

RICE SEED SYSTEM AND ITS EFFECT IN RICE PRODUCTION OF NEPAL

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ABSTRACT

To access various types of seeds used in rice production and its effect in production a study was conducted in Kavre and Rupandehi districts of Nepal. A random sample of 50 households from Kavre district and 50 from Rupandehi districts was selected for the purpose of study. Study methods included were PRA tools, field visits including key informants' interviews (KII), and household survey. Statistical mean, percentage, regression analysis, paired T- test were used to analyze the data. Private seed companies in Rupandehi district were found to be prominent in comparison to Kavre district. In Rupandehi district major chunk of seed was delivered through private company whereas in case of Kavre district community sector played major role to deliver seed. There was significantly high correlation (at 0.01%) between education and the use of seed. The study revealed that tendency to use improved seed was more among the educated farmers. Price of output, education level, improved seed, quantity of seed, were the explanatory variables assessed to find out their effect in rice production. The coefficient of multiple determinations (R^2) of the linear return function was 0.331 indicating 33.1% of the variation in the grain yield being explained by the variables included in the equation. The F value 12.529 was highly significant. The study thus concludes that easy access of quality seed has positive impact on the rice production of Nepal.

Key Words: Rice, Seed System, Production.

INTRODUCTION

Rice is a major cereal crop of Nepal, it accounts for about 46 percent of total area of cereal cultivation and 55 percent of the production share, contributing a significant role in national food security and livelihood of the Nepalese people (Gauchan and Pandey, 2012). Crop productivity and the quality of production primarily depend upon the quality of seed.

Seed is a vital input in production process. Increment in productivity is important for food security. Evidence shows that 20-30 percent food production can be increased by using improved seed in an assumption that improved seed are better quality seed (NPC, 2010). A similar scenario was seen in a case of production of India¹ where production increased from 53.6 million tons in FY 1980 to 74.6 million tons in FY 1990, i.e. 39 percent increased production over the decade. In Nepalese context more than 90 percent of total supplied seed is through farmers' seed system. However, Nepalese farmers have limited access to quality seed of desired varieties due to lack of institutionalized production, processing, quality control and distribution systems. The existing service providers both the government and the private sectors are far behind to be able to meet the seed demand of the country (Thapa, 2011).

Seed replacement rate in India was found to be 23 percent in the year of 2002-2003 where as that rate was estimated to be 38 percent in the year 2010-2011. This depicts 11 percent increment in seed replacement rate within a period of seven years. Basically this increment was governed by good

¹ India A country study: Crop output Library of congress , Washington D.C., September 1995. Retrieved July 5, 2015.

seed system which according to Singh (2012) can be further raised up to 40-45 percent with efficient management of other inputs. Seed replacement rate of rice in Nepal is below 10 percent (SQCC, 2010).

Considering the importance and the scope of improved rice seed a need to assess the rice seed system and effect of use of improved seed in Nepalese rice production was felt. Therefore, the study was carried out with the objectives to find out the difference in rice seed access and its effect in rice production.

MATERIALS AND METHODS

Site description

Kavre and Rupandehi districts were selected as the study area. Kavre district is situated at 1,480 to 1,850 masl. Kavre district mainly lies within subtropical climate region however the southern part experiences temperate climate. The temperature reaches as high as 34° C during summer (Jun-Aug) and as low as 2° C during winter (Dec – Feb) with annual precipitation of 1,581 mm. The major part of rainfall occurs during June to September receiving 80 percent of the total annual precipitation. Altitude of the Rupandehi district varies from 100 to 300 m experiencing the tropical climate. The rainfall estimate in the area is 2,288 mm/yr. The summer temperature varies from minimum 32°C to maximum 41°C in Rupandehi.

Study period and the methods used

This study was conducted during June 2010 to December 2011 in Kavre and Rupandehi districts of Nepal. Eight VDCs of Kavre district namely Mangaltar, Bhakunde Besi, Khanal Thok, Daraune Pokhari, Fulbari, Bhim Khori, Nitin Kote, and Chapar Bari and four VDCs from Rupandehi district namely Dhakdhahi, Parroha, Chotaki Ramnagar and Pathrouli were selected for the purpose of study. The basis for selection of the VDCs and household was access to registered seed producing institutions. To collect the data of seed production, Kavre district of Nepal was selected as site because of its diversity in rice farming, accessibility as well as priority by District Seed Self Sufficiency Program (DISSPRO). Fifty farmers from Kavre and 50 farmers from Rupandehi districts were selected as respondents for the study. Study methods included field visit key informants' interviews and household survey. Structured questionnaire was used for household survey. Variables under study included price of seed, ethnicity, quantity of seeds, other fixed and variable cost incurred in seed as well grain production. Purpose of production, purchased seed, yield were analyzed by using descriptive tools such as frequencies, percentages, means and standard deviation. Besides these, regression analysis and Pearson correlation tests were used for data analysis. Multivariate regression model was used to estimate relationship between yield and selected independent variables. Coefficient of multiple determinations (R^2) was calculated to find the variation in income as explained by these variables. The coefficients of explanatory variables were tested at different significant levels. The theoretical framework used was:

$Y = f(\text{Price of output as a seed price, Ethnicity, Quantity of seeds used, other fixed and variable cost, Purpose seed, Purchased seed})$.

A linear relationship assumed was:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6$$

Where,

X_1 = Price of output as a seed price

X_2 = Ethnicity

X_3 = Quantity of seeds used

X_4 = Other fixed and variable cost

X_5 = Purpose seed

X_6 = Purchased seed

a is a constant value and b_1 to b_6 are coefficients of the respective terms.

RESULTS AND DISCUSSION

Seed system in Nepal

Informal and formal are the two types of seed systems in Nepal. Informal system is the one in which farmers produce and preserve seeds for their own use. The formal seed systems are characterized by an organized production and distribution of tested and released/registered varieties by public and private organizations using agreed quality control mechanism. The formal and informal seed systems are interlinked and are complement of each other for the fulfilment of desired varieties' seed to make available during the planting season. Although, the formal sector supplies less than 10 percent of seed transaction in Nepal, it has an important role in developing new varieties, maintain gene and ultimately increasing production and regulating marketing mechanisms.

Nepalese history of improved seed starts with the establishment of Agriculture Supply Corporation (ASC) during the period of third five year plan (1965-70) which was established with governmental effort. It procures improved seeds produced in government farms and act as a channel of import from different sources and distribute among the farmers. Fig.1 shows the status of seed supplied by public seed distributor Agriculture Input Corporation (AIC) and National Seed Company (NSC) in last ten years.

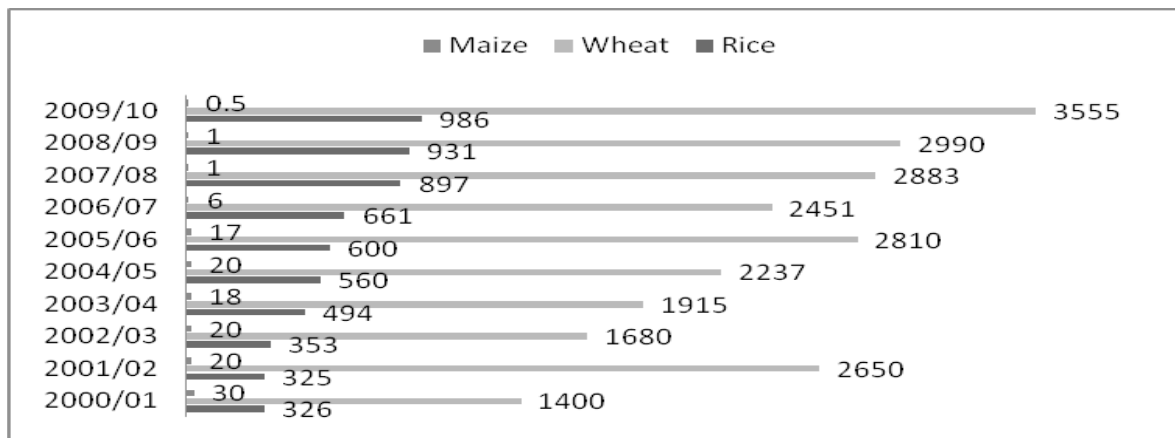


Fig. 1. Seeds (t) supplied in last ten years from public sector (AIC and NSCL)

Source: National Seed Company

National seed Company was established to multiply and procure the foundation seeds. The total demand of rice seed is 77,463 t/ year (CBS, 2010) and only 986(t) of seeds is supplied by NSC. Nepal Agricultural Research Council (NARC), a governmental mandated apex body to work for

breeders' seed production in the country was established in 1991. This organization has comparative advantage in context to other countries import for breeders' seed.

Department of Agriculture (DoA) is mandated for the extension of seed all over the country. Since the Ninth Five Year Plan (1998/99 to 2001/03), District Seed Self Sufficiency Program (DISSPRO) was initiated with the motive to encourage and strengthen local level seed production and marketing to meet local and district level seed demand. As well Community Based Seed Production program organized jointly by DoA, NARC and farmers' group (FG) for cereal production was emerged. Community Based Seed Production Program was a program based on bottom to top approach. About 4,500 ton of cereal seeds annually have been produced by these approaches and it also assist on subsidies on seeds, creation of revolving funds, group/social network, training and visit (T & V) farmers to farmers (F to F) exchange. A scenario of Public (Government) – private (Agrovets-Seed Companies) – farmer (Seed User) were created. Meanwhile private seed companies emerged and started to multiply various categories seed from foundation seed up to improved seed. In addition to multiplication, private seed companies started to sell the seed. Paradigm shift occurs with the initiation of Private Seed Companies (PSC) since the 2059-60, (2003/4) out of seven seed companies Everest Seed Company, Universal Seed Company, Lumbini Seed Company and Shree Ram Seed Company were established in five years duration. The emerging private companies of Nepal are involved in vegetable seed marketing however till now even the National Seed Company is not matured enough to fulfill the rice seed demand of farmers. But another feature of many seed policy analyses is the demonstration of need for effective collaboration between the public and private sector.

A scenario of seed system of Kavre and Rupandehi district

Seed supply systems are an association of formal and informal channels by which farmers acquire their total seed requirements each year (Turner, 2010). Scenario depicts that Rupandehi district possess three seed companies namely, Universal Seed Company, Lumbini Seed Company and Kalika Seed Company. Where as Kavre district has only one cooperative Bhakunde Krishi Biu Bijeem Sahakari Sanstha. Public, private, individual and community seed delivery system were most prominent seed delivery mechanism in both districts. In Kavre district 50 percent with highest share of seed was delivered through community seed producers and in Rupandehi 61 percent with highest share was delivered through private companies. It depicts in both districts public sector were less functioning in comparison to private and community seed system.

Effect of ethnicity on seed purchase

Variable ethnicity has been divided into two groups among Brahmin and other. In selected sites Brahmin are assumed to be more educated comparison to other caste farmers. Among 100 respondents 68% are Brahmin and 32% are other caste. Education level of respondents is categorized to assess the basis of seed use. Seed purchasing tendency was analyzed on the basis of ethnicity of farmers. Correlation between the two variables ethnicity and seed use tendency as shown in Table 2 revealed that the correlation is significant at the 0.01 level (2-tailed). This revealed that the improved seed use is more in Brahmin family.

Table2. Correlations between education and seed use

Variables		Ethnicity	Purchased=1Own=0
Ethnicity	Pearson Correlation	1	-.288(**)
	Sig. (2-tailed)		.000
	N	160	160
Purchased=1 Own=0	Pearson Correlation	-.288(**)	1
	Sig. (2-tailed)	.000	
	N	160	160

** Correlation is significant at the 0.01 level (2-tailed).

Source: Survey 2009.

Variable and hypothesis

Table 3 depicts the variables as price of output as seed, ethnicity, quantity of seeds used, fixed and variable cost, purpose of production and the assumptions.

Table3. Explanatory variables and hypothesis

Variables	Expected sign	Assumption
Price of output as a seed	+	Seed price are high
Ethnicity	+	Brahmin are more educated
Quantity of seeds used		Less seed rate will be measured in purchased seed
Other fixed and variable cost	-	Cost is increased in seed production
Purpose of production	+	Seed and grain are two comparative production seed production gives more yield
Farmers seeds or purchased seed	-	Use of farmers own kept seed gives less production in comparison to farmers seed

Regression analysis for linear production function

Rice production was regressed against the above mentioned explanatory variables. Estimates of the regression coefficients are given in Table 4.

Table 4. Coefficients of regression for return function of seed producer

Parameters	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Significance
	B		B		
Constant	3883.352	841.842		4.613	.000
Price of output as a seed price	-61.155	13.033	-.354	-4.692	.000
Ethnicity	-1111.247	347.922	-.233	-3.194	.002
Quantity of seeds used	9.939	5.232	.129	1.900	.059
Other fixed and variable cost	.015	.013	.077	1.126	.262
Purpose Seed=1, grain=0	377.649	353.019	.079	1.070	.286
Purchased=1Own=0	410.544	393.200	.081	1.044	.298

R² 0.331, Adjusted R² .305, Standard Error 1.938, F 12.529

The coefficient of multiple determinations (R^2) of the linear return function was 0.331 which indicated that 33.1%, of the variation in the grain yield could be explained by the variables included in the equation. The F value ($F=12.529$) was found to be highly significant. Quantity of seeds used, other fixed and variable cost, purpose of seed production and purchased seed used all are significant. The estimated function for seed producer is:

$$Y^* = 3883.352 - .354X_1 - .233X_2 + .129X_3 + .077X_4 + .079X_5 + .081X_6$$

CONCLUSION

Informal and formal are the two types of prominent seed system in Nepal. In case of selected districts, in Rupandehi private seed companies are prominent in comparison to Kavre district. In Rupandehi major chunk of seed is delivered through private company whereas in case of Kavre district community sector plays major role to deliver seed. Ethnicity plays major role to use improved seed. Price of output, education, improved seed, quantity of seed, have positive effect on rice seed production.

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