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Economic Returns to Seed Growers From Wheat Seed Production in Morang District, Nepal

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INTRODUCTION

The sustainable increase in agricultural production is necessary to meet the demand for food of increasing population of developing countries, which could be possible through the use of critical inputs combination in agricultural production. Among different inputs seeds hold the key of agricultural production. It has universally been realised that seed is the starting point for agricultural development. This concept holds good for any level of production whether on a small private garden or a large area of commercial farms.

The economic importance from the adoption of certified seeds is one of the most well recognised facts for the raising the level of returns from a crop. Infact, no other method of agricultural development meets with such a ready response and adoption from farmers these days as the use of the certified seeds. It has also been recoginsed beyond doubt that the seed production programm has to be scientifically streamlined to achieve the fruits of green revolution. Wheat seeds production requires special scientific care, to maintain true to the type, during production and the seed growers are usually given higher prices for the seeds produced on their farms as compare to the prices received by them for the commercial crop production, the crop raised not specifically for seed purposes. The high price for wheat seeds crop is offered to

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compensate the seed growers for the risk that they bear, additional management skill and the cost they have to put in for seed production. It is therefore, important to know the details of cost involved in production of certified wheat seeds as well as to have an idea about the various factors which influence the production of wheat seed. Finally, it would be easy to find out the per hectare economic returns to seed growers from wheat seeds production in the project area.

METHODOLOGY

The first requirement was the selection of the project area befitting to the objective so that sufficient information could be made available for the study. To probe the problem within the limited time and other resources available, district Morang, which has the largest area under quality wheat seeds (certified) production in Nepal during the year 1991 to 1992 was selected purposively for the study. Village wise name of wheat seeds growers were obtained form the Agriculture Inputs Corporation and it was observed that more than 50% wheat seeds growers were located in Kerawari, Hoklawari village and Biratnagar notified area. All the seeds growers of the identified locations were arranged in the descending order as per their operational holdings. It was observed from the list that there were no wheat seeds growers having and operational holdings less than 2.7 hectares. As such the wheat seed growers were categorised in only two groups, that is , medium size (2.71 to 5.42 ha) and large size (above 5.42 ha) group of farms.

Out of the total seventy nine wheat seed growers, a sample of forty seeds growers, that is, fifty percent seed growers from each size group from medium to large were then selected randomly with the help of Random Table. Total number of wheat seed growers and sample seed growers selected from each category of the farms have been presented in Table 1.

Table 1.
Total Number of Seed Growers and Sample Seed Growers from Different Categories of Farm.

Size of holdings	Total No. of seed growers	Number of sample seed growers selected
Medium size group (2.71 to 5.42 ha.)	30	15
Large size group (above 5.42 ha.)	49	25
	79	40

The primary data regarding the cost of inputs, labour charges, machine charges, portion of the seeds accepted and rejected and other information etc. were obtained from the sample seed growers through personal interview with the help of schedules specifically prepared for the purpose. The data for the study covered the year 1992 and were collected during the month of May, June 1993.

The Model

To estimate the elasticity of key input factors used in the production of the wheat seeds, Cobb-Douglas production function was selected for the purpose of analysis. The equation fitted to the different sets of data as follows:

$$Y = a\, x_1^{b_1}\, x_2^{b_2}\, x_3^{b_3}\, x_4^{b_4}\, x_5^{b_5}\, x_6^{b_6}\, e^{u}$$

Y = Gross returns per hectare in Rs
a = Intercept (constant)
X_1 = Human labour (Rs/ha.)
X_2 = Draft power (R/ha.)
X_3 = Manures & fertilzers (Rs/ha)
x_4 = Seeds (Rs/ha.)

x_5 = Irrigation (Rs/ha.)
X_6 = Pesticides (Rs/ha.)
b_1 to b_6 regression coefficient of the respective variables.
e^u = Error term.

The Cobb- Douglas function was converted into logarithmic form as follows:

$\text{Log } Y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + b_6 \log X_6$ and was fitted the resource efficiency.

With a view to find out whether the resources have been used optimally or not, the marginal value products of the input factors were compared with their respective acquisition costs. The marginal value of products have been obtained at the geomatric mean level and was calculated by an equation as follows:

Marginal value of products $(xi) = bi\ x^y$

Where,
bi = Regression coefficient at factors costs.
y = Geometric mean of output.
x = Geometric mean of input.

RESULTS AND DISCUSSION

Cost of Production

In order to have a deeper insight of various costs component in the cost structure a detail break-down of cost of cultivation has been presented in table 2.

Table 2.
Operational and Fixed Costs of Wheat Seed Cultivation.

(Rs. per hectare)

Cost Components	Medium farm	Large farm	All-farm
A. Operational costs			
1. Human labour	2991.14	3066.80	3038.43
	(24.15)	(23.56)	(23,77)
2. Machine labour	2478.20	2960.76	2779.80
	(20.02)	(22.75)	(21.75)
3. Manures, fertilizers & plant protection chemicals	1736.87	1903.76	1841.18
	(14.02)	(14.63)	(14.41)
4. Seeds	1414.33	1448.48	1435.67
	(11.42)	(11.13)	(11.23)
5. Irrigation	564.67	5558.00	560.50
	(4.56)	(4.28)	(4.39)
6. Bullock labour	525.67	169.60	313.25
	(4.46)	(1.30)	(2.45)
7. Misscellaneous	53.53	54.80	54.32
	(0.43)	(0.42)	(0.43)
8. Interest on working capital	652.76	677.48	668.21
	(5.28)	(5.20)	(5.23)
Sub-total	10444.17	10839.68	10691.36
	(84.34)	(83.27)	(83.66)
B. Fixed costs			
1. Imputed rental value of owned land	1870.38	2106.74	2018.11
			(15.79)
2. Land revenue	69.33	70.36	69.97
	(0.56)	(0.59)	(0.55)
Sub-total	1939.71	2177.10	2088.08
	(15.66)	(16.73)	16.34)
Total Costs	12383.88	13016.78	12779.44
	(100.00)	(16.73)	(100.00)

Note: Figures in parentheses indicate percentage to respective total cost.

Sources: Nanu Jha, OP. cit. , Table 5.8,p.67

In the table 2, various cost components have been grouped into two main heads, namely, operational and fixed costs. It may be observed from that per hectare operational costs, on an average farm, amounted to NRs. 10691. 36, which worked to 83. 66 percent of total costs. Per hectare expenditure on fixed costs, on an average farm, amounted to NRs. 2088.08 being nearly 16.34 percent of the total costs of wheat seeds cultivation. Among the operational costs components, expenditure on human labour (both hired & family labour), on an average, amounted to NRs. 3038. 43, which worked out to 23.77 percent of total costs. Expenditure on this items was NRs. 2991.14 (24.15 percent) on the medium farms and NRs 3066.80 (23.56 percent) on the large farms. Expenditure on this items to such a magnitude was mainly because of the fact that wheat seed cultivation is highly labour intensive crop since most of the operations like land preparation, application of manures and fertilizers, sowing, pesticide application, roguing, harvesting and threshing were performed by human labour.

Per hactare expenditure on machine labour, on an average, amounted to NRs. 2779.80. The cots of this item varied from NRs. 2478. 20 on medium to NRs. 2960.76 on the large farms. The expense on machine labour on the large farms was mainly because of the fact that the operations like land preparation and threshing were done mostly by machine labour.

Per hectare expenditure on an average farm, on manures and fertilizer and plant protection chemicals (NRs. 1841.18) constituted nearly 14.41 percent and on seeds 11.23 percent (NRs. 1435.67). Per hectare expense on irrigation, on an average was NRs 560.50 of total costs of cultivation of wheat seeds production.

Bullock labour, though is considered to be indispensable for any cultivation in the project area, in wheat seeds cultivation per hectare expenditure on this item, on an average, however, amounted to NRs 313.25 (2.45 percent).

Interest on working capital was also computed and found on an average to be NRs 668.21 for all the sample farms. Size groupwise analysis showed a declining trend, that is, comparatively higher on large farms (NRs 677.48) followed by medium farms (NRs 652.76).

Per hectare expenditure on imputed rental values of owned land was the most important. It was worked on the basis of share of

the land owner in the share of cropping system prevalent in the location. It may be observed from the table, on an average, per hectare expenditure on this item was NRs 2018.11 (15.79 percent). Comparatively higher expenditure on this item was found in case of the large size farms, mainly because of the fact that gross returns in wheat seeds production was comparatively higher on this size group of farms.

Gross and Net Returns

Gross returns is the value of total output obtained on the farm i.e. gross returns=px. y, where, px= average price of per unit of output. Net returns was calculated by deducting the cost from the total returns of the farms (net returns = total income-total cots) Gross returns, total expenditure and net returns have been presented in table. 3.

It may be observed from the table that per hectare gross returns and net returns on an average, were estimated to be NRs 13947.25 and NRs 1167.81 respectively. Comparatively higher gross and net returns were found in case of large size farm and lower on medium size farms. In spite of comparatively higher per hectare expenses, the large size farms earned comparatively higher gross and net returns indicating better use of inputs on these farms.

Table 3
Returns to Seed Growers from Wheat Seeds Production

(In rupees)

Size group of farms	Gross returns		Costs		Net returns	
	Per ha.	Per qt.	Per ha.	Per qt.	Per ha.	Per qt.
Medium	13238.53	725.80	12383.88	678.94	854.65	46.86
Large	14372.48	716.12	13016.78	648.57	1355.70	67.55
All-farms	13947.25	719.67	12779.44	659.41	1167.81	60.26

Source : Nanu Jha, Op. cit., Table 5.10, P-74

Resource Use Efficiency

The regression coefficient, returns to scale and marginal value of product of input resource have been presented in the table 4.

In pooled analysis, regression coefficients of human labours (x_1), draft power (x_2), fertilizer (x_3) seeds (x_4), irrigation (x_5) and pesticide (x_6) were 0.0947, 0.0457, 0.9228, 0.5784, 0.0007 and 0.0039, respectively. However, regression coefficient of fertilizer, seeds and pesticide were found statistically significant at 1 percent level of probability. It clearly indicates that the use of fertilizer, seeds, and pesticide influenced the wheat seed production on sample farms significantly. An increase in the level of 1 percent use of fertilizer, seeds and pesticide would result in a additional wheat seed production by 0.92, 0.58 and 0.004 percent, respectively.

Table 4
Production Elasticities Alongwith their Standard Error and Coefficient of Multiple Determination

Category of farms	Human Labour (X1)	Draft Power (X2)	Fertili-zer (X3)	Seeds (X4)	Irriga-tion (X5)	Pestici-des (X6)	Sum of elastic-ities	R2
Midium	-0.2854 (0.15500)	0.0946*** (0.0552)	1.3811** (0.48024)	-0.1818 (0.83918)	-0.0126 (0.02214)	0.0064* (0.00129)	1.0523	0.87175
Large	0.2455** (0.09770)	-0.0338 (0.07211)	0.3960 (0.37504)	0.5287** (0.29558)	0.0159 (0.01934)	0.0007 (0.00185)	1.1530	0.72272
All-farms (Pooled)	0.0847 (0.07865)	0.0457 (0.04687)	0.9228* (0.29558)	0.5784* (0.20540)	0.0007 (0.01552)	0.0039 (0.00118)	1.6462	0.75889

Note: Figure in parentheses indicates standard errors of corresponding elasticities.

* Denotes significance at 1 percent level of probability.
** Denotes significance at 5 percent level of probability.
*** Denotes significance at 10 percent level of probability.

Source: Nanu Jha, Op, Cit,, Table 5.14, P-79

Size groupwise analysis reveled that both size group of farms under study differ from each other with respect to response of input factors used in wheat seed production. The estimated production coefficient of human labour was 0.2455 on large size farms and was found significant at 5 percent level of influence on wheat seeds production on these farms. Whereas, the corresponding coefficient

on medium size farms was negative (-0.2354), indication of the over utilization of their resource in wheat seeds production on medium size farms. Draft power, commonly surplus resource perticlarly on small size farms, was found over utilized on large size farms(being production efficiency (0.338) on medium and large size farms, respectively, but it was found influencing wheat seeds production positively on medium size farms, though it was statistically non-significant. Production efficiency of fertilizer were 1.3811 and 0.3960 on medium and large size farms, respectively, but it was found significant on medium size farms at 5 percent level of inprobability, indicating under utilization of this resources on medium size farms. The production elasticity of seeds were 0.5287 and 0.1818 on large and medium size farms, respectively, but it was found significant only at large size farms at 5 percent level of probability. Production efficiency of irrigation was positive on large size farm (0.0159) and negative on medium size farms (-0.126), but were statistically non-significant. The use of pesticides was found at a lower level in wheat seeds production in both the size group of farms and their production elasticity was lower but positive (0.0007) and (.0064) on large and medium size farms, respectively. The production efficiency of pesticides was found significant on medium size farms indicating that the uses of pesticides influence the wheat seeds production on these farms in project area.

Returns to Scale

The sum of the elasticities indicate the nature of returns. In the present study sum of elasticities on pooled estimate as well as on large and medium size farms were 1.65, 1.15 and 1.05, respectively. All the estimated sum of the elasticities are more than one and hence, the increasing rate of returns is obtained on all the categories of farms. It implies that if one percent increase in all the inputs under study is made it will result in an increase of wheat seeds production by 1.6 percent on all the farms, and 1.15 percent on large and 1.05 percent on medium farms, respectively.

It may be observed from the table No. 4 that the coefficient of multiple determination (R^2) was estimated to be 0.75889, 0.87175 and 0.72272 for pooled, medium and large farms, respectively. The value

of coefficient of multiple determination showed that the independent variable included in the function was able to explain a very large proportion of variation in dependent varible in wheat seeds production (Y), that is 76 percent in pooled estimation, 87 percent on medium farms and 72 percent on large size farms. The unexplained part might be due to non-inclusion of certain cost items as variable in equation or error in reporting the original data as well as on account of the difference in the management factors on these farms.

Marginal Value Production of Input Resources

The marginal value product of resource are presented in table 5. The marginal value productivity of fertilizer (X_3) on medium size farm was (11.040, on large farms wa (3.345) and in pooled situation was (5.60). The marginal value productivity of pesticide (X_6) was found more than one on only medium farms (1.037) and human labour (X_1) on large farms (1.086).

Table 5

Marginal Value Products (MRP) of Input Resources at Geometric Mean Level

Category of farms	Resources					
	Human labour (X_1)	Draft Power (X_2)	Fertilizer (X_3)	Seed (X_4)	Irrigation (X_5)	Pesticide (X_6)
Medium	---	0.658	11.040	---	---	1.037
Large	1.086	---	3.345	5.238	0.409	0.073
All-farms	0.427	0.328	7.641	5.599	0.017	0.466

Source: Nanu Jha, op. cit; Table 5.15, p-83

The above results clearly indicate that there is ample scope for augmenting investment on human labour on large farms, on fertilizer under all the three situations, on seed, on large farms and pooled situation, and on pesticide in case of medium farms, since these inputs were underutilized under respective situation and

further increase in utilization of these inputs would increase the profitability on farms under study. It also indicates that medium farms should increase the investment on human labour, seed and irrigation. Large farms may also be advised to decline the expenses on draft power, irrigation and pesticide. The resource allocation on these suggested terms in wheat seed production would improve the profitability of wheat seed producer in general and sample farms in particular.

CONCLUSION

A margin of profit in wheat seed production was much lower on seed grower farms which can be increased by reducing the cost and increasing the productivity by adoption of modern technologies in wheat seed production. The wheat seed growers should be advised to use higher level of fertilizers for improving their productivity which will ultimately result in higher margin of profit. Seeds growing being a lucrative farm industry and also being an essential input commodity must be given boost for expansion in our agricultural plan.

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