (followed by Ngalaru genotypes: 1989.06 and Loiyo Putih: 1595.28) but also has a high amount of empty grain. The number of hollow grain affects rice yield, the higher the amount of empty grain then the rice production becomes low [20]. Although in this study, Tinangge genotypes had high amounts of empty grain, the output was still included in the height of 3.28 tonnes ha-1. This is probably because the grain/rice grain of the Tinangge genotyping is denser, shown with a weighted 100 grains of the most robust grain (table 3). The same is stated that the sizeable oval-shaped grain will have a higher weight than the round and small-sized grain [21].

Ngalaru genotypes are genotypes with the highest harvest index of 50.32%, although not really differ with Tinangge, White Loiyo, and Ungurunu (table 2). The percentage of harvest index is a comparison of grain weight with weighing the upper part of the plant, so it relates to the weight of dried grain produced. The higher the weight of dry grain, The higher the harvest Index. Based on the results of the observation (table 2), it appears that the treatment of genotyping has a very noticeable effect on the harvest index. The highest harvest index is obtained in Ngalaru genotypes, while the black genotyping Pae Ndowatu has the lowest harvest index. The harvest index is an indicator used to measure the distribution of plant biomass. Therefore, the value of high harvest index is not always obtained from the best vegetative growth because, since the initiation of malai (formation of Malai), there is a build-up of assimilates and increased grain weight, while the experience decreases [22].

The results showed that the value shown in the number of grain per panicles, the amount of fill and hollow, and the weight of 1000 grains in line with the value shown in the Harvest index. The characters needed to increase the potency of 10 percent higher than the potential new type of rice yield, one of which is 50% Harvest index [23]. Further affirmed, that a high harvest index is required for a new type of rice (PTB) [23,24].

3.3. Weight 1000 grains and dried grain production

Table 3. Weight 1000 grains and production of dried grain rice genotype harvest in south East Sulawesi.

Treatment	Observation Variable	
	Weight 1000 item (g)	Dry grain production is harvested (ton ha^{-1})
Loiyo Kuning	21.67 c	1.99 bc
Loiyo Putih	22.34 bc	2.29 ab
Waburi-buri	25.58 ab	1.25 c
Pae Ndowatu Hitam	23.39 bc	1.27 c
Ngalaru	26.88 ab	4.08 a
Ungurunu	27.70 ab	2.16 c
Pae Momea	25.09 ab	1.73 c
Tinangge	29.31 a	3.28 ab

Observations of dried grain production showed that Ngalaru genotyping is the highest production genotyping with an average of 4.08 ton ha-1; the value is not distinct from the Tinangge and Loiyo white genotypes. Although the production of dried rice genotyping Ngalaru crops, not really differ with the output of genotyping Tinangge and Loiyo Putih, the results showed that Ngalaru genotyping is the highest production genotypes with an average of 4.08 ton ha-1.

4. Conclusion

There is a diversity of harvest age, number of productive tillers, amount of grain content, total grain, harvest index, weights 1000 grains, as well as the production of dried grain harvest in the test rice genotypes. Genotyping Ngalaru has the highest output of dried grain Harvest (GKP), 4.08 tons ha-1 followed by Tinangge genotypes (3.28 tons ha-1), and white Loiyo genotypes (2.29 tons ha-1).

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