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Enhanced the Farmers Income through Improved Cultivation Practices of Lowland Rice under Longleng District of Nagaland: A Success Story

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A B S T R A C T

Longleng district falls under the subtropical hill zone of Eastern Nagaland. Agriculture is the main stay of the people, in which Low land (Pani Kheti) is one of them for their livelihood. Farmers of the district practiced traditional rice cultivation with low yield after maximum inputs due to lack of knowledge of improved cultivation practices. Therefore, Krishi Vigyan Kendra (KVK) took initiative to replace the farmers' practices through disseminations of improved technology for enhancing the productivity and income. Before the intervention of new technology, awarness -cum- training programme on lowland rice was organised in the village. All together 16 nos. of farmers were participated in the training programme and took interest for adopt the improved practices. After that hand on training programme of nursery sowing, transplanting was conducted at farmers' field during the year 2014-15 to 2016-17. Results of improved practiced found that average yield (3 years) was recorded 44.76 q/ha against 32.40 q/ha with farmers practices. Net profit and B:C ratio were recorded Rs.33210/ha, Rs.19080/ha and 2.62, 1.96 with improved and farmers practices respectively. Percentage increase yield and net profit were 38.2 and 73 % with improved practice as compared to tradition cultivation. The successful demonstration on low land rice is by following the principles of "learning and doing" and "seeing and believing". After the successful intervention of technology, farmers growing new intervention technology of rice cultivation. The impressive performance of the technology awankened the farmers, farm women of the village and neighbouring villages to adopt this technology helps to increase the net income of the farmers.

Introduction

Rice is main staple food crop of North East India and occupying an area of ~3.5 m ha, which account ~7% of the area and 6.5% of the country rice production (Kumar *et al.*, 2017). The productivity of rice in NE states is ~2.15 t/ha, is much below than average national a productivity of rice 2.58 t/ha (Agricultural statistics, 2018). In context to Nagaland, rice is primary food and cultivated in an area of ~21.2 thousand ha and producing 42.4 thousand tonnes with a productivity of ~ 2.0 t/ha (Anonymous, 2018). Longleng district in the states fall under most backward as per classified by planning commission of

India. The livelihood of the people largely depends on agriculture production system and rice is the stable food in the region and cultivated in an area of ~8.57 thousand ha with the production of 19.38 thousand tonnes and productivity ~2.26 t/ha (Anonymous, 2018). Farmers of the district practiced traditional rice cultivation with low yield after maximum inputs (seeds and labour) and are not even able to meet their food requirement due to the lowest productivity of rice. The main problems associated with lower productivity of rice due to lack of knowledge about the improved cultivation practices. Therefore, the Krishi Vigyan Kendra Longleng took the initiative and conducted a demonstration programme during the three consecutive *kharif* season of the year 2014 to 2016 to replace the farmers practice with improved cultivation practices in lowland rice for achieving optimum productivity and profitability of the poor tribal farmers of Longleng District.

Materials and Methods

Field demonstration was conducted at farmer's field of Krishi Vigyan Kendra, Longleng, ICAR- Research Complex for North Eastern Hill Region, Nagaland Centre Jharnapani, Medziphema during the three consecutive *kharif* seasons of 2014-15 to 2016-17. The field was located between at 26^0 26' 0'' N Latitude, 94^0 52' 0'' E Longitude with altitude of 1366 m above mean sea level. Soil of the experimental field was sandy loam and acidic in reaction (pH 5.3), high in organic carbon (0.91%), low in available N (302 kg/ha) and medium in available P (12.8 kg/ha) and K (280 kg/ha). Mean monthly average temperatures of three years were varying from 27.64°C to 29.85°C and 16.54°C to 21.09°C during the year of 2014-2016, respectively (Fig. 1). Total rainfall received during the cropping period (May – October) was 1945.8 mm, 2192.6 mm and 1096 mm in 2014, 2015 and 2016, respectively and average rainfall (3 years) was 1744.8 mm. However, the rainfall distribution over month was better in 2015 as compare to 2014 and minimum rainfall was received in 2016. The monthly rainfall was recorded maximum in month of August 2014 and August 2015. Whereas, maximum rainfall was recorded higher in the month of July, 2016. Baseline survey was conducted in the Pongching village before the intervention of improved cultivation practices of rice. It was found that farmers using more seed rate (40-50 kg/ha), seedling age (30 - 40 days for transplanting, more seedling per hill (6-8 nos. /hill) along with less spacing (10 x 10 cm) and therefore getting low yield. A intervention was taken up with improved cultivation practices such as seed rate (20 kg/ha), seedling age (15-20 days), spacing (20 cm x 20 cm) and nos. of seedlings (2-3/ hill). Before the intervention of new technology, awarness -cum- training programme on lowland rice was organised in the village. All together 16 nos. of farmers were participated in the training programme and adopted the intervention of improved technology. After that demonstration was conducted on nursery management and transplanting of rice at farmers field during the year 2014-15 to 2016-17 covering an area of 4.5 ha. Farmers fields was regularly monitored of by the agronomy scientist during the crop cycle. Two hand weeding were given at 20 and 45 days after transplanting (DAT). Neem oil @ 3ml per litre of water during the flowering stage for controlling the insect and no disease was appeared during the cropping cycle. Five plants were randomly selected in each demonstration to record the observation on growth and yield parameters. Data collected on plant height, tillers/m^2, grains/panicle, panicle length, panicle weight and 1000-grain weight were recorded at crop maturity. Grain yield was recorded and convert into q/ha during all the years of demonstration. In

economics, cost of cultivation was taken into account for calculating economics of practices as work out net return per ha and benefit cost ratio. The gross returns were taken as income from produce of grain yield based on prevailing price. Net return and benefit cost ratio was calculated with the help of following formula:

Net return (ha^{-1}) = Gross return (ha^{-1}) - cost of cultivation (ha^{-1})

$$\text{Benefit : cost ratio} = \frac{\text{Grain yield}}{\text{Biological(Grain + Straw) yield}}$$

Production efficiency and economic efficiency (Kumar *et al.*, 2017) were calculated with the help of the formula.

$$\text{Production efficiency (kg/ha/day)} = \frac{\text{Grain yield (kg/ha)}}{\text{Total duration of the crop (days)}}$$

$$\text{Economic efficiency(Rs/ha/day)} = \frac{\text{Net return (Rs/ha)}}{\text{Total duration of the crop (days)}}$$

Results and Discussion

Growth, yield parameters and economics were presented in the table 1. Results revealed that the plant height was recorded 115.2 cm and 96.4 cm with improved and traditional practices respectively. Yield attributes such as Panicle/m^2, Panicle length, Panicle weight and Test weight were recorded 146, 21.2 cm 4.2 g, 30.2 g and 116, 18.8 cm, 3.6 g, 28.6 g under improved and traditional practices respectively. Grain yield was recorded 42.50, 45.30, 46.50 q/ha with improved practices during the year 2014-15, 2015-16 and 2016-17 respectively. Whereas, grain yield was obtained 31.9, 33.2, 32.10 q/ha under traditional practices (Fig. 2). Maximum mean rice grain yield (3 years) was recorded 44.76 q/ha with improved practices, which was 38.14 percent higher than traditional practices (32.40 q/ha). Net profit and B:C ratio were recorded Rs.33210/ha, Rs.19080/ha and 2.62, 1.96 with improved and farmers practices respectively. Percentage increase of net profit was found 74 % higher with improved practice than traditional cultivation practices. Production efficiency was recorded 34.92, kg/ha/day and 24.10 kg/ha/day under improved and farmers practices respectvely, whereas economic efficiency was also found higher (258.75 Rs/ha/day) in improved practices as compared to farmers practices (141.33 Rs/ha/day).

Table.1 Different parameters of traditional & improved rice cultivation (mean 3 years)

Parameters	Traditional	Improved
Plant height (cm)	96.4	115.2
Panicle/m2	116	146
Panicle length (cm)	18.8	21.2
Panicle weight (g)	3.6	4.2
Test weight (g)	28.6	30.2
Net Income (Rs/ha)	19080	33120
B:C ratio	1.96	2.62
Production efficiency (kg/ha/day)	24.10	34.92
Economic Efficiency(Rs/ha/day)	141.33	258.75

Fig.1 Rainfall, the maximum and minimum temperature of the cropping period (mean 3 years)

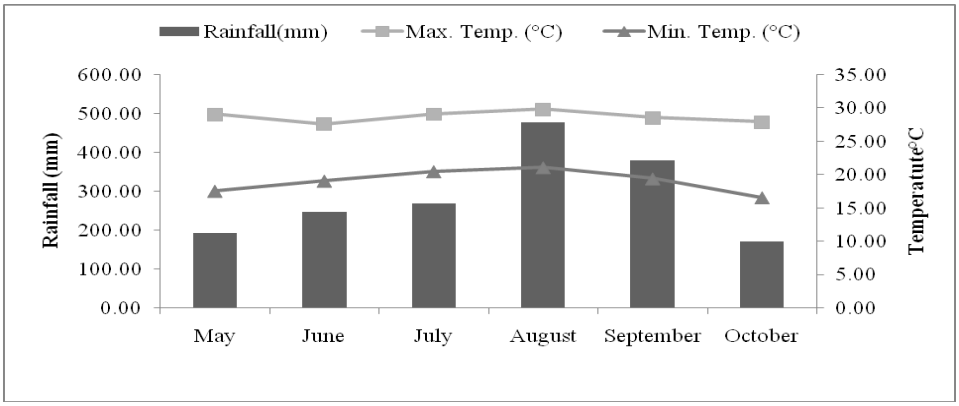
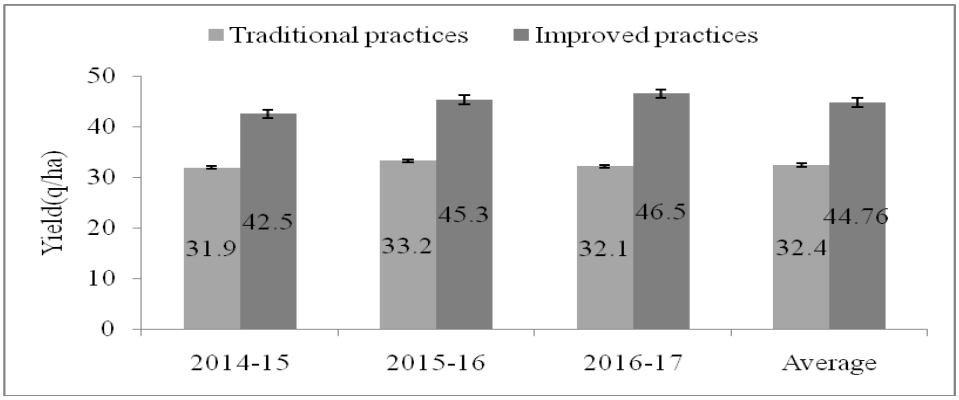


Fig.2 Rice grain yield of traditional & improved rice cultivation (mean 3 years)



All the growth and yield parameters was recorded higher in improved practice than farmers practice. This might be due to optimum environment condition suited for improved rice cultivation practices, which helps for better root development and

ultimately increase the growth and yield attributes. Higher grain yield of rice might be due to the higher productive tiller/plant and higher number of grain per panicle. Thus, the FLD might have a positive impact on farming community in the district over local practices. Similar results were also reported by Mondal *et al.*, (2005), Kumar *et al.*, (2017) and Samant (2014) in rice crops.

In conclusion the successful demonstration on lowland rice by following the principles of "believing through seeing" and "learning by doing". After the successful intervention of technology, farmers was adopted new technology of improved rice cultivation. The impressive performance of the technology awankened the farmers, farm women of the village and neighbouring villages to adopt this technology helps to increase the elevate net income of the farmers.

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