BIBLIOGRAPHY

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ABSTRACT

Ten different varieties of traditional rice were evaluated to identify the varieties with the highest yield and resistance to pest and determine the economic benefit of growing traditional rice varieties.

Based on the results, *Bayag*, *Balisanga*, *Burik*, *Pulot*, *Raminad* and *Talabtab* are the highest yielders while all the varieties were resistant to blast and stem borer. *Bayag* also was the most profitable among the ten varieties evaluated.

TABLE OF CONTENTS

INTRODUCTION

Traditional rice are varieties that have not undergone improvement in formal breeding and research institutions (CECAP and PhilRice). These varieties are grown in the highland areas for 6-7 months, leaving one cropping a year. Low tillering, awned grains, and tall stalks characterize these rice varieties.

There are constraints to the production of rice in Benguet. Some of those constraints are low temperature in the high altitude areas, small average landholdings ranging from 0.15 to 0.25 hectares, and pest infestation (e.g., rodents and birds). There is also a high cost of and inaccessibility to farm inputs due to access condition of the area (CECAP, 2000).

Inspite of these constraints and introduction of hybrid rice, farmers still prefer traditional rice and desire to preserve it.

In the Cordillera region, several traditional rice varieties are grown in addition to the commercial rice supplied by the lowland producers (Olat, 2003).

Kapangan, a municipality in Benguet, produce traditional rice due to its aroma, good eating quality, minimum inputs and management, adaptability to the locality, and stable yield. In addition, there is a great advantage of eating traditional rice over imported ones since native rice are highly nutritious and usually grown organically (Quinio, 2004).

Thus, because of the potential benefits of these varieties, characterization and evaluation should be done. It is also necessary to identify varieties adaptable to Kapangan with its mountainous terrain and cool temperature.

The study aims to:

1. determine the growth and yield of ten traditional rice varieties;
2. identify the variety with the highest yield and resistance to pest; and
3. determine the economic benefit of growing traditional rice varieties.

The study was conducted at Beling Bilis, Kapangan, Benguet from August 2009 to February 2010.

REVIEW OF LITERATURE

Characteristics of Traditional Rice Varieties

CECAP and PhilRice (2000) as cited by Gamsawen (2006), enumerated some characteristics of traditional rice varieties grown in Cordillera as those with low fertility, awned grains, tall stalks and late maturing.

PhilRice (2001) stated that traditional rice varieties are mostly 160-200cm in height with droopy leaves, photoperiodic meaning their growth duration varies depending on the month they are planted, low yielding, late maturing, and less responsive to nitrogen fertilizer. They are good sources of resistance and quality traits. These varieties also endure environments such as submerged region and in areas with low soil fertility.

Varietal Evaluation

Salcedo (2002) found that among the ten rice cultivars evaluated, the result showed that the Imbannig, In-Lammahan and Imbuucan as to the number of days from transplanting to tillerring were the longest to produce tiller with a mean of 21.62. 21.33 and 21.00 respectively; however, Matinkan was the earliest to produce among the cultivars with a mean of 17.33.

From the evaluation of five different varieties of Kintoman (aromatic) rice, it shows that all varieties of kintoman performed well and were adopted at La, Trinidad, Benguet however, kintoman is highly recommended as shown by early maturity, and at the same time it gives the highest yield per hectare at a mean of 1,895.83 kg (Atin, 2002).

Effect of Pest and Diseases

CECAP and Phil Rice (2000) stated that rat problems have always existed along with rice production in the Philippines. In the Cordillera, farmers consider rats to be the number one problem, together with rice birds, golden snail (kuhol) and rice bugs.

Harvesting, threshing, and drying

PCARRD (2001) as cited by Gamsawen (2006) stated that harvesting and its related handling operation are significant points in pest production sequence where losses can be incurred.

Threshing is the process of detaching or separating rice grains from the panicle. Its timing, availability, and efficiency greatly affects the quality of the grains produced (PCARRD, 2001). Threshing is usually done at least one day after harvest to allow the panicle to be readily threshed. Another important post harvest of rice before storage is drying up to 14% moisture content. This is done purposely to lower the moisture content of a newly threshed palay with the aim of reducing its susceptibility to mold infestation, prevent sprouting, prolong its shelf life and at the same time preserve its quality.

Functional Properties and Nutritional
Composition of Traditional Rice

Some landraces in the Philippines have protein content up to 14%, the average protein content of HYVs is 6-11%. Commercial varieties of rice usually contain about 2 mg/kg of iron, certain colored traditional rice in Philippines have 63.5 mg/kg iron. Some highly-colored rice landrces in the Philippines and Malaysia can contribute most, but not all, of a person's daily requirement of vitamin A precursors (Uphoff, 2008).

Brown or rough rice reduces blood cholesterol and decreases urinary calcium for people prone to kidney disorder (Javier, 2001). It contains vitamin B and dietary fibers that helps prevents cancer and an effective laxative.

MATERIALS AND METHODS

Seedbed and Land Preparation

An area of 150 square meters was cleaned and prepared (Figure 1). Each plot had a measurement of 1x5meters. Each variety was sown separately on each seedbed to avoid mixtures. Necessary labels were placed on each seedbed for easy identification.

Lay-outing and Transplanting

Following the Randomized Complete Block Design (RCBD), rice seedlings were transplanted on the designated plot and replicated three times. Two to three seedlings per hill for each ten varieties was planted on straight lines using 20cmx20cm spacing at both ways.

The ten varieties tested were as follows:

Variety	Place of Collection
Balisanga	Palina, Kibungan
Suyaaw	Gadang, kapangan
Bayag	Ballay, Sablan
Pulot	Poblacion,Bakun
Botalga	Poblacion, kibungan
Burik	Duacan
Makaneneng	Palina, Kibungan
Raminad	Naguey, atok
Talabtab	Poblacion, kibungan
Tawataw	Bedbed, mankayan

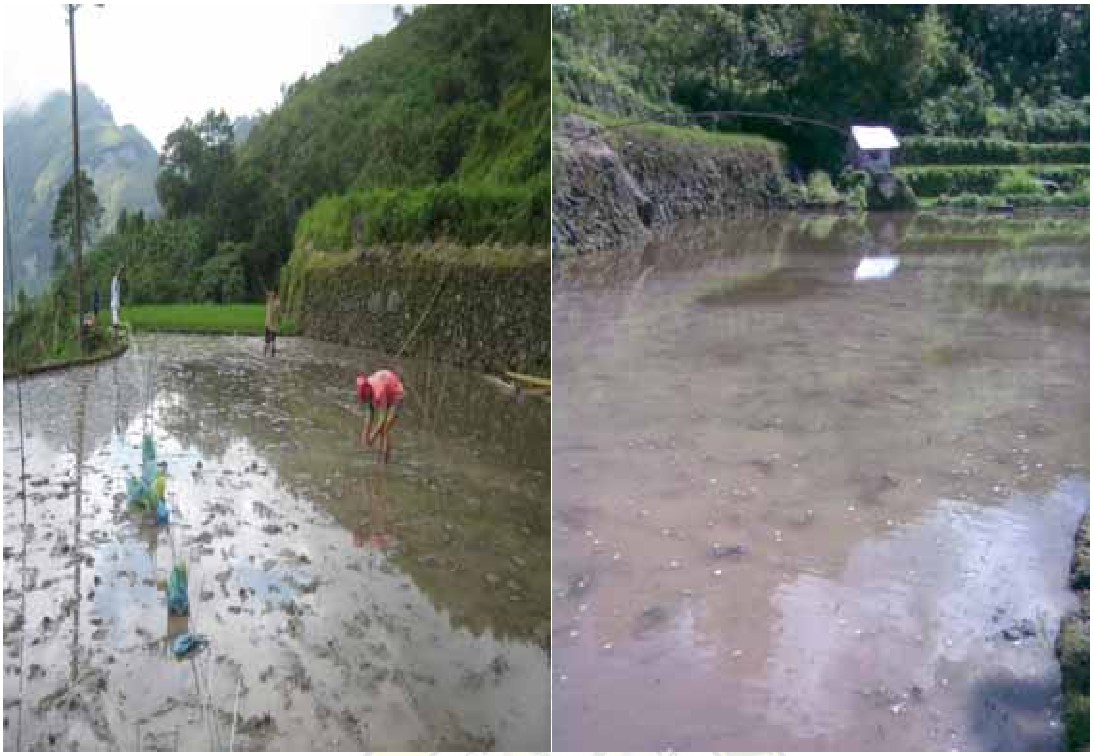

Figure 1. Overview of the experimental area

Data Gathered

A. Soil Chemical Properties. Soil samples were taken from the experimental area before and right after harvest to determine the pH, organic matter, nitrogen, phosphorous, and potassium content of the soil.

B. Agronomic Characters

1. Plant vigor. This was taken before transplanting using the following scale:

Scale	Description	Remarks
1	Majority of the seedlings have 5 or more leaves with 2-3 tillers	Very vigorous
2	Majority of the seedlings have 1-5 leaves with 1-2 tillers	Vigorous

Scale	Description	Remarks
3	Most of the seedlings have 4 leaves without tillers	Normal
4	Most of the seedlings have 3-4 leaves without tillers	Weak
5	Most of the seedlings turned yellow and thin	Very weak

2. Seedling height (cm). This was measured from the base of the shoot to the tip of the tallest leaf blade.

Scale	Remarks
1	Short (<30 cm)
2	Intermediate (~45 cm)
3	Tall (>60 cm)

3. Number of days from planting to tillering. This was taken when 50% of the plants produced heads as observed.

4. Number of tillers produced. The number of tillers were counted just before booting using ten hills per treatment.

5. Number of productive tillers per hill. The number of productive tillers were counted using 10 hills per treatment selected randomly. Only the plants which produced panicles will be considered productive.

6. Number of days from transplanting to booting. This was taken when 50% of the total plants in a plot booted as shown by the swelling of the upper flag leaf sheath.

7. Number of days from heading to heading to ripening. This was taken when at least 80% of the plants had their panicle turn in yellow.

8. Panicle exertion. This was observed as the extent to which the panicle is exerted above the flag leaf sheath at near maturity.

Scale	Description
1	Enclosed (panicle is partly or entirely enclosed within the leaf sheath of the flag leaf blade)
2	Partly exerted (panicle base is slightly beneath the collar of the flag leaf blade)
3	Just exerted (panicles base coincides with the collar of the flag leaf blade)
4	Moderately well exerted (panicle base is above the collar of the flag leaf blade)
5	Well exerted (panicle base appears as well above the collar of the flag leaf blade)

9. Number of filled and unfilled grains per panicle. This was recorded by counting the numbers of filled and unfilled grains at heading.

10. Height at maturity (cm). This was measured from the base of the plant to the tip at harvesting using ten samples per plot selected randomly.

D. Pest and Disease Incidence

1. Stem borer damage evaluation. Field rating was based on actual number of panicles affected. Ten sample hills were selected at random where white heads will be counted ten days before harvest. The following standard scale was used:

Scale	Description	Rating
1	1- 5 white heads	Resistant
2	6 – 10 white heads	Moderately resistant

Scale	Description	Rating
3	11- 15 white heads	Intermediate
4	16 – 25 white heads	Moderately susceptible
5	26 – above white heads	Susceptible

2. Blast resistance (neck rot). Evaluation of the severity of rice blast was taken from the plant at the center rows. Ten sample hills were sampled randomly. Computation on percent infection was done using the formula (Phil Rice, 1996):

$$\% \text{ infection} = \frac{\text{No. of Panicle Infected}}{\text{Total Number of Panicle}} \times 100$$

Scale	Description	Rating
1	0-5%	Resistant
2	6-25%	Intermediate
3	26-% above	Susceptible

D. Yield and Yield Components

1. Yield per plot (kg). Grain yield per plot was taken after threshing and drying at 14% moisture content (MC) then weighed.

2. 1000 – grain weight (g). Random samples of 1000 well-developed, whole grains, dried to 13% moisture content were weighed on a sensitive balance.

3. Computed yield per hectare. This was taken by converting grain yield per treatment into yield per hectare using the following ratio and proportion:

$$\text{Yield/ha} = \frac{\text{Yield per plot (kg)}}{\text{Plot size}} \text{ X } \frac{x}{\text{1 Hectare (10,000 sq. m)}}$$

E. Cost and Return Analysis

1. ROCE. This was the actual expenses during the conduct of the study and computed using the formula:

$$\text{Return on cash expense (ROCE)} = \frac{\text{Net Income}}{\text{Total cost production}} \times 100$$

Data Analysis

All results were analyzed using Analysis of Variance (ANOVA) for Randomized Complete Block Design (RCBD). The significance of difference among treatment means will be treated using Duncan's Multiple Range Test (DMRT) at 5% level of significance.

RESULTS AND DISCUSSION

Soil Chemical Properties

Soil pH. A slight change in the soil pH is observed before planting and after harvesting (Table 1).The soil pH before planting and after harvesting which was 6.02 and 6.01 respectively, favors the growth of rice since the pH range for rice is 4.5-7.5 (Martin and Leonard, 1970).

Organic matter and nitrogen. Table 1 shows that the percent soil organic matter before planting was 1.50 %. It was observed that the amount of organic matter and nitrogen in the soil before planting and after harvesting remained the same because of the presence of azolla. Alam (2004) stated that azolla can be a potential source of nitrogen due to its N-fixing capacity. Thus, instead of utilizing the residual nutrients, the rice plants might have used the Nitrogen released by the azolla plant.

Phosphorus. The phosphorus content of the soil deceased from 29 to 15 ppm. The decrease in phosphorus could be attributed to none application of fertilizer and utilization of residual P in the soil by the plants.

Table 1. The soil pH, organic matter, nitrogen, phosphorus, and potassium before planting and after harvest

	pH	OM (%)	N (%)	P (ppm)	K (ppm)
Before planting	6.02	1.50	0.175	29	118
After harvest	6.01	1.50	0.175	15	98

Source: Department of Agriculture, Soils Laboratory, Pacdal, Baguio City

Potassium. As shown in Table 1, there was decrease in the soil potassium content from 118 to 98 ppm. The soil potassium may have been utilized by the plants during grain development.

Number of Days from Transplanting to Tillering

The number of days from transplanting to tillering is shown in Table 2. Results show that there is no significant difference on the number of days from transplanting to tillering of the ten traditional rice varieties. *Suyaaw* was the earliest to produce tillers followed by *Balisanga* and *Bayag*. *Makaneneng* was the latest to produce tillers in 77 days.

Number of Days from Transplanting to Booting

No significant differences were observed on the number of days from transplanting to booting of the different traditional rice varieties (Table 2). *Botalga* was the earliest to boot at 84 days followed by *Tawataw* at 85 days.

Early booting could mean earlier maturity which may be attributed to the genetic make-up and adaptability of the variety to the area.

Number of Days from Heading to Ripening

Table 2 shows that there were no significant differences on the number of days from heading to ripening of the traditional rice varieties. *Bayag* and *Tawataw* were the earliest to ripen in 25 and 27 days, respictively. *Pulot* and *Raminad* were the latest to ripen.

Table 2. Number of days from transplanting to tillering and booting and heading to ripening

	NUMBER OF DAYS FROM		
VARIETY	TRANSPLANTING	TRANSPLANTING	HEADING TO

	TO TILLERING	TO BOOTING	RIPENING
Bayag	71	86	25
Balisanga	71	89	29
Botalga	76	84	28
Burik	72	89	28
Makaneneng	77	88	28
Pulot	74	89	33
Raminad	72	88	31
Talabtab	72	88	28
Tawataw	72	85	27
Suyaaw	69	85	29
CV(%)	4.62	2.91	8.16

Number of Total and Productive Tillers

Table 3 shows that there were no significant differences on the number of total and productive tillers produced by the ten traditional rice varieties. *Bayag* had the highest number of total tillers produced while *Talabtab* had the highest number of productive tillers produced. More produvtive tillers may mean higher yield.

Vergara (1992) mentioned that plants produced more tillers during wet season than during the dry season. Rice plants also grow faster at warmer temperatures.

Table 3. Number of total and productive tillers of the traditional rice verieties

	NUMBER

VARIETY	TOTAL TILLERS	PRODUCTIVE TILLERS
Bayag	18	11
Balisanga	11	8
Botalga	11	7
Burik	11	7
Makaneneng	11	6
Pulot	15	9
Raminad	15	9
Talabtab	15	12
Tawataw	15	7
Suyaaw	12	8
CV (%)	24.13	26.48

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Panicle Exertion

All the rice varieties had well exerted panicles which implies that the plants have longer panicles.

Height at Maturity

No significant differences were observed on the height at maturity of the traditional rice varieties (Table 4). *Raminad* was the tallest with a height of 95.67 cm followed by *Makaneneng* and *Botalga.* The shortest variety was *Tawataw* with a height of 85.33 cm.

Table 4. Height at maturity of traditional rice varieties

VARIETY	HEIGHT AT MATURITY (cm)

Bayag	89.00
Balisanga	91.67
Botalga	92.00
Burik	89.67
Makaneneng	92.67
Pulot	82.33
Raminad	95.67
Talabtab	90.67
Tawataw	85.33
Suyaaw	88.33
CV (%)	6.09

PhilRice (2001) stated that traditional rice are mostly tall with droopy leaves and are late maturing. Furthermore, Vergara (1992) stated that reduced plant height is the most important factor to increase the grain yield potential of rice. Shorter plants can take up more nitrogen fertilizer without lodging, resulting in higher grain yields.

Number of Filled and Unfilled Grains per Panicle

No significant differences were observed on the number of filled and unfilled grains per panicle of the traditional rice varieties (Table 5). Among the ten varieties, it

Table 5. The number of filled and unfilled grains of traditional rice varieties

	NUMBER OF GRAINS PER PANICLE	
VARIETY	FILLED	UNFILLED

Bayag	87	10
Balisanga	101	22
Botalga	101	21
Burik	82	22
Makaneneng	97	23
Pulot	91	17
Raminad	93	25
Talabtab	96	22
Tawataw	132	12
Suyaaw	89	14
CV (%)	22.28	37.37

was observed that *Tawataw* had the highest number of filled grains per panicle (133) while the other varieties had filled grains ranging from 83 to 102. It was also noted that *Bayag* had the lowest number of unfilled grains per panicle (10) followed by *Tawataw* (12).

Vergara (1992) stated that a low percentage of filled spikelets can result if temperature at flowering is too low (less than 20) or too high (above 30).

Reaction to Stem Borer and Blast (neck rot)

All the entries were found resistant to stem borer and blast.

Weight of 1000 Filled Grains

Statistically, no significant varietal differences on the weight of 1000 filled grains were observed (Table 6). The mean weight of 1000 filled grains of the different varieties ranged from 18.68-23.74 grams (Figure 2). *Burik* obtained the highest weight of 1000 filled grains while *Raminad* had the lowest.

Table 6. Weight of 1000 filled grains, total yield per plot and computed yield per hectare of the traditional rice varieties

VARIETY	1000-GRAIN WEIGHT(g)	TOTAL YIELD ($g/5m^2$)	COMPUTED YIELD (tons/ha)
Bayag	20.37	161.33[a]	0.32[a]
Balisanga	21.83	149.00[a]	0.30[ab]
Botalga	22.85	131.33[ab]	0.26[abcd]
Burik	23.74	157.67[a]	0.32[a]
Makaneneng	22.67	141.67[ab]	0.28[abcd]
Pulot	21.43	157.67[a]	0.21[bcd]
Raminad	18.68	151.33[a]	0.30[a]
Talabtab	21.44	145.33[a]	0.29[abc]
Tawataw	22.73	102.00[b]	0.20[cd]
Suyaaw	22.90	99.33[b]	0.20[d]
CV (%)	11.52	16.69	17.39

Yield per Plot

Table 6 reveals that there are significant differences on the total yield per plot of the traditional rice varieties. *Bayag* had the highest yield per plot (161.33 $g/5m^2$) but not significantly different with *Burik, Pulot, Balisanga, Raminad* and *Talabtab. Suyaaw* obtained the lowest yield with a mean of 99.33 g/5m^2. The high yield of the varieties mentioned maybe attributed to the high weight of 1000 grains and considerably the number of productive tillers.

Computed Yield per Hectare

Significant differences were observed on the computed yield per hectare of the traditional rice varieties. *Bayag* obtained the highest yield per hectare of .32 tons followed by *Burik* (0.32 tons). The significant differences could be attributed to the yielding ability of the different varieties. Yield is normally a function of genetic make-up and environmental conditions (Modesto, 2010).

Furthermore, the low yield of all the varieties evaluated may be due to the damage caused by birds feeding on the grains. Damage worsened when the rice planted on the surrounding farms were harvested earlier. The lack of fertilizer applied on the field may have also contributed to the low yield.

Return on Cash Expense (ROCE)

The return on cash expense of the ten traditional rice varieties is shown in Table 7. *Bayag* had the highest ROCE compared to the other varieties evaluated. This result implies that *Bayag* is profitable to be produced at Beling, Bilis, Kapangan.

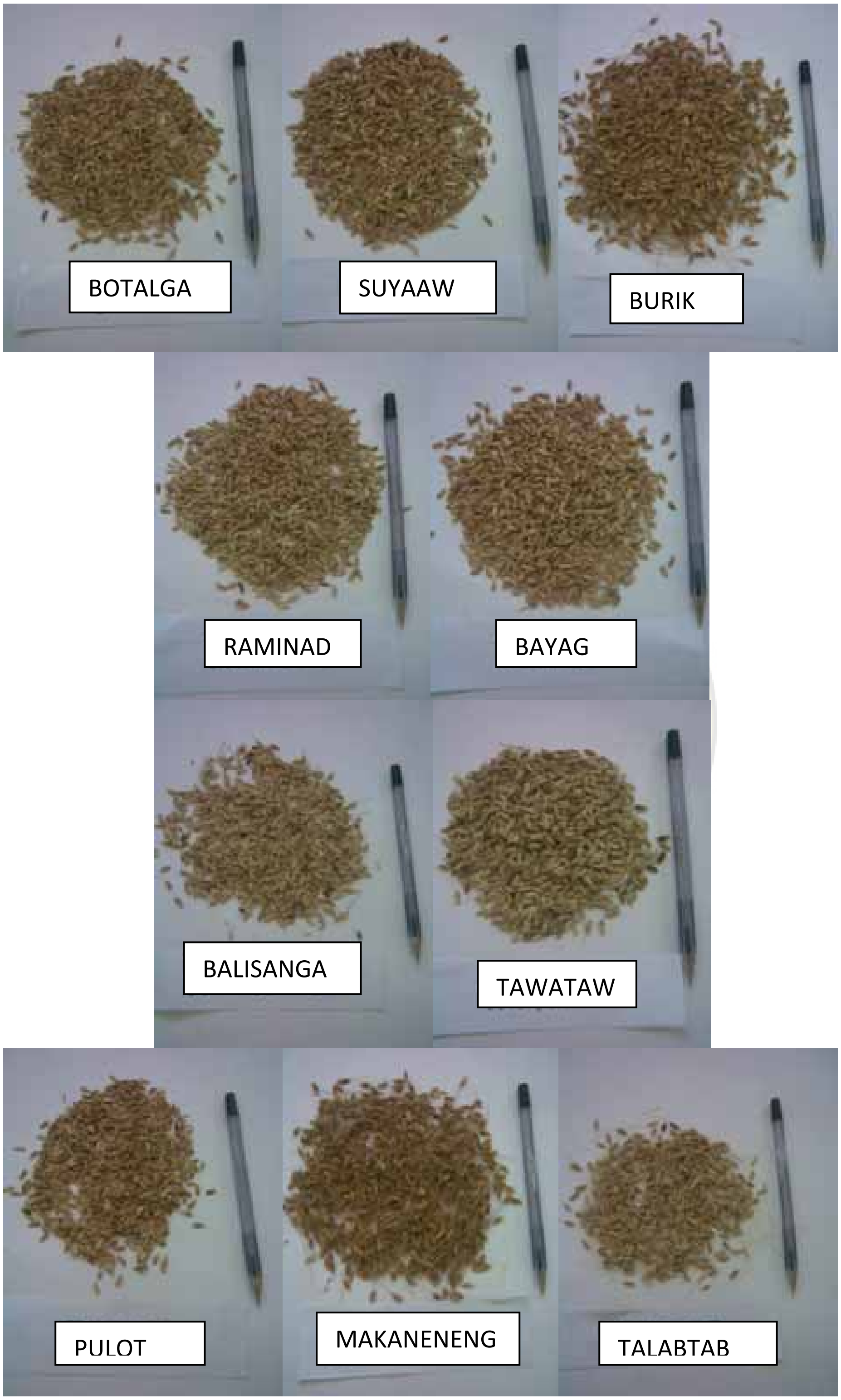

Figure 2. Grains of ten traditional rice varieties

The negative ROCE of some varieties is due to low yield.

Table 7. Return on cash expense (ROCE) of producing traditional varieties

VARIETY	YIELD PER $5m^2$ (g)	GROSS INCOME (Php)	COST OF PRODUCTION (Php)	NET INCOME (Php)	ROCE (%)
Bayag	161.33	12.10	10	2.10	21.00
Balisanga	149.00	11.18	10	1.18	11.80
Botalga	131.33	9.85	10	-0.15	-1.50
Burik	157.67	11.83	10	1.83	18.30
Makaneneng	141.67	10.63	10	0.63	6.30
Pulot	157.67	11.83	10	1.83	18.30
Raminad	151.33	11.35	10	1.35	13.50
Talabtab	145.33	10.90	10	0.90	9.00
Tawataw	102.00	7.65	10	-2.35	-23.50
Suyaaw	99.33	7.45	10	-2.55	-25.50

SUMMARY, CONCLUSION AND RECOMMENDATION

Summary

Ten traditional rice landraces were evaluated to identify the best variety with the highest yield and resistance to pest and diseases and to determine the profitability of producing traditional rice under Beling, Bilis, Kapangan, Benguet condition.

Suyaaw produced tillers early but *Botalga* and *Tawataw* booted earlier. *Bayag* ripened within the shortest time.

All of the varieties were found to be resistant to stem borer and neck rot.

Among the ten varieties evaluated, *Tawataw* and *Balisanga* had the highest number of filled grains. Significant differences were also observed on the total yield per plot and computed yield per hectare of the ten varieties. *Bayag* had the highest total and computed yield and ROCE followed by *Burik* and *Pulot*.

Conclusion

Based on the results, *Bayag, Balisanga, Burik, Pulot, Raminad* and *Talabtab* are the highest yielders while all the varieties were resistant to blast and stem borer. *Bayag* also was the most profitable among the ten varieties evaluated.

Recommendation

Based on the results of the study, *Bayag*, *Balisanga*, *Burik, Pulot, Raminad* and *Talabtab* are recommended for traditional rice growers at Beling, Bilis, Kapangan, Benguet due to high yield and positive ROCE.

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APPENDICES

Appendix Table 1. Number of days from transplanting to tillering

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	78.00	65.00	70.00	213.00	71.00
Balisanga	73.00	70.00	69.00	212.00	70.67
Botalga	76.00	77.00	75.00	228.00	76.00
Burik	72.00	73.00	72.00	217.00	72.33
Makaneneng	80.00	77.00	73.00	230.00	76.67
Pulot	81.00	75.00	67.00	223.00	74.33
Raminad	75.00	72.00	70.00	217.00	72.33
Talabtab	72.00	68.00	75.00	215.00	71.67
Tawtaw	73.00	73.00	70.00	216.00	72.00
Suyaaw	68.00	68.00	72.00	208.00	69.33

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	71.66	35.83			
Treatment	9	148.30	16.47	1.46^{ns}	2.46	3.60
Error	18	203.00	11.27			
TOTAL	29	422.9667				

^{ns}-not significant CV% 4.62

Appendix Table 2. Number of days from transplanting to booting

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	88.00	85.00	86.00	259.00	86.33
Balisanga	90.00	85.00	92.00	267.00	89.00
Botalga	85.00	88.00	80.00	253.00	84.33
Burik	88.00	90.00	90.00	268.00	89.33
Makaneneng	92.00	85.00	86.00	263.00	87.67
Pulot	90.00	87.00	90.00	267.00	89.00
Raminad	89.00	90.00	85.00	264.00	88.00
Talabtab	87.00	88.00	89.00	264.00	88.00
Tawtaw	85.00	86.00	83.00	254.00	84.67
Suyaaw	86.00	83.00	86.00	255.00	85.00

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	11.26	5.63			
Treatment	9	98.13	10.90	1.69^{ns}	2.46	3.60
Error	18	116.06	6.44			
TOTAL	29	225.4667				

^{ns}-not significant CV% 2.9

Appendix Table 3. Number of days from heading to ripening

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	20.00	27.00	28.00	75.00	25.00
Balisanga	31.00	28.00	28.00	87.00	29.00
Botalga	28.00	25.00	30.00	83.00	27.67
Burik	25.00	28.00	32.00	85.00	28.33
Makaneneng	23.00	30.00	30.00	83.00	27.67
Pulot	32.00	33.00	33.00	98.00	32.67
Raminad	28.00	34.00	30.00	92.00	30.67
Talabtab	25.00	31.00	27.00	83.00	27.67
Tawtaw	27.00	28.00	26.00	81.00	27.00
Suyaaw	28.00	30.00	30.00	88.00	29.33

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	48.60	24.30			
Treatment	9	118.83	13.20	2.20^{ns}	2.46	3.60
Error	18	108.06	6.00			
TOTAL	29	275.5				

^{ns}-not significant CV% 8.60

Appendix Table 4. Number of tillers produced

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	27.00	16.00	12.00	55.00	18.33
Balisanga	14.00	11.00	8.00	33.00	11.00
Botalga	13.00	11.00	8.00	32.00	10.67
Burik	13.00	12.00	9.00	34.00	11.33
Makaneneng	11.00	11.00	12.00	34.00	11.33
Pulot	16.00	14.00	15.00	45.00	15.00
Raminad	13.00	14.00	18.00	45.00	15.00
Talabtab	16.00	18.00	10.00	44.00	14.67
Tawtaw	13.00	17.00	15.00	45.00	15.00
Suyaaw	16.00	14.00	7.00	37.00	12.33

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	73.86	36.93			
Treatment	9	169.46	18.82	1.78^{ns}	2.46	3.60
Error	18	190.13	10.56			
TOTAL	29	433.4667				

^{ns}-not significant CV% 24.13

Appendix Table 5. Number of productive tillers produced

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	11.00	13.00	8.00	32.00	10.67
Balisanga	8.00	9.00	7.00	24.00	8.00
Botalga	6.00	9.00	6.00	21.00	7.00
Burik	6.00	9.00	6.00	21.00	7.00
Makaneneng	4.00	7.00	8.00	19.00	6.33
Pulot	11.00	10.00	7.00	28.00	9.33
Raminad	8.00	9.00	10.00	27.00	9.00
Talabtab	13.00	17.00	7.00	37.00	12.33
Tawtaw	8.00	5.00	9.00	22.00	7.33
Suyaaw	6.00	12.00	7.00	25.00	8.33

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	34.06	17.03			
Treatment	9	93.46	10.38	2.03^{ns}	2.46	3.60
Error	18	91.93	5.10			
TOTAL	29	219.4667				

^{ns}-not significant CV% 26.48

Appendix Table 6. Number of filled grains per panicle

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	91.00	86.00	85.00	262.00	87.33
Balisanga	85.00	105.00	115.00	305.00	101.67
Botalga	85.00	120.00	98.00	303.00	101.00
Burik	68.00	93.00	87.00	248.00	82.67
Makaneneng	110.00	83.00	98.00	291.00	97.00
Pulot	89.00	100.00	85.00	274.00	91.33
Raminad	105.00	85.00	91.00	281.00	93.67
Talabtab	88.00	90.00	110.00	288.00	96.00
Tawtaw	195.00	88.00	115.00	398.00	132.67
Suyaaw	87.00	90.00	90.00	267.00	89.00

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	198.86	99.43			
Treatment	9	5149.36	572.15	1.22^{ns}	2.46	3.60
Error	18	8447.13	469.28			
TOTAL	29	13795.37				

^{ns}-not significant CV% 22.28

Appendix Table 7. Number of unfilled grain per panicle

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	13.00	9.00	8.00	30.00	10.00
Balisanga	21.00	18.00	28.00	67.00	22.33
Botalga	25.00	25.00	15.00	65.00	21.67
Burik	31.00	23.00	13.00	67.00	22.33
Makaneneng	22.00	20.00	28.00	70.00	23.33
Pulot	13.00	23.00	15.00	51.00	17.00
Raminad	15.00	26.00	35.00	76.00	25.33
Talabtab	16.00	16.00	36.00	68.00	22.67
Tawtaw	5.00	18.00	13.00	36.00	12.00
Suyaaw	15.00	10.00	18.00	43.00	14.33

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	55.80	27.90			
Treatment	9	772.03	85.78	1.68^{ns}	2.46	3.60
Error	18	916.86	50.93			
TOTAL	29	1744.7				

^{ns}-not significant CV% 37.37

Appendix Table 8. Height at maturity

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	85.00	89.00	93.00	267.00	89.00
Balisanga	88.00	91.00	96.00	275.00	91.67
Botalga	82.00	99.00	95.00	276.00	92.00
Burik	85.00	95.00	89.00	269.00	89.67
Makaneneng	90.00	94.00	94.00	278.00	92.67
Pulot	83.00	85.00	79.00	247.00	82.33
Raminad	101.00	98.00	88.00	287.00	95.67
Talabtab	88.00	87.00	97.00	272.00	90.67
Tawtaw	91.00	85.00	80.00	256.00	85.33
Suyaaw	88.00	83.00	94.00	265.00	88.33

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	40.06	20.03			
Treatment	9	390.53	43.39	1.45^{ns}	2.46	3.60
Error	18	537.26	29.84			
TOTAL	29	967.8667				

^{ns}-not significant CV% 6.09

Appendix Table 9. Weight of 1000 filled grain

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	19.12	22.00	20.00	61.12	20.37
Balisanga	21.50	23.00	21.00	65.50	21.83
Botalga	22.55	23.00	23.00	68.55	22.85
Burik	21.23	24.00	26.00	71.23	23.74
Makaneneng	24.00	23.00	21.00	68.00	22.67
Pulot	21.30	21.00	22.00	64.30	21.43
Raminad	18.03	19.00	19.00	56.03	18.68
Talabtab	22.32	23.00	19.00	64.32	21.44
Tawtaw	20.20	23.00	25.00	68.20	22.73
Suyaaw	25.70	16.00	27.00	68.70	22.90

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	2.89	1.44			
Treatment	9	59.17	6.57	1.04^{ns}	2.46	3.60
Error	18	114.10	6.33			
TOTAL	29	176.1763				

^{ns}-not significant CV% 11.52

Appendix Table 10. Yield per plot

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	170.00	112.00	202.00	484.00	161.33
Balisanga	140.00	150.00	157.00	447.00	149.00
Botalga	154.00	106.00	134.00	394.00	131.33
Burik	160.00	135.00	178.00	473.00	157.67
Makaneneng	140.00	151.00	134.00	425.00	141.67
Pulot	135.00	170.00	168.00	473.00	157.67
Raminad	170.00	114.00	170.00	454.00	151.33
Talabtab	145.00	153.00	138.00	436.00	145.33
Tawtaw	130.00	86.00	90.00	306.00	102.00
Suyaaw	122.00	102.00	74.00	298.00	99.33

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	2098.87	1049.43			
Treatment	9	13475.33	1497.26	2.76*	2.46	3.60
Error	18	9776.47	543.14			
TOTAL	29	25350.67				

^{ns}-not significant CV% 16.69

Appendix Table 11. Computed yield per hectare

LANDRACES	REPLICATION			TOTAL	MEAN
	I	II	III		
Bayag	340.00	224.00	404.00	968.00	322.67
Balisanga	280.00	300.00	314.00	894.00	298.00
Botalga	308.00	212.00	268.00	788.00	262.67
Burik	320.00	270.00	356.00	946.00	315.33
Makaneneng	280.00	302.00	268.00	850.00	283.33
Pulot	270.00	214.00	148.00	632.00	210.67
Raminad	340.00	228.00	340.00	908.00	302.67
Talabtab	290.00	306.00	276.00	872.00	290.67
Tawtaw	260.00	172.00	180.00	612.00	204.00
Suyaaw	244.00	204.00	148.00	596.00	198.67

ANALYSIS OF VARIANCE TABLE

SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM OF SQUARES	MEAN OF SQUARES	COMPITED F	TABULAR F	
					0.05	0.01
Block	2	12526.67	6263.33			
Treatment	9	60872.13	6763.57	3.09*	2.46	3.60
Error	18	39342.67	2185.70			
TOTAL	29	112741.5				

ns-not significant CV% 17.39