Evaluation of Promising NERICA rice varieties under Upland (rainfed) and lowland (Irrigated) Environmental Condition in PNG (Laloki)

Introduction

Rice (O. *sativa)* is considered one of the most common daily diet of many Papua New Guineans yet it has not been well adopted due to none availability of modern high yielding and climate ready rice varieties with acceptable physio-chemical characteristics. To date there are less than 50 different rice varieties cultivated throughout the country thus raising concerns that in country with very diverse agro-ecological environments and with the current climate change and other biological and economic factors the number of rice varieties grown is considered low and needs to be increased to meet the different constraints and opportunities. In 2011 a total of 78 "New Rice for Africa" or "NERICA" was imported by NARI from the Africa Rice Centre in Benin, West Africa to PNG to be evaluated under different environmental conditions to identify high yielding and well adapted genotypes for different ecologies and cultivating environments. From the Preliminary observation and evaluation, 10 upland and 6 lowland NERICA varieties were recommended for further evaluation under dry environmental condition. Thus the major objective of this evaluation was to identify the best performing NERICA rice variety/ies (1) for cultivation under upland rain-fed condition and (2) under lowland irrigated condition in Laloki (PNG).

The report is divided into two parts; (i) Evaluation of Upland NERICA rice and (ii) Evaluation of Lowland NERICA rice.

Materials and methods

Experimental site:

The experiments were conducted at the NARI's Southern Regional Centre (Laloki), Central Province. Laloki is situated at 147° 18' 52" East & 9° 23' 8" South and 15 kilometers northwest of Port Moresby at an altitude of 38 meters above sea level with a soil type of clay loam soil . It experiences a mean annual rainfall of 1440 millimeters (mm) and has distinct dry and wet seasons. The wet season starts from December to February and the dry season starts from April to November. Average daily temperature is at 26.6^{0}C with a daily minimum of 21.0^{0}C and a maximum of 32.0^{0}C.

Cultivation:

The experiment was conducted between February and July 2015 .

Plot area: Upland trial 275.2m^2 and 172.8m^2 for the lowland trial.

Cultivars: 17 varieties which consist of 10 NERICA Upland varieties, six Lowland NERICA varieties and NR 1.

Spacing: 30cm between rows and 20cm between plants which is at a planting density of 17 plants per m^2.

Experimental design: RCBD was used with three replicates.

Fertilizer application:

A total rate of 100kg of nitrogen fertilizer was applied in spilt applications at the rate of 60:20:20 Kg/plot

Basal application: 60 kg of Nitrogen based fertilizer (N, P_2O_5: K_2O+MgO) was applied before transplanting. Top dressing (active tillering stage): Upland trial - 1.2 Kg of urea fertilizer and Lowland trial - 0.75 Kg of urea for the lowland trial. While the final topdressing: Upland trial: 1.2 Kg of Urea fertilizer 0.75 Kg of urea for the lowland trial.

Measurements:

Weekly growth measurements were taken and yield and yield components assessment at maturity stage.

Statistical analysis :

All raw data analysis was processed with MS 2010 Excel spreadsheet and statistical analysis and correlations were done using Genstat, Edition 14.

Results & Discussion

Both the upland and lowland NERICA varieties adopted well into Laloki's ecological condition and showed promising results of early maturing (mature within 100 days after transplanting) and show showed some ability to withstand attack from common rice pest and yield better than the Asian rice NR 1.

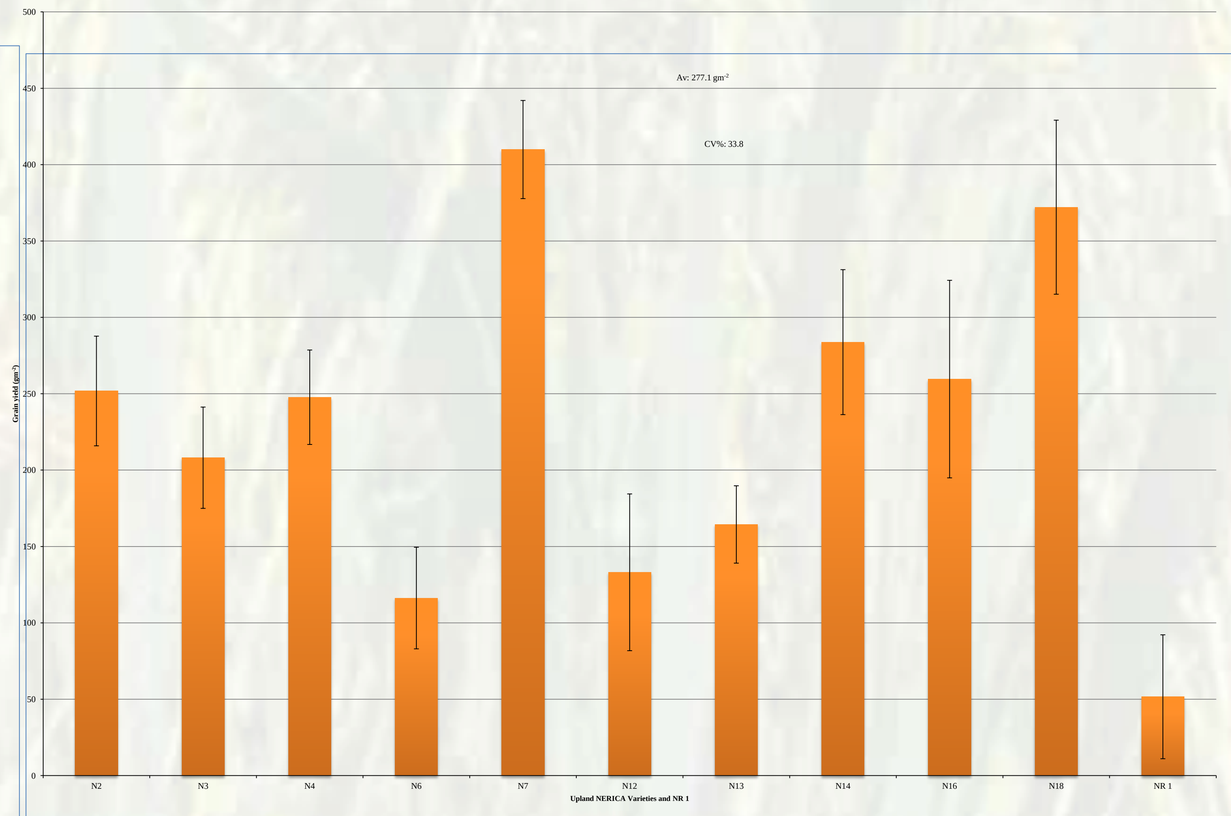

Figure 1: The grain yield of the 10 NERICA varieties and NR 1 for the first AET crop season (2015) under upland condition.

The Upland NERICA varieties 7 (409.9 gm^{-2}), 14 (283.8 gm^{-2}) and 18 (372.1 gm^{-2}) produce significantly higher grain yield then the other upland NERICA varieties and NARI released Asian rice variety NR 1 (51.6 gm^{-2}).

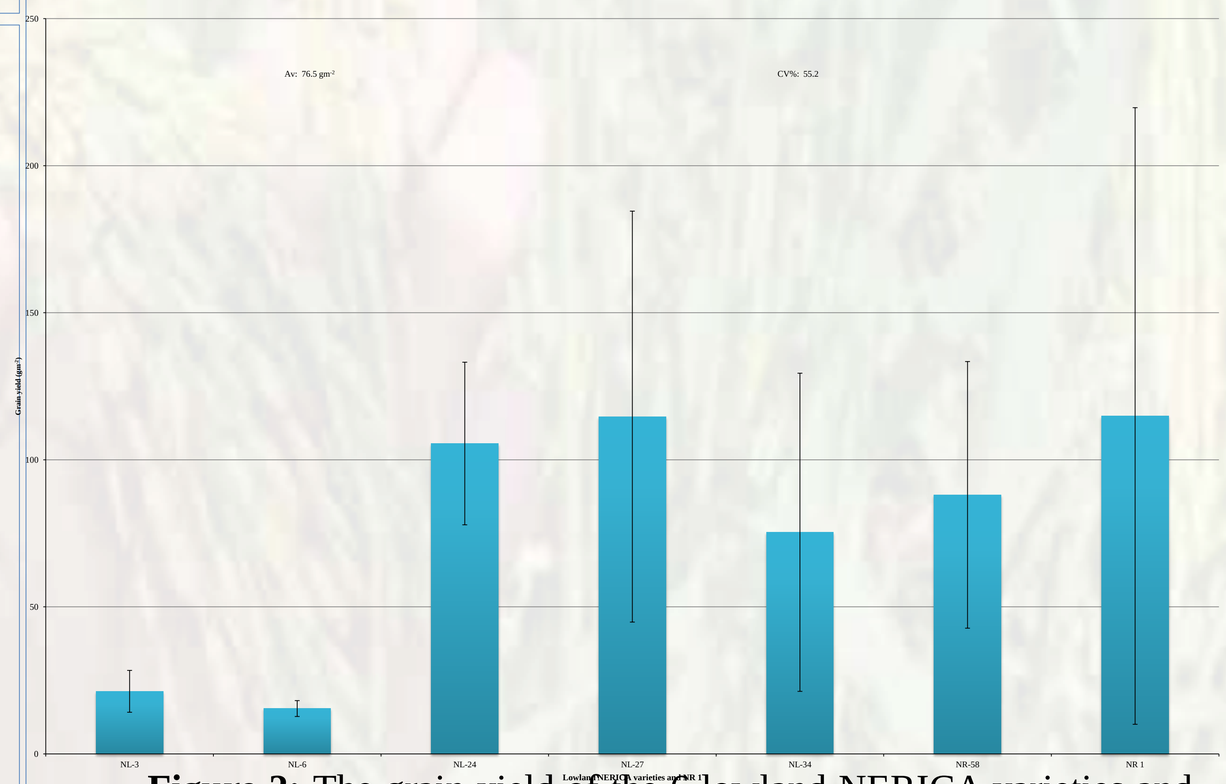

Figure 2: The grain yield of the 6 lowland NERICA varieties and NR 1 for the first AET crop season (2015) under irrigated condition.

For the Lowland/irrigated NERICA rice varieties, the local check variety NR 1 produced better grain yield (114.9 gm^{-2}) then all the Lowland NERICA varieties except NERICA-L 24 (105.5 gm^{-2}) and NERICA-L 27 (114.7 gm^{-2}) which were almost similar to NR 1.

General Conclusion

The actual yield and yield components of NERICA 7, NERICA 14 and NERICA 18 were statistically better than the Local check variety NR 1 and all upland NERICA varieties tested during the 2015 cropping season. The three best performing or high yielding Upland NERICA varieties (NERICA 7, 14 and 18) should be further evaluated under dry environmental condition to further confirm these results and determine their real potentials.

The actual yield and yield components of all lowland NERICA varieties except NERICA-L 24 and NERICA-L 27 are no better than the local check NR 1 under irrigation condition at Laloki.

Therefore, the lowland NERICA varieties NERICA-L 24 and NERICA-L 27 should be further evaluated under irrigated condition to confirm their real potentials.

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