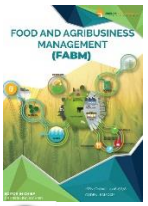
ZIBELINE INTERNATIONAL™ PUBLISHING
ISSN: 2716-6678 (Online)
CODEN: FAMOCP

Food & Agribusiness Management (FABM)

DOI: http://doi.org/10.26480/fabm.02.2023.66.70



RESEARCH ARTICLE

PROFITABILITY AND RESOURCE USE EFFICIENCY OF CAPSICUM PRODUCTION IN CHITWAN DISTRICT, NEPAL

Aarati Badal[a], Ashmita Bhatta[a*], Ankit Ojha[b]

[a]Faculty of Agriculture, Agriculture and Forestry University (AFU), Rampur, Chitwan, Nepal
[b]Department of Plant Breeding and Genetics, AFU, Rampur, Chitwan, Nepal
[*]Corresponding Author Email: bhattashmita25@gmail.com

ARTICLE DETAILS

Article History:

Received 09 April 2023
Revised 12 May 2023
Accepted 19 June 2023
Available online 21 June 2023

ABSTRACT

Unavailability coupled with inefficient and inappropriate use of resources is culminating into diminishing profitability and efficiency of vegetable production. This study aimed to analyze cost of production and resource use efficiency of capsicum enterprise in Chitwan district of Nepal uses Cobb-Douglas production function analysis to investigate the effects of different inputs on the returns from capsicum enterprise. Besides, descriptive statistics and t-test were also used. Primary data was collected from 66 randomly selected capsicum producers in Rapti Municipality and Bharatpur Metropolitan City using pre-tested semi-structured questionnaires. The total cost of production of capsicum in Chitwan district is NRs. 1,067,075.65 per ha; labour accounting the most of it at 22.14%. Capsicum production is found to be a profitable enterprise (BCR≈2). The return from capsicum production is likely to increase through improvements in use of fertilizer and plant protection inputs. Similarly, plant protection, seed and fertilizers are underutilized while labour, land preparation and harvest inputs are overutilized. In light of these findings, it is suggested that resources need to be allocated optimally in suggested proportions to get maximum returns. Also, labour costs can be minimized by introduction of mechanization for intercultural operations.

KEYWORDS

Allocation, Cobb-Douglas, Overutilization, Production economics, Variable cost

1. INTRODUCTION

Capsicum (*Capsicum annum L.*) is an important agricultural commodity in Nepal from commercial viewpoint as well as medicinal; as it contains natural colors and antioxidants (Ogunbo, 2015). The delicate taste, pleasant flavor and varied colors with nutritious qualities account for its global admiration (Bhattarai et al., 2020). In Nepal, it is grown in 1,779 hectares of land with production of 18,748 metric tonnes and productivity of 10.54 tonnes/ha (MoALD, 2022). Out of the major capsicum growing areas in Nepal, Chitwan is one with acreage of 122 ha and production and productivity of 1,464 metric tonnes and 12 tonnes/ha (MoALD, 2022).

Vegetable sub-sector is one of the most important sub-sectors of agriculture in Nepal with its high productivity and income generating feature, which constitutes 9.71% of the total 16.75% of horticultural component of agriculture's contribution to GDP (MoF, 2015; Adhikari and Pokhrel, 2020). The demand for fresh vegetables is increasing in Nepal due to growing health concerns and spending power of consumers. However, the country remains a net vegetable importer; most of it coming from neighboring country India (CASA, 2020). This shows the scope for commercialization of vegetable sector in Nepal. Vegetable farming is lucrative to most of the farmers owing to its high productivity, market value, gender – friendly nature and low-cost requirements. However, the major concern in vegetable farming of Nepal is found to be the unavailability of adequate resources and inefficient and inappropriate use of available resources leading to reduced profitability and efficiency in production (Shrestha et al., 2015).

Increase in agricultural production in developing countries primarily depends upon continuous improvement through technical changes which in turn is governed by sustained and rapid growth in use of inputs such as seeds, fertilizers, pesticides, machineries etc. (Mistary, 2022). And what is more important is, to use all these inputs at their optimum levels because all production factors are most efficiently used when they are used at that level (de Wit, 1992).

However, most of the vegetable farms are comprised with small land holding (<1 ha) and are characterized with intercropping, where capsicum is cultivated with other vegetables and crops. Therefore, this enterprise is not fully commercialized yet. To meet the current demand, production should be commercialized and market driven and for that to happen, profitability and productivity of capsicum enterprise should be realized by farmers.

Due to a large extension agent to farmer ratio, farmers are deprived of quality agricultural information services (Thapa et al., 2020). Moreover, the concept of economic use of inputs hasn't been found to be explored much in extension sector. Farmers may use inputs rationally but not at an economically optimum level owing to less knowledge on resource optimization. It is necessary to analyze the economics of production and efficiency of resources to maximize profits and minimize costs to achieve commercialization in farming. It has been found that, although studies regarding resource use efficiency in major cereals and high value crops prevail, it hasn't been explored extensively in case of capsicum. Being a major vegetable crop with high price value, it is imperative to study about the resource use efficiency in capsicum. In that regard, this study intends

Quick Response Code	Access this article online	
	Website: www.fabm.org.my	**DOI:** 10.26480/fabm.02.2023.66.70

Cite the Article: Aarati Badal, Ashmita Bhatta, Ankit Ojha (2023). Profitability and Resource Use Efficiency of Capsicum Production in Chitwan District, Nepal. *Food & Agribusiness Management, 4(2): 66-70.*

to find answers to three questions as – What is the cost of production of capsicum? How are the resources being utilized? How can we achieve optimum allocation of resources? The findings of this study will help farmers and other market stakeholders as well as policymakers to uplift the agribusiness of capsicum and vegetable as a whole.

2. Materials and Methods

2.1 Study Area, Sample Size and Data Collection

The study was conducted in Chitwan district, which was selected for two major reasons. Firstly, it is one of the major vegetable producing districts of the country. And secondly, realizing the potential of the district for vegetable production, the Prime Minister Agriculture Modernization Project (PMAMP) has declared the district as the vegetable zone intending to increase the productivity and commercialization of vegetables. Further, two municipalities namely Rapti Municipality and Bharatpur Metropolitan City were purposively selected because these are the major vegetable growing regions of the district. Capsicum farmers (66) cultivating capsicum as a major part of the cropping system were randomly selected from the list of farmers obtained from vegetable zone using Raosoft calculator. Out of the total respondents, 46 and 20 were allocated to Rapti Municipality and Bharatpur Metropolitan City respectively using proportionate sampling. The primary data was collected through an interview schedule using semi-structured questionnaires which were pre-tested before the survey. The primary data covered socio-demographic information along with information related to the cost of production and problems of cultivation. Similarly, reports of MoALD were referenced for secondary data. The collected data was then analyzed using MS Excel (2007) and STATA (version 12.1).

2.2 Estimation of Cost and Return

The total expenditure of an enterprise consists of both fixed and variable inputs. Fixed costs account for those inputs whose quantity doesn't vary with production volume while that of variable costs is for inputs that vary with production volume.

i.e., Total cost = Total fixed cost + Total variable cost

All inputs like seed, fertilizer, pesticides, rental value of land, wage for temporary laborers cost involved in cultivation were considered and valued at current market prices to calculate cost of production. During cost estimation, both purchased and own farm produced inputs were accounted.

Total Cost (NRs. /ha) = $C_{\text{land rent}} + C_{\text{seed}} + C_{\text{fertilizer}} + C_{\text{plant protection}} + C_{\text{labor}} + C_{\text{harvest}} + C_{\text{mulching}} + C_{\text{irrigation}} + C_{\text{nursery}}$

where, $C_{\text{fertilizer}} = C_{\text{FYM}} + C_{\text{urea}} + C_{\text{DAP}} + C_{\text{potash}}$

$C_{\text{plant protection}} = C_{\text{Pesticides}} + C_{\text{Insecticides}} + C_{\text{herbicide}} + C_{\text{micronutrients}}$

$C_{\text{labor}} = C_{\text{family labor}} + C_{\text{rental labor}}$

$C_{\text{land rent}} = C_{\text{explicit rent}} + C_{\text{implicit rent}}$

(Note: - Each cost is calculated in NRs. / ha)

The gross return refers to the returns to an enterprise without excluding the total costs, while net returns is the returns excluding total cost.

Gross Return (NRs. /ha) = Amount of Capsicum produced (kg/ha) × Price per kg (NRs.)

Net Return (NRs. /ha) = Gross Return (NRs. /ha) - Total cost (NRs. /ha)

2.3 Benefit – Cost Analysis

The ratio of undiscounted benefits and costs was obtained for profitability estimation. The following formula was used:

Benefit Cost Ratio = $\frac{Gross\ return}{Total\ cost}$

This formula was also used to analyze profitability of wheat enterprise by (Bist et al., 2021).

2.4 Production Function Analysis

Cobb-Douglas form of production function in the following form was fitted to examine the resource productivity and efficiency following (Gujarati, 2009).

$$Y = aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}X_6^{b6}e^{u}$$

where, Y = Gross return from Capsicum production (NRs. /ha)

X_1 = Cost on fertilizers (NRs. /ha),

X_2 = Cost on plant protection (NRs. /ha),

X_3 = Cost on seed (NRs. /ha),

X_4 = Cost of labour (NRs. /ha)

X_5 =Cost of land preparation (NRs. /ha)

X_6 =Cost of harvest (NRs. /ha)

e = Base of natural logarithm,

u = Random disturbance term,

a = Constant, and

b1, b2, b3, b4, b5 and b6 = Coefficients of respective variables

The Cobb-Douglas production function in the form expressed above was linearized into a logarithmic function with a view of getting a form amenable to practical purposes using technique as expressed below;

$$\ln Y = \ln a + b1\ln X1 + b2\ln X2 + b3\ln X3 + b4\ln X4 + b5\ln X5 + b6\ln X6$$

where, ln = Natural logarithm, and rest of the other abbreviations are same as previous explanations.

2.5 Resource Use Efficiency

The allocative efficiency of a resource used was determined by the ratio of Marginal Value Product (MVP) of variable input to the Marginal Factor Cost (MFC) for the input and tested for its equality to one i.e. (MVP/MFC) = 1. The efficiency of resource use was calculated as;

R = MVP/MFC

Where, r = Efficiency ratio,

MVP= Marginal value product of a variable input, MFC= Marginal factor cost

Decision rule for resource use efficiency is that efficiency ratio (r) equal to unity indicates the optimum use of that factor, the ratio more than unity indicates that gross return could be increased by using more of the resource and the ratio of less than unity indicates the excess use of resource which should be decreased to minimize the loss. Again, the relative percentage change in MVP of each resource required to obtain optimal resource allocation, i.e., r=1 or MVP = MFC was estimated using the following equation below;

D= (1-MFC/MVP) × 100 Or, D= (1-1/r) × 100

where, D represents absolute value of percentage change in MVP of each resource, and r for efficiency.

Similar approach was used in their studies by (Subedi et al., 2020; Mijindadi, 1980).

3. Results and Discussions

3.1 Cost of Production

The total cost of production of capsicum per ha in Chitwan district is calculated to be NRs. 1,067,075.65. Labour is found to be the most important and largely used input in capsicum cultivation accounting for 22.14% of the total cost per ha. This is because human labour is used in almost all cultivation operations as land preparation, planting, fertilizers and pesticides application, irrigation, mulching and harvesting. Has a also found out that cost of labour is the largest input in tomato production, which has a similar growing pattern with capsicum (Subedi et al., 2020). The cost of plant protection used per ha is 20.6% of the total, making it the second largest input used. Capsicum is the most commercial vegetable and most prone to diseases; thus, requiring maximum use of pesticides for its safety. In line with this, a study in Chitwan also found out that farmers use pesticides 17 times in one growing season of capsicum making it the second largest figure after eggplants (Paudel, 2017). Fertilizers and seeds constitute 16.84% and 14.22% of the total cost; thus, being the third and fourth largest input used respectively. Furthermore, the cost share of land rent, land preparation, irrigation, mulching and post-harvest was less than 6%; irrigation being the lowest at 0.5%.

Table 1: Cost of Production of Capsicum in one ha of land		
Variables	Cost (NRs. /ha)	Share (%)
Total land rent	63,385.86	5.94
Land preparation	43,629	4.09
Labour	236,287.15	22.14
Fertilizers	179,742.97	16.84
Seed	151,777.92	14.22
Nursery	18,802.25	1.76
Plant protection	219,877	20.6
Irrigation	5,341.21	0.5
Mulching	48,294.64	4.53
Harvest	57,421.42	5.38
Others	42,516.23	3.98
Total	1,067,075.65	100

1 USD: 130.68 NRs

4. Variable Costs

4.1 Cost of Fertilizers

Table 2: Fertilizer cost in capsicum production (NRs/ha).				
Cost category	Overall (n=66)	Rapti (n=46)	Bharatpur (n=20)	t-value
Manure (NRs/ha)	31757.58 ± 27588.49	30815.12±26058.5	33925 ± 31440	-0.41^{ns}
Chemical fertilizers (NRs/ha)	8772.90 ±12291.00	8093±12211.9	10336.65±12647.24	-0.67^{ns}
Total Fertilizer (NRs/ha)	179743 ±88171.4	177681 ±87716	184483.5±91318	-0.28^{ns}

Average cost of total fertilizer used was found to be NRs. 179,743. There was no significant difference in cost of fertilizer between two local bodies. Cost of manure was more than chemical fertilizers in both the municipalities and in total. This is because the productivity of per unit chemical fertilizers is more as compared to manure and therefore more quantity of manure is required and hence more the cost (Jasuja, et al., 2023).

4.2 Cost of Plant Protection

Table 3: Cost of plant protection in capsicum production (NRs/ha)				
Cost category	Overall (n=66)	Rapti (n=46)	Bharatpur (n=20)	t-value
Cost of pesticides (NRs/ha)	183950±97129.45	204994±100543	135550±69241	2.8071***
Cost of micronutrients (NRs/ha)	35926.6±26930	39549±27811	27593±23331	1.6806**
Total cost (NRs/ha)	219877±113659.4	244543.7±116939.2	163143 ±83342.34	2.8124***

*** and ** implies level of significance at 1% and 5% respectively.

Average cost of plant protection per ha was found to be NRs 219,877. The cost of pesticides and micronutrients used per ha was significantly higher in Rapti Municipality than Bharatpur Metropolitan City at 1% and 5% level of significance respectively. This might be attributed to less use of mulching by farmers of Rapti Municipality. Also, the total cost of plant protection per ha was significantly higher in Rapti Municipality at 1% level of significance.

4.3 Other Costs

Table 4: Other Costs involved in capsicum production (NRs/ha)				
Cost category	Overall (n=66)	Rapti (n=46)	Bharatpur (n=20)	t-value
Land preparation (NRs/ha)	43629.9±19557	38599±13669	55200±25763	-3.4199^{ns}
Seed (NRs/ha)	151777.9±64426	177285±47047	93110±61314	6.0793^{ns}
Labour (NRs/ha)	236287.2±156046.7	280041.4±155265.8	135652.5± 104463.8	-3.7939***
Nursery (NRs/ha)	18802.25±31952	4667.3±12336	51312.5±39191	-7.3396^{ns}
Mulching (NRs/ha)	48294±39466.95	47455±41655.98	50225±34834	-0.2601^{ns}
Irrigation (NRs/ha)	5341.219±13054	2261±3685	12425±21796	-3.092^{ns}
Harvest (NRs/ha)	57421±27457	56194±21506	60242±38362	-0.5474^{ns}

*** implies level of significance at 1%.

The average cost of land preparation, irrigation and nursery per ha is significantly higher for Bharatpur Metropolitan City than Rapti Municipality at 1% level of significance. However, the cost of seed and labour used per ha is higher in Rapti Municipality as compared to Bharatpur Metropolitan City at 1% level. The labour cost was higher in Rapti Municipality due to less use of technical equipment and more use of manual labour. There was no significant difference found between both local level for land preparation, seed, nursery, mulching, irrigation and harvest cost per ha.

4.4 Fixed Cost

There was no significant difference between explicit and implicit land rent as well as total land rent between both local levels. The total land rent cost on an average was found to be 63,385.86 NRs/ha.

Table 5: Fixed cost involved in capsicum production (NRs/ha)				
Cost category	Overall (n=66)	Rapti (n=46)	Bharatpur (n=20)	t-value
Explicit land rent (NRs/ha)	23359±27831	26115±32755	18950±18120.6	0.6309^{ns}
Implicit land rent (NRs/ha)	9804±4930	9354±4764	11200±5432	1.0298^{ns}
Total (NRs/ha)	63385.86±20860	62379±16696	65700±28641	-0.5913^{ns}

4.5 Cost and Return Analysis

The average productivity for farmers of Rapti municipality was found to be 26727.04 kg/ha while receiving an average price of 82.35 NRs/kg giving a return of 2074913 NRs/ha. Similarly, average productivity was 25028.78 kg/ha for Bharatpur municipality farmers. Price received by farmers was 87.9 NRs/kg giving a return of 2238538 NRs/ha. The productivity of capsicum in both municipalities is found to be similar. There was no significant difference between gross return, net return and benefit cost ratio of the two municipalities. This might be attributed to the similar features of farm such as land holding, use of varieties and other inputs and especially same market.

And all of the financial indicators were found positive and significant hence signifying the enterprise profitable. The overall benefit cost ratio was estimated to be 1.99 and that of Rapti and Bharatpur municipality as 1.91 and 2.38 respectively; indicating capsicum production as a profitable and viable enterprise at all three levels.

Table 6: Returns and Benefit Cost Ratio of Capsicum Enterprise in Chitwan				
Cost category	Overall (n=66)	Rapti (n=46)	Bharatpur (n=20)	t-value
Gross return	2124496±1450871	2074913±953678	2238538±2242249	-0.41^{ns}
Net return	1120805±1427365	1003196±9593343	1391305±2163270	-1.0154^{ns}
Benefit cost ratio	1.99	1.91	2.38	-1.0469^{ns}

4.6 Resource Productivity Analysis

The estimated values of the coefficients and related statistics of Cobb-Douglas production function defining the effect of six major inputs viz fertilizer, plant protection, seed, labour, land preparation and post-harvest on returns from capsicum production is shown in Table 7. The overall F-value was 12.65 which was statistically significant at 1% level indicating that the explanatory variables used in the model correctly govern the returns from capsicum enterprise. The R^2 value was estimated to be 0.5627, which means that about 56.27% variability in returns is explained by the explanatory variables. Out of six independent variables included in regression analysis, only fertilizer and plant protection were found significant at 5% and 10% level of significance while other factors namely seed, labour, land preparation and post-harvest were found insignificant in Capsicum production in the study area. The regression coefficient of fertilizer and plant protection was 0.35 and 0.23 respectively, which indicates that with 1% increase in fertilizer and plant protection cost or their usage, the gross return from Capsicum cultivation could be increased by 0.35 percent and 0.23 percent respectively. Dhakal et al. (2015) also reported the positive and significant effect of fertilizer and plant protection on returns from mustard cultivation in Chitwan. The sum of the regression coefficients of all the inputs taken in consideration in the regression function turned out to be 0.71 which indicates that the production function exhibited a decreasing return to scale. This implies that if all the inputs specified in the production function are increased by 1%, the production will increase by 0.71%. also found decreasing returns to scale on maize production in Palpa, (Nepal Sapkota et al., 2018). That also obtained similar results (Yadav et al., 2022).

Table 7: Values of Coefficients and Probabilities of the Production Function				
Factors	Coefficient	Standard Error	t-stat	p-value
Constant	5.6	2.03	2.75	0.008
Fertilizer	0.35	0.13	2.64**	0.011
Plant protection	0.23	0.12	1.83*	0.073
Seed	0.22	0.16	1.34	0.184
Labour	0.017	0.15	0.12	0.906
Land preparation	-0.077	0.16	-0.48	0.631
Post – harvest	-0.03	0.14	-0.2	0.839
F – value	12.65			
R square	0.5627			
Adjusted R square	0.5182			
Returns to scale	0.71			

The efficiency ratios of the inputs' fertilizers (3.91), plant protection (2.19) and seed (2.88) are estimated to be greater than one indicating their overuse, while that of labor (0.162), land preparation (-1.12) and post – harvest (-1.04) are estimated to be less than one indicating their underuse (Table 8). This shows the inputs are not managed efficiently are there is scope of input management for optimum returns.

For optimum allocation of resources, the use of fertilizers, plant protection and seed should be increased by 74.4%, 54.3% and 65.27% respectively; while that of labour, land preparation and post-harvest should be decreased by 517%, 189.28% and 196% respectively. The opportunity of doing adjustments in input levels can be utilized by increasing the amount of quality seeds used along with increment in the dose of quality fertilizers and pesticides as per the estimates of resource use efficiency. Moreover, the overuse of labour can be optimized by introducing mechanization in the cultivating operations. Similarly, number of land preparing operations should be reduced along with spending less on post harvest operations as per the estimates.

In line with the findings of this study, also reported the underutilization of planting materials, fertilizers and plant protection chemicals, overutilization of human labour in capsicum cultivation under open farm conditions in Himachal Pradesh, (India Kumari and Sharma, 2021). Similar results of overutilization of human labour have been reported in cauliflower production in Dhading stating a 116% reduction in labour costs is required for optimum allocation of inputs by (Ghimire and Dhakal, 2014).

Table 8: Measures of Resource Use Efficiency of Inputs						
Variables	Coefficient	MVP	MFC	r	D-value	Efficiency
Ln_fertilizers	0.35	3.91	1	3.91	74.4	Under-utilized
Ln_plant protection	0.23	2.19	1	2.19	54.3	Under-utilized
Ln_seed	0.22	2.88	1	2.88	65.27	Under-utilized
Ln_labor	0.017	0.162	1	0.162	-517	Over-utilized
Ln_land	-0.077	-1.12	1	-1.12	189.28	Over-utilized
Ln_harvest	-0.03	-1.04	1	-1.04	196	Over-utilized

5. Conclusion

This study showed that capsicum cultivation in Chitwan is a financially viable and profitable enterprise with high productivity and production potential. Fertilizers and plant protection inputs have been playing significant and positive role in governing the returns obtained from the enterprise. However, the resources are not yet being optimally utilized and there is scope to manage the cost of production to keep it at optimum levels so as to increase the profitability by increasing the cost on fertilizers, seed and plant protection inputs; meanwhile decreasing the same on labour, land preparation and post-harvest costs. This appeals the need of proper technical knowledge among the farmers to use the available existing resources efficiently. This study concludes that the resources should be used wisely to maximize return. Government and other concerned stakeholders could give priority to provide efficient technical knowledge about optimum utilization of resources.

Acknowledgements

We would like to acknowledge PMAMP and AFU for providing the platform of Learning Entrepreneurial Experience (LEE) Internship program, without the institutional and financial support of which, this study could not have been possible. Similarly, we extend our sincere gratitude towards our senior Mr. Saurya Karmacharya for helping us in data analysis.

References

Adhikari, B., and Pokharel, A., 2020. Trend Analysis on Production, Import, and Export of Vegetable Sub-Sector in Nepal. Journal of the Institute of Agriculture and Animal Science, Pp. 53-62.

Bhattarai, D. R., Maharjan, S. K., Gautam, I. P., Subedi, S., and Pokhrel, S., 2020. Evaluation of capsicum (Capsicum annuum L.) genotypes for variety improvement. Journal of Agriculture and Forestry University,Pp. 139-144.

Bist, P., Bhatt, P., Bist, S. N., and Kafle, R., 2021. Resource use efficiency of wheat seed production: a case of wheat superzoneKailali, Nepal. Azarian Journal of Agriculture, 8(2), Pp. 67-75.

CASA. 2020.Vegetable Sector Strategy – Nepal. Commercial Agriculture for Smallholders and Agribusiness. CASA Nepal Country Team, Nepal, Kathmandu

de Wit, C. D., 1992. Resource use efficiency in agriculture. Agricultural systems, 40(1-3), Pp. 125-151.

Dhakal, S. C., Regmi, P. P., Thapa, R. B., Sah, S. K., and Khatri-Chhetri, D. B., 2015. Resource use efficiency of mustard production in Chitwan district of Nepal. International Journal of Applied Sciences and Biotechnology, 3(4),Pp. 604-608.

Gujarati, D.N. 2009. Basic econometrics. Tata McGraw-Hill Education

Jasuja, N., S, P., Sehgal, P., Bansal, R., Srinoo, Williamson, J., Maribelsmarty., 2023, May 5. Diffen LLC. Retrieved from Diffen.com: https://www.diffen.com/difference/Chemical_Fertilizer_vs_Organic_Fertilizer

Kumari, S., and Sharma, S., 2021. Resource use efficiency of capsicum cultivation under open farm conditions in Himachal Pradesh. Journal of Agricultural Development and Policy, 31(2), Pp. 170-174.

Mijindadi, N.B., 1980. Production efficiency on farms in northern Nigeria. PhD dissertation. Cornell University, USA.

Mistary, V. S., 2022. Agriculture inputs and their importance for productivity-an overview. EPRA International Journal of Agriculture and Rural Economic Research (ARER), 10(3), Pp. 1-3.

MoALD. 2022. Statistical Information on Nepalese Agriculture. Kathmandu, Nepal: Planning and Development Cooperation Coordination Division, Statistics and Analysis Section.

MoF. 2015. Nepal Portfolio Performance Review (NPPR) 2015. Government of Nepal, Ministry of Finance. https://doi.org/10.1017/CBO9781107415324.004

Ogunbo, M. M., 2015. Resource-use efficiency and optimal farm plan in pepper (Capsicum spp.) production in Ogun state, Nigeria. African Journal of Food, Agriculture, Nutrition and Development, 15(4), Pp. 10255-10271.

Paudel, R. K., 2017, July 16. Republica. Retrieved from myrepublica.nagariknetwork.com: https://myrepublica.nagariknetwork.com/news/farmers-using-most-pesticide-on-eggplant-capsicum

Sapkota, M., Joshi, N. P., Kattel, R. R., and Bajracharya, M., 2018. Profitability and resource use efficiency of maize seed production in Palpa district of Nepal. SAARC Journal of Agriculture, 16(1), Pp. 157-168.

Shrestha, R. B., Huang, W., and Pradhan, U., 2015. Resource use efficiency in vegetable production in the high hills of eastern Nepal. Nepalese Journal of Agricultural Economics, 2(3), Pp. 79-87.

Subedi, M., Pandey, M., Ojha, R.K., and Acharya, B., 2020. Production economics and resource use efficiency of tomato under open field condition in Kapilvastu, Nepal. Journal of Agriculture and Natural Resources, 3(1), Pp. 282-289. DOI: https://doi.org/10.3126/janr.v3i1.27181

Subedi, S., Ghimire, Y. N., Kharel, M., Sharma, B., Shrestha, J., and Sapkota, B. K., 2020. Profitability and resource use efficiency of rice production in Jhapa District of Nepal. International Journal of Social Sciences and Management, 7(4), Pp. 242-247.

Thapa, A., Shrestha, D., Baudhacharya, N., Ramtel, R., Thapa, S., and Poudel, S., 2020. Information and communication technology (ICT) mediated extension services in agriculture in Nepal-A review. Acta Informatica Malaysia, 4(2), Pp. 33-36.

Yadav, R. K., Yadav, P. K., and Tiwari, U., 2016. Resource Use Efficiency of Wheat (Triticum Aestivum L.) Production in Kailali District, Nepal. Tropical Agroecosystems, 3(2): Pp. 36-42.