TRIALS ON THE PRODUCTION POTENTIAL OF TAIWANESE RICE VARIETIES IN PAPUA NEW GUINEA

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ABSTRACT

Trials on the production potential of Taiwanese Rice Varieties is being co-ordinated by the R.O.C. (on Taiwan) Agricultural Technical Mission to Papua New Guinea. An outline of the cost of a mechanized system of Rice production and results of the three promising varieties for upland and paddy field cultivation is discussed.

INTRODUCTION

The objective of this experiment was to investigate the adaptability and production potential of introduced Rice varieties in Papua New Guinea (PNG). The Rice varieties were introduced and tested by the R.O.C. (on Taiwan) Agricultural Technical Mission to PNG. The Mission hopes to select promising Rice varieties to release to farmers or growers for the extension program in the coming year.

MATERIALS AND METHODS

Three introduced Rice varieties, Taichung Sen 10, Tainung Sen 20 and Taiken 2, were used in this experiment. All three Rice varieties were grown in Paddy Field, except Taichung Sen 10 which was also grown in an Upland Field. The activities involved in the cultivation of both Paddy and Upland Rice were mechanized. In the case of Paddy Rice, seedlings were raised in the nursery and were transplanted using a transplanter (see Figure 1) at a spacing of 30 cm between rows and 15 cm between plants. For Upland Rice seeds were directly shown into the field using machine at a row spacing of 30 cm.

Transplanting and Sowing Date for Paddy and Upland Rice

Varieties Taichung Sen 10, Tainung Sen 20 and Taiken 2 were transplanted on June 19, July 7 and July 24, 1992 respectively. Sowing of Taichung Sen 10 in upland field was done on June 9, 1992.

Location of experimental sites

Paddy and Upland Rice field experiments were conducted at Bubia Agricultural Research Centre. A site situated at the periphery of Bubia (11 miles from Lae) was used for Upland Rice Experiment using variety Taichung Sen 10.

Rate of fertilizer application for Paddy and Upland Rice is given in Table 1.

Paddy rice was harvested on October 12, (Taichung Sen 10), October 26 (Tainung Sen 20), and November 23, 1992 (Taiken 2). Upland Rice (Taichung Sen 10) was harvested on October 6, 1992.

Grain harvesting, grain ripping and bagging is done using a Kubota R140 Rice Harvester (about 40 horse power) as depicted in Figure 2. This machine is capable of harvesting 1 hectare of rice field per day. Rice bags are than dried for two days to about 13% grain moisture. This is done using a Mash Toyo JB30 (20 horse power) combine processing and milling machine. The machine is capable of drying 6 tons of rice and has a capacity of milling 1 ton per hour.

Cost of Rice production

The cost of Rice production given in Table 2 is based on the mechanized cultivation of the model farms.

RESULTS AND DISCUSSION

According to the results of the field trials of 1992, the three introduced Rice varieties were quite adaptable to the climate of PNG. The varieties not only established well but also showed high productivity, particularly, Taichung Sen 10 which yielded about six tons per hectare in paddy field. This was quite consistent

Table 1: **Fertilizer Rates for Rice Production**

Fertilizer	Rate (Kg/ha)
Paddy Rice	
Ammonium Sulphate	500
Calcium Perphosphate	300
Potassium Chloride	120
Compound fertilizer	160
Zinc Sulphate	50
Upland Rice	
Ammonium Sulphate	370
Calcium Perphosphate	270
Potassium Chloride	170
Upland Rice:	
Land preparation	120.00
Sowing with machine	60.00
Weed management	238.00
Fertilizer application	446.00
Pest Control	220.00
Harvesting with machine	108.00
Drying with machine	70.00
Total	1262.00

Table 2: **Cost of Mechanized Rice Production**

Activity	Cost(Kina/ha)
Paddy Rice:	
Nursery Preparation	168.00
Land preparation	140.00
Transplanting with Machine	80.00
Weed management	292.00
Fertilizer application	510.00
Pest control	260.00
Harvesting with machine	108.00
Drying with machine	70.00
Total	1628.00

Figure 1. **Transplanting Paddy Rice with Machine.**

Figure 2. **Extension farmer at his well matured Paddy Rice farm.**

Figure 3. **Transplanting paddy Rice with Machine**

Table 3: **Results of the field trial of the three introduced Rice varieties in Paddy Field.**

Variety	Growth duration (days)	Plant height (cm)	Panicle number	Panicle weight (g)	Spikelets per panicle	Seed-set (%)	1000-grain weight (%)	Yield (kg/ha)
Taichung Sen 10	116	109	17	3.9	154	87	27	5930
Tainung Sen 20	112	106	23	3.4	156	91	26	4855
Taiken 2	122	113	26	2.9	138	84	26	4750

Table 4: Results of the field trial of introduced Rice in two different Upland Fields.

Location	Growth duration (days)	Plant height (cm)	Panicle number per metre^2	Panicle weight (g)	Seed-set (%)	1000 grain weight (g)	Yield (Kg/ha)
Bubia Station	120	110.3	96	4.2	86	26.2	5678
11 miles from Lae	120	110.8	102	3.2	79	24.2	2929

to the results obtained in Taiwan. Taichung Sen 20 and Taiken 2 produced about five tons per hectare (see Table 3). These results were not as expected, but still yield performances were better than those of the traditional Rice Varieties (Wantok, Senis, and Niupela) grown in PNG. These varieties produce about 3 to 4 tons in upland field. Under irrigated field conditions varieties Senis and Niupela can produce 5.4 and 4.0 tons per hectare respectively (Wohuinangu 1982).

In the case of Upland Rice, Taichung Sen 10 produced 5.7 tons per hectare in the field at Bubia Station, and only 3 tons on the farm 11 miles from Lae (see Table 4). The former result is quite consistent with the Paddy Rice, this was due to the fertility and high water holding capacity of the soil, in contrast, the soil at 11 miles was sandy and gravelly, and suffered several times of drought during the growing season, hence the low yield.

The evaluation of the net returns of Rice production was calculated by the estimated value of the total products minus the total costs of Rice cultivation. In reality, it is very difficult to generalize the profitability of Rice production in different regions and where various agricultural methods are practiced. Results obtained from the model Farm of the Mission, showed that the production cost of Paddy Rice and Upland Rice was 1600 Kina and 1300 Kina. While the average grain yield from the trials was about 600 Kg and 3500 Kg respectively. Hence the net profit of Paddy Rice and Upland Rice production was about 2600 Kina and 1150 Kina per hectare respectively. Obviously, the paddy Rice cultivation is profitable than the Upland Rice. However, if Upland Rice was cultivated in suitable soil and adequate cultural management, the grain yield would probably be higher than 4000 Kg per hectare, giving a net profit of more

than 2000 Kina.

Results also showed that variety Taichung Sen 10 is suitable for both Paddy and Upland field in PNG. More details of these results should be verified in the coming years. Although Paddy Rice cultivaton is more profitable than the Upland Rice, the Upland Rice cultivation is more suitable for extension and promotion of Rice production before introducing the irrigation system for Paddy Rice production in this country. This will involve designing irrigation facilities for Paddy Rice cultivation.

Production of Upland Rice depends entirely on the rainfall distribution and stored soil moisture, therefore, adjustment of the growth stage of rice to suit the rainy season is the critical factor in order to attain high grain yield. The Upland Rice is susceptible to water stress during the growing stage in sandy or gravely soils. This can be avoided if adequate irrigation water is made available.

Weeds limit the growth and yield of Upland Rice, however ranking only second to drought stress in reducing grain yield. Despite this, most of the land in this country has never been cultivated, hence, the weed population is higher and more dense in the field, thus, several times of ploughing in dry season is necessary before sowing. Most of the farmers however do not have machinery to plough the land, and this limits the agricultural development in this country.

In view of the problems of the agricultural extension program in this country, it is recommended that a Joint Operation Team of Machinery be set up by Provincial Governments or villages and financial support be given to farmers for purchase of chemcials, fertilizers and other machinery by the National Government.

Rice was harvested with good quality and high yield in the Extension Farms, particularly, the Paddy Rice, which produced more than six tons per hectare (See Figure 3). The growers were pleased with the profits obtained.

REFERENCES

Wohuinangu J.S. (1982.) Studies on the Effect of Split Application of Nitrogen on Rice Plant Growth and Yield. Bachelor of Agriculture Honours Thesis. University of Papua New Guinea, Agriculture Department, Port Moresby, Papua New Guinea. ❑