Testing and Evaluation of Upland Rice Varieties In Sultan Kudarat Province

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Abstract**—** A study was conducted in Senator Ninoy Aquino and Bagumbayan, Sultan Kudarat for six (6) consecutive wet and dry cropping seasons from May 2008 to November 2011 to determine the agronomic and yield characteristics and its reaction to pests and diseases. Results showed that on the average yield of the different upland rice cultivars in six cropping seasons, Kasagpi , Kulaman and Bli outyielded the check with a mean yield of 2717,2675 and 2555 kg/ha, respectively. In terms of the agronomic characteristics, all indigenous varieties exhibited similar characteristics on the average number of productive tillers and filled grains. However in terms of plant height almost all indigenous cultivars were taller and are late maturing as compared to the check (UPL Ri 5, UPL Ri 7 and NSIC varieties). In terms of its reaction to pests and diseases, Kulaman cultivars were severely damaged with rice blast during dry season

Keywords**—** Maturity, productive tillers, upland rice, cultivar**.**

I. Introduction

HISTORICALLY, farmers play an important role in the development of crops. The first breeders were the farmers who domesticated wild plants that resulted to the cultivated crops being grown today like upland rice.

Upland rice is noted for its quality and aromatic flavor which is highly demanded as source of carbohydrates specifically for the Filipinos. This is usually served during special occasions where family and friends dine in together. Demands of these varieties are high in the market and commands higher price as compared to the lowland rice varieties. In spite of this situation, rarely we can see farmers planting the said cultivars due to limited or unavailable seed supply coupled with its susceptibility to pests and diseases and high production cost.

With only few approved released varieties available to farmers, they continue to select new varieties/cultivars that will suit to their needs and preferences that can adapt to local conditions.

With the desire to increase and sustain rice production in the country, there is a need to continuously develop new and improved upland rice cultivars. However, before a new upland rice cultivar is recommended to the farmers for commercial planting, there is a need to conduct multi-location season trials in order to determine their yield potentials and its reaction to pest and diseases. It is on this premise that this study was conducted to collect available seeds from the farmers in the province and in the neighboring provinces and to test its adaptability through performance evaluation in terms of its agronomic characteristics and yielding ability. High performing and high yielding varieties will be screened further to test its resistance to pest and diseases. Results of this study will be made as one of the bases in deciding what upland rice cultivars is suitable in the province of Sultan Kudarat

Objectives

1. To determine the agronomic characteristics and yielding ability of different upland rice varieties collected in the province of Sultan Kudarat
2. To evaluate the field reaction of the different upland rice varieties to major rice pest and diseases
3. To mass produce selected lines/varieties for commercial production

II. Review Of Related Literature

A research-farmer managed trial was constructed in highland area of Cotabato provinces from April to August 1995. Three Farmer cooperators were requested to set aside 5,000sqm used to test the different upland rice varieties. Six upland rice varieties were superimposed in the farmer field. Among the different varieties tested, UPL Ri-7 has the highest yield of 3.83 tons per hectare followed by PSB RC-I, UPL Ri-S1, C4-68g, C4-137 and BPI-76 with a mean of 3.67, 3.56, 3.52, 3.40 tons per hectare respectively. The harvest was obtained by Dinorado farmers variety with a mean of 1.82 tons per hectare.

Nine upland rice selection, one Philippine seed board (PSB) upland rice variety and a popularity grown farmers variety were evaluated for adaptation quality in acid upland areas of cavity, Iloilo, Negros Occidental and Bukidnon with varying degrees of acidity. Adaptation trials aimed to evaluate cultivars in terms of higher yield, more tolerance to acidity and other associated soil disorders, resistance to pest and comparable grain qualities with the currently grown rice cultivars in the area. Only the selection IR 3880-2-3 ad IR 2979-24-1 (brown) obtained higher mean yield than the check variety IR3880-2-3 yielded more than 2,000kg/ha or 86%.

Upland rice refers to rice grown both in levels and stopping fields that are bounded and depend in rainfall for moisture (De Datta, 1975). Likewise shifting cultivation hill paddy, dry land rice and direct sewn upland are term that are describe Upland

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rice which is grown entirely as rain fed, well drained-non paddled and non-irrigated crops (grist 1975) observed that the land rice varieties grown in the tropic are characterized with rapid emergence from the sort following direct sowing, vigorous seedling growth enabling the crop to complete with weeds, low to medium lettering, insensitivity or weak sensitivity to photoperiod and maturation period ranging from 100 to 125 days.

Mackensize et al (1980) as cited by Ortuoste (1993) rice characteristics are controlled by single mutagens or induced imitation an affected tool for improving specific of existing cultivars particularly, plant height, maturity and certain grain character.

Moorman, as cited by a Datta (1975) noted a positive correlation of ground water and growth of upland rice. He observed that the surface soil with medium to sandy texture overlying and subsoil of their texture are often considered best of upland rice. In the same manner, Abifarin et al, as cited by Clarete (1978) reported that in West Africa- upland rice most successful on soil with higher water retention capacity.

Reuben and Katuli (1978) as cited by Ortuoste (1993) evaluated 12 upland rice lines from various research centers. Each line was direct sown at 20 x 20 cm spacing in the field under rain fed condition during the 1987 cropping season in randomized complete block design with three replications. The overall yield which range from 1.8 t/ha. to 0.3 t/ha. yielded local check Supa. The low yield was attributed to drought, particularly during the productive stage between booting and grain filling.

III. Review Of Related Literature

The materials used in this study were as follows: eighteen (18) upland rice seeds, herbicides, pesticides, knapsack sprayer, fertilizer, tiebox, meter stick, record book, and tape measure.

This study was carried out in a randomized complete block design with the 18 upland rice cultivars as treatments replicated three times. The procedure used in this study were the following.

1. Collection
2. Evaluation
3. Purification
4. Seed multiplication and production
5. Seed distribution

IV. Results And Discussion

Plant Height (cm)

Fig. 1 showed that the different rice cultivars exhibited significant difference in plant height. Among the upland rice cultivars tested, Dinarado 3 was found out to be the tallest (150.00 cm). Lagani and Dinorado2 cultivars obtained a plant height with a means of 148.00 and 136.00 cm. The NSIC-9 and Dinorado 1 obtained the third and second shortest upland rice cultivars tested. UPL Ri-7 cultivar was significantly the shortest among the cultivars used (85.00 cm). These differences in height could be attributed to the varietal characteristics of the crops planted.

Productive Tillers/hill

The number of productive tillers Fig. 2 mostly of all cultivars tested range from 10-12 productive tillers per hill. Only UPL Ri-5 got the lowest productive tillers produced 9.0/hill.

Panicle Length (cm)

The longest length among the cultivars tested was observed in cultivars Kiling with a mean of 32.00 cm, followed by Binilaan and Kasagpi obtained similar length with a mean of 31.00 cm. While the NSIC-11 got the shortest length with a mean of 20.00 cm.

Filled Grains/Panicle

The Bli cultivars was found out an obtained the highest number of filled grains per panicle with a mean of 98, followed by Kotibos and Kasagpi with a mean of 97 and 96 filled grains per panicle respectively. While the lowest number of filled grains per panicle was observed in UPL Ri-5 with a mean of 83.

Number of Days to Maturity (DAS)

The different upland rice cultivars exhibited highly significant differences on the number of days to maturity from sowing (Fig. 5). The Kulaman, Dinorado 3, Binilaan, Kasagpi, Kulod and Kiling cultivars were found to be late to mature with the means range from 122- 126 days. Bli, Kotibos, Lagani, Malan, Dinorado 2, NSIC-9, UPL Ri-5, UPL Ri-5, Koronadal, and Ungi belong to early maturing range from 109-119 days. The Dinorado 1 and NSIC 11 were found to be the very early maturing cultivars among the entries tested with a means of 96 and 105 days.

The result implies that these differences could be attributed to the agronomic characteristics and to the climate adaptability of different upland rice cultivars to the local condition and also to the fertility of the soil.

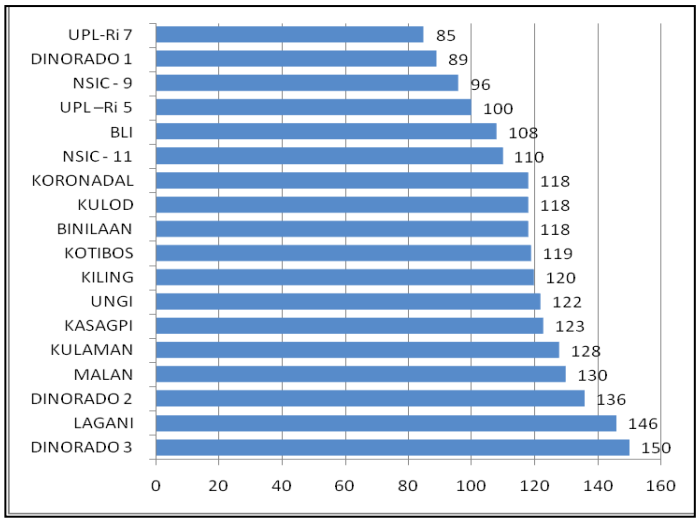

Fig.1 Plant height of Upland rice Cultivars in Sultan Kudarat Province

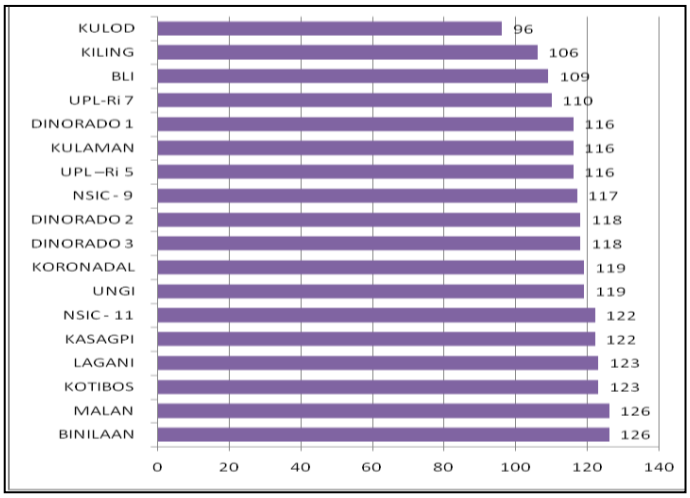

Fig.2 Productive Tillers of Upland rice Cultivars in Sultan Kudarat Province

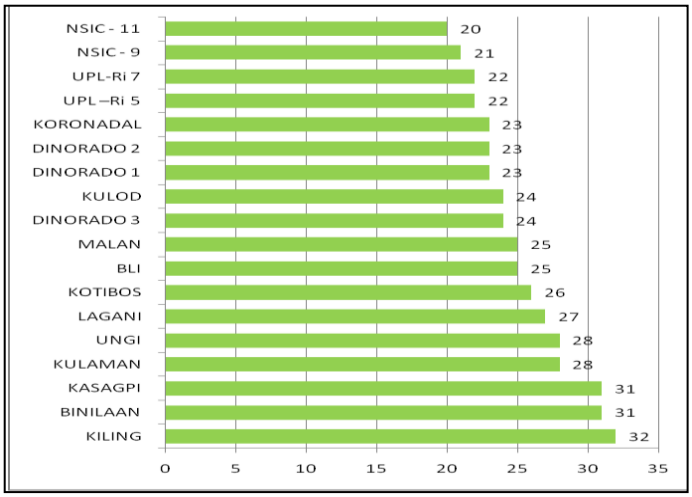

Fig.3 Panicle Length of Upland rice Cultivars in Sultan Kudarat Province

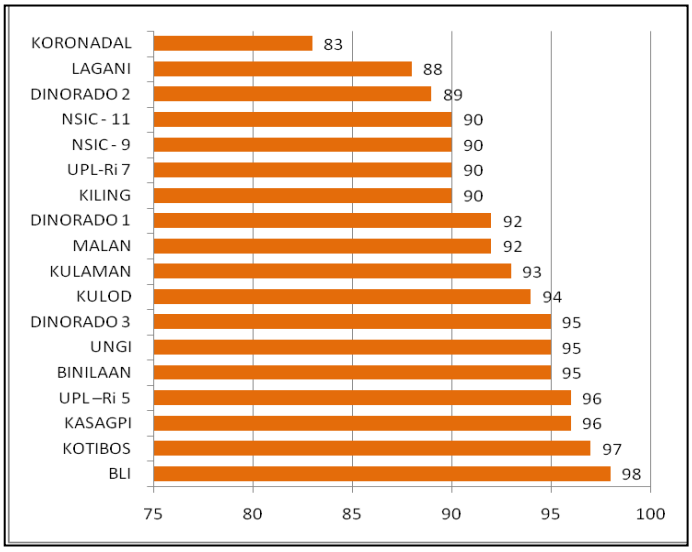

Fig.4 Filled Grains/Panicle of Upland rice Cultivars in Sultan Kudarat Province

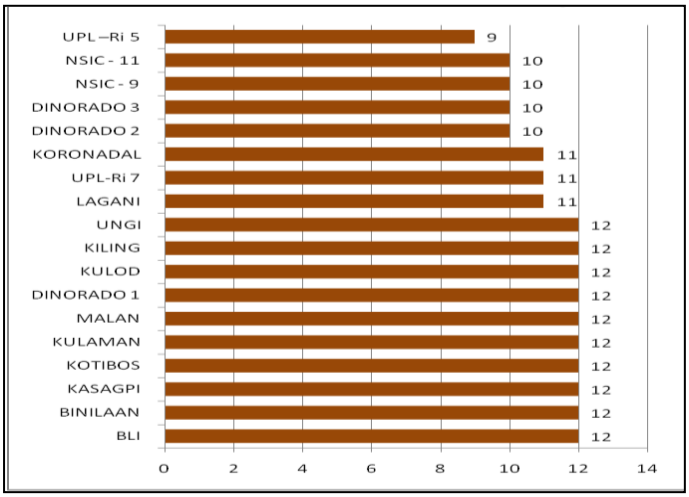

Fig.5 Maturity (DAS) of Upland rice Cultivars in Sultan Kudarat Province

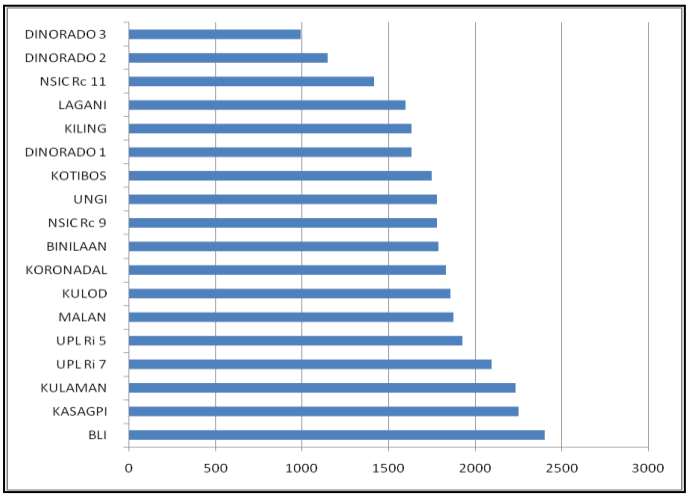

Fig.6 Grain yield (kg/ha) of upland rice cultivars/entries for wet season across locations in Sultan Kudarat Province

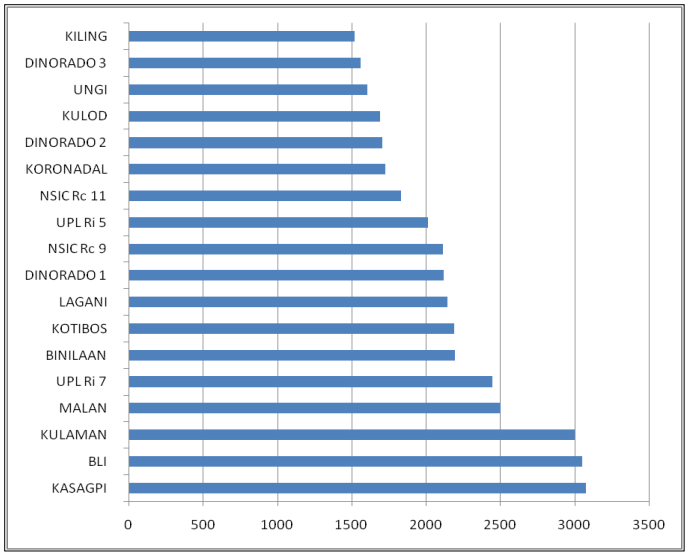

Fig.7 Grain yield (kg/ha) of upland rice cultivars/entries for dry seasons across locations in Sultan Kudarat Province

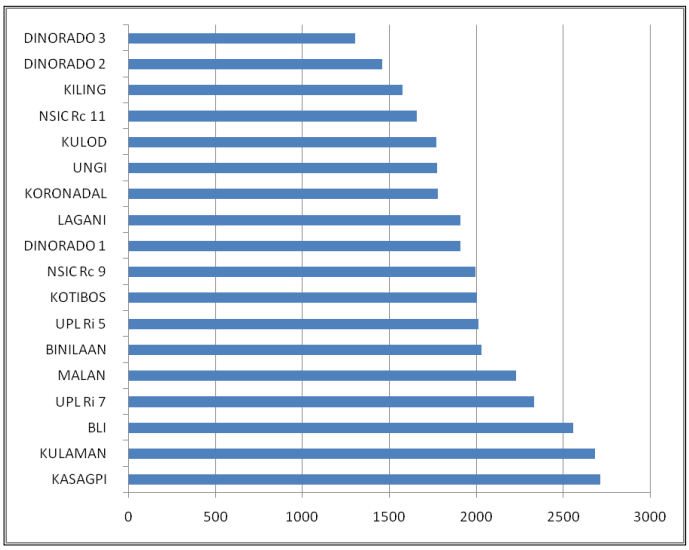

Fig.8 Average Grain yield (kg/ha) of upland rice cultivars/entries for dry(3) & wet(3) seasons across locations in Sultan Kudarat Province

Pest and Disease Reaction

The pest and disease reaction of different upland rice cultivars it was found out that during wet season stem borer and leaf folder were observed in some cultivars (Intermediate). While in the dry season rice blast and leaf folder were damage in some cultivars (Intermediate). Only the NSIC-11 varieties got severe damage in rice blast (susceptible) during dry season.

TABLE I
PEST AND DISEASE REACTION OF UPLAND RICE CULTIVARS/ENTRIES PLANTED DURING WET AND DRY SEASON, CY 2007-2011`

ENTRIES	WET SEASON*				DRY SEASON*			
	Stem borer	Leaf folder	Rice blast	Leaf spot	Stem borer	Leaf folder	Rice blast	Leaf spot
1. BLI	MR	I	R	R	R	I	I	R
2. BINILAAN	I	I	R	R	R	I	I	R
3. KASAGPI	MR	I	R	R	R	I	R	R
4. KOTIBOS	I	MR	R	R	R	I	R	MR
5. KULAMAN	MR	I	R	R	I	I	R	I
6 LAGANI	I	I	R	R	I	I	R	MR
7. MALAN	I	I	R	R	R	I	I	R
8. DINORADO 1	I	MR	R	R	R	R	I	I
9. DINORADO 2	I	I	R	R	R	R	I	I
	WET SEASON*				DRY SEASON*			
ENTRIES	Stem borer	Leaf folder	Rice blast	Leaf spot	Stem borer	Leaf folder	Rice blast	Leaf spot
10.DINORADO 3	I	I	R	MR	I	I	R	R
11. NSIC Rc 9	I	I	MR	MR	I	R	R	I
12. NSIC Rc11	I	I	MR	MR	MR	R	S	R
13. UPL Ri 5	I	I	R	R	I	I	I	R
14. UPL Ri 7	I	I	R	R	I	R	R	I
15. KULOD	MR	I	R	R	R	MR	MR	R
16.KORONADAL	MR	MR	R	R	R	R	MR	I
17. KILING	MR	MR	R	R	R	R	MR	R
18. UNGI	MR	MR	R	I	R	R	MR	R

*R – Resistant; MR – Moderately Resistant; I – Intermediate

Grain Yield (kg/ha)

The different upland rice cultivars exhibited differences on grain yield as shown in table 2. It was found out that the top yielder among the 18 entries were Kasagpi, Kulaman, Bli UPL Ri 7 Malan and Binilaan with a means of 2712, 2679,2555,2333,2227 and 2022 kg/ha respectively. The increase in yield was principally attributed to the number of grains per panicle, number of productive tillers, varietal yielding capabilities and also to the growth performance of every cultivar tested.

TABLE II
GRAIN YIELD (KG/HA) OF UPLAND RICE CULTIVARS/ENTRIES FOR 6 CROPPING SEASONS ACROSS LOCATIONS IN SULTAN KUDARAT PROVINCE

ENTRIES	PLANTING SCHEDULE (MONTH/YEAR)						
	May to Oct, 2008	Nov to April, 2009	Jun to Oct 2009	Dec to Apr 2010	Jun to Oct 2010	June-Nov.2011	AVERAGE (kg/ha)
1. BLI	2660	4008	3360	2750	1180	2394	2555
2. BINILAAN	1530	3110	2690	1675	1135	1808	2028
3. KASAGPI	2180	4120	3550	2690	1020	2417	2712
4. KOTIBOS	1630	2840	2280	1930	1330	1796	2002
5. KULAMAN	2840	4060	2940	2640	915	2307	2679
6. LAGANI	1830	2700	2175	2050	780	1685	1907
7. MALAN	2030	3360	2360	2160	1225	1982	2227
8. DINORADO 1	1830	2570	2290	2080	780	1705	1910
9. DINORADO 2	945	2790	1840	1055	660	1276	1458
10. DINORADO 3	760	2380	1680	1160	535	1147	1303
11. NSIC Rc 9	2030	2350	2450	2285	860	1709	1995
12. NSIC Rc 11	1250	2660	2240	1375	755	1466	1656
13. UPL Ri 5	2680	2230	2170	2050	930	1758	2012
14 UPL Ri 7	2680	2950	2580	2430	1025	1955	2333
15. KULOD	2550	2260	1930	1875	1090	945	1770
16. KORONADAL	2155	2390	2360	1920	975	877	1779
17. KILING	1780	2025	1990	1635	1120	900	1575
18. UNGI	1930	2175	2150	1730-	1255	915	1775

Fig. 9 showed that the highest milling recovery was observed in cultivars Kasagpi with a mean of 62.43 Kg followed by UPLR1-7 (check(with a mean of 62.33 Kg. while the Bli, Kulaman and Malan got a mean of 61.67, 61.23 and 60.80 kgs respectively.

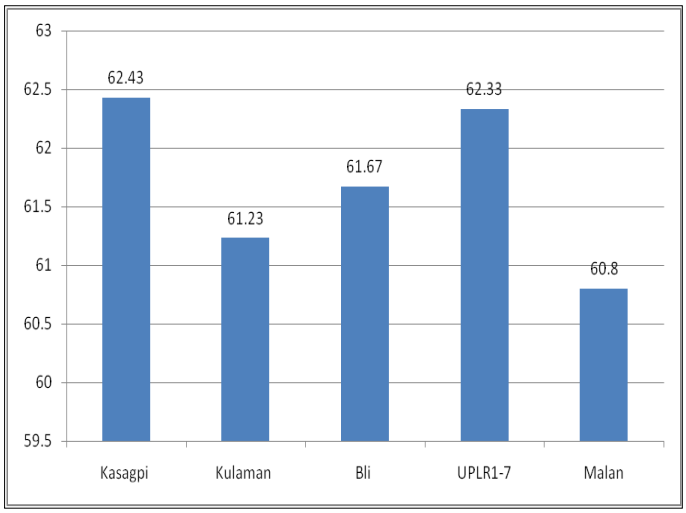

Fig. 9 Milling Recovery (kg) of top yielding upland rice cultivars in Sultan Kudarat Province

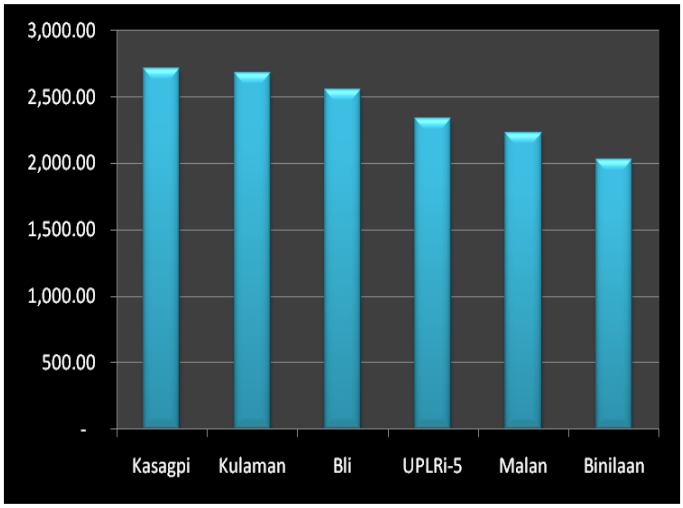

Fig. 10 Average grain yield (kg/ha) of the top six high yielding upland cultivars for 6cropping seasons across locations in Sultan Kudarat

IV. Summary And Conclusion

The result of the study can be summarized as follows:

1. Indigenous rice cultivars were observed to be taller than check varieties.
2. Productive tillers ranged from 9-12 tillers/hill for wet season and 9-12 tillers per hill during dry season.
3. Majority of indigenous upland rice cultivars obtained longer panicle length compared to check varieties.
4. Bli and Kasagpi cultivars exhibited the most number of filled grains with a mean of 98-96 filled grains per panicle. The lowest were observed from UPL Ri -5 (check) with a mean of 83 filled grains per panicle.
5. Most of the indigeneous cultivars were found to be late maturing (120-128 DAS) while the check are early maturing (95- 116 DAS).
6. In terms of yielding ability, KASAGPI, Kulaman and Bli gave the highest grain yield with a mean of 2712, 2679 and 2555 kg/ha .
7. Field infestation of stem borers and leaf folders was observed during wet season while rice blast infestation was dominant in the area during dry season.

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