Plant Archives Volume 20 No. 2, 2020 pp. 9095-9103 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

COST AND RETURNS ON VARIOUS FARM LEVELS OF SELECTED MAJOR HORTICULTURAL CROPS IN THE STATE OF NAGALAND AND MANIPUR, INDIA

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Abstract

In India, agriculture is important occupation of which 52.00 percent of the people depend for their livelihood. Although agriculture dominates the primary sector however it has not reached its potential level, since most of the farmers use traditional technology, slow adoption of modern and proven technologies which impaired productivity and results in lower standard living of the framers in the region. The proposed study comprises both primary and secondary data have been collected. The primary relevant information of the proposed study has been collected by adopting personal interview method from the selected farm households in the study area for agricultural year 2016 to 2018. The BCR was found to be maximum (9.89: 1) on marginal potato farm, whereas it was minimum (2.43: 1) on medium farm of pineapple farm in Nagaland state, while in the Manipur state the BCR was found to be maximum (4.27: 1) on marginal potato farm and it was minimum (1.76: 1) on medium farm of pineapple farm, respectively.

Key words: Nagaland, Manipur, pineapple, potato, cabbage, cost and return.

Introduction

Struggle for food has been the basis for survival ever since mankind had evolved. From the nomadic people to the settled or permanent groups or communities, agriculture or farming has becomes the only primary means or of way of existence. Indigenous peoples have different ways of life in their specific boundaries Kent and Sharma (2014). Of these, farming in their own way for socio-economic development is considered to be an unavoidable aspect of the indigenous people living in different parts of the world. So, indigenous farming is associated with indigenous people and its various forms of indigenous cultures and agricultural practices that have been developed and practiced by the Indigenous. In fact, Indigenous farming is a way of life and it encompasses the social, economic, cultural and political purview too.

On the other hand, population explosion coupled with human being consistent pressurization on the natural resources for their existence or livelihood has been the concerned for the planners and policy makers for an effective solution to the above problems. Also, the decadal population growth rate and modernization of agriculture has led to the rise of Green Revolution in many underdeveloped and III-World countries. This Revolution of the modern agriculture is by and large depended on heavy use of chemical inorganic inputs for improving the production and productivities of the major's crops. However, the success of this agricultural system is largely depended on the efficient of water, use of quality seeds and heavy use of weedicides, insecticides or fungicides and better management practices through agricultural farm mechanization. Again, the current burgeoning issue of climate change and its impact has a fuller capacity or tendency of altering the crops-livestock's production and productivity level too. Further, climate change has also resulted in altering or changing the crop-livestock's habitation of the present certain ecosystem.

The present study has limitation of the time and other resources commonly faced by researcher and the study pertained to field survey. Though all attempts were made to extract correct information, the peculiar behavior of respondents might have caused limitations to some extent in extracting the true information.

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Materials and Methods

The present study has been carried out in Manipur and Nagaland both state in consultation with the organizations and the line-departments working in the field of Organic farming at the first and secondly the feasibility of the researcher. A multi-stage-random sampling technique has been used for the selection of sample units. Both purposive and cluster sampling method have been used for the selection districts, blocks and surveyed of the sample sizes.

In the first stage of sampling, selection of district has been carried out. Dimapur and Kohima districts from Nagaland and Senapati and Thoubal districts from Manipur were selected purposively for the study because of its popularity and production of major horticultural crops in the District.

In the second stage of sampling, block having highest acreage and production of major horticultural crops under the selected district have been selected with the help of District Agriculture Department and other reputed institutes. Kohima and Medziphema from Nagaland and Thoubal & Mao-Maram blocks from Manipur were purposively selected to get the desire information on the above objectives.

In the third stage of sampling plan, a list of villages under the selected block was prepared with the help of Block Development Officer/District Agriculture Department and ICAR institutes. From the villages available in this concerned district, villages which have popularity and production of major horticultural crops were randomly selected for further selection of respondent farmers by using simple random sampling without replacement. Accordingly, Medziphema and Jakhama from Nagaland and Phikomai; Kalinamei and Waithou Chiru were selected for the study.

In the fourth stage of sampling plan, with the help of the selected villages, authority (Headman) and KVKs institutes, the farmers who cultivate pineapple and potato were analysed and from these villages, 300 farmers (150 respondent farmers from Manipur and 150 respondent farmers from Nagaland) were selected for each crop (i.e 75 farmers/crop) for the data collection of the above crops. From the prepared farmers list, by adopting stratified random sampling, proportional allocation and cluster sampling techniques, the respondent farmers were drawn for collection of information using pre-tested schedule.

The categorizations of household farmers into marginal, small and medium group were done on the basis of their operational land holdings as follows:

Marginal	:	Less than ha
Small	:	1.01 to 2 ha
Medium	:	2.01 & above.

A complete list of farmers along with their holding size was prepared from each of the selected villages with the help of village headman/Chairman/pradhan of the respective villages. While preparing the list due consideration was given to those farmers who have devoted at least twenty percent of their net sown area to the particular selected vegetables for inclusion in the final list of the selected household. In the third stage farmers was selected randomly each from a selected village to get optimum sample size. Finally, the farmer respondents were classified into different categories or marginal, small and medium size groups. To determine the optimum sample size two step approaches was be used, first a preliminary sample size was selected using simple random sampling without replacement (SRSWOR) to estimate the population parameter values, which in turn was used to determine the final sample size. Secondly, the preliminary sample was augmented by drawing additional units from the population so that the size of the augmented sample is same as the required sample size (Ravindra and Nauran 1975).

Let n1 be the size of preliminary sample selected using simple random sampling without replacement (SRSWOR) then sample mean square

Table 9. n_1

S_1^2 = ---------- $\Sigma i = 1 (y_i - y_1)^2$

$n_1 - 1$

Table 9. n_1

Where, y = ---------- $-\Sigma_{i=1}$ is the preliminary sample mean.

N_1

Sample size required for estimating population mean with permissible error B is given by;

$$n = \frac{N_{S1^2}}{ND + S1^2}$$

Where, D = $D = \frac{B^2}{4}$ and N= size of the population i.e., total number of vegetable Growing farmers.

Analytical Framework

Various analytical tools that has been employed for the collection of primary and secondary data analysis

and interpretation to meet the objectives of the study is being analyzed as below.

A. Evaluation of inputs and output

Inputs and output are quantified and valuated as:

Table 9. **1. Human labour:** Human labour both family and hired have been measure in terms on man-days of eight hours. The differences in the efficiency of labour will be accounted by converting female and child labour-days into man-days by using the following criterion.

Man equivalent: Male = 1, Female = 0.75, Children = 0.5

a) Hired labour: The wage for hired labour will be evaluated as the actual amount paid in cash and kind.

b) Family labour: The imputed value of family labour have been work out on the basis of hired labour charge.

2. Bullock labour: The work done by a bullock team (a pair of bullock and a ploughman) have been calculated at the actual amount paid in cash and kind.

a) Hired bullock labour: The wage for bullock have been estimated at the actual amount paid for hiring the bullock team for different operation.

b) Owned bullock labour: The wages for owned bullock labour have been accounted for as per the rates of hired bullock team prevailing in the locality.

3. Hired machines charges: Machines charges have been accounted on the basis of actual amount paid.

4. Seed: The purchased seed have been value at the actual amount paid plus transportation charges. Home produced seeds are valued at the prevailing price in the locality plus transportation charges.

5. Manures and Fertilizer: Farm produced manure have been value at the prevailing locality price. Purchased manures and fertilizer will be value at the actual amount paid plus transportation charges.

6. Plant protection chemicals: These will be value at the actual amount paid plus transportation charges.

7. Interest on working capital: Calculated at the commercial bank's rate for half the duration of the crop on the sum total of paid out cost.

8. Land revenue: The land revenue paid by the sample farmers have been apportioned for the crops using the relationship:

$$\text{Land revenue} = \frac{\textit{total land revenue paid per annum}}{\textit{total crop area}} \times \text{area under the crop}$$

9. Depreciation: The cost associated for using farm tools and implements production have been calculated using straight line method. The annual rate of depreciation will be converted to the duration of production period.

Annual rate of depreciation =

$$\frac{\textit{purchased price} - \textit{junk value}}{\textit{life span of the asset}}$$

10. Interest on fixed capital:

Rate of interest for fixed capital have been work out at per interest rate paid by the commercial bank in short term deposits. Using the rate of interest, the interest on fixed capital have been calculated for the total fixed cost.

B. Cost and Returns Analysis

Analysis of cost and returns of major horticultural crops grown under organic and conventional farming practices have been done using simple mathematical and average calculation.

1. Cost of production: The expenses incurred in the production have been categorized into two groups.

a) Total fixed cost (non recurring cost): It will include the expenses (value) incurred in the following items:

1. Family labor
2. Depreciation
3. Land revenue
4. Interest on fixed capital
5. Imputed rental value of owned land

b) Total variable cost (recurring cost): It will include the expenses of the value incurred in the following items;

1. Seed
2. Fertilizer
3. Manure
4. Hired Human labour
5. Hired machine/bullock
6. Interest on working capital
7. Rental value for lease-in land

c) Total cost (Gross Cost) = Fixed cost + Variable cost

2. Cost Concepts: The cost concept have been used in working out the cost and returns structures of production are as follows:

Cost A_1 includes

1. Value of hired human labour (permanent and

casual).

2. Value of manure and fertilizer.

3. Value of hired and owned machinery.

4. Value of seed (both farm produced and purchased).

5. Depreciation on farm implements used

6. Land revenue and other taxes

7. Interest on working capital

8. Miscellaneous expenses

Cost A_2 = Cost A_1 + Rent paid for leased-in land.

Cost B = Cost A_2 + Imputed rental value of owned land (less land revenue paid there upon) + imputed interest on fixed capital (excluding land).

Cost C = Cost B + Imputed value of family labor.

Cost D = Cost C + Managerial cost (10% of Cost A_1+ Risk Margin (10 percent of Cost A_1).

Returns analysis

1. Gross farm income (GFI) (gross returns) = Gross value of output (qt) x price (Rs)/qt.

2. Net farm income (NFI) = GFI – Cost D.

3. Farm business income = GFI – Cost A_1

4. Owned farm business income = GFI – Cost A_2

5. Family labor income = GFI – Cost B

6. Benefit cost ratio based on the total cost = GFI/ Cost D

7. Benefit cost ratio based on the variable cost = GFI/CostA_1

Results and Discussion

Table 1 reveals the cost and return structure for different selected horticultural crops in Nagaland state. The total investment on seed for the pineapple farming was found to be maximum with 10.32 percent on marginal farm size group and it was minimum with 8.62 percent on medium farm size group, while on potato it was found to be maximum 23.02 percent on medium farm and it was found to be minimum 20.56 percent on marginal farm size group and on cabbage it was found to be maximum 5.66 percent on marginal farm and it was found to be minimum 4.07 percent on medium farm size group, respectively. Similar studies were carried out by the Sharma and Singh (2001); Sharma (2012); Dinesh and Sharma (2019).

The total investment on labour was varied from 16.01 to 24.34 percent across the different farm size groups, respectively. The total cost on pineapple farming was found to be maximum with Rs 16777.11 on small farm size group and it was minimum with Rs 11858.36 on marginal farm size group, even for the potato it was found to be maximum Rs 29908.40 on medium farm and it was found to be minimum Rs 24976.04 on marginal farm size group and on cabbage farm it was found to be maximum Rs 14022.32 on marginal farm and it was found to be minimum Rs 13706.03 on small farm size group, respectively. Similar study was carried out in the same line by Das and Sharma (2018).

The cost B on pineapple farming was found to be maximum with Rs 17927.11 on medium farm size group and it was minimum with Rs 13153.36 on marginal farm size group, even for the potato it was found to be maximum Rs 31158.41 on medium farm and it was found to be minimum Rs 26176.04 on marginal farm size group and on cabbage farm it was found to be maximum Rs 15421.32 on medium farm and it was found to be minimum Rs 15096.23 on marginal farm size group, respectively. Similar studies were carried out by the Sharma (2012); Sharma *et al.,* (2018).

Cost C on pineapple farming was found to be maximum with Rs 40597.21 on small farm size group and it was minimum with Rs 36508.36 on marginal farm size group, even for the potato it was found to be maximum Rs 54429.38 on small farm and it was found to be minimum Rs 51866.38 on marginal farm size group and on the cabbage farm it was found to be maximum Rs 43292.82 on small farm and it was found to be minimum Rs 40631.03 on marginal farm size group, respectively. Similar studies were carried out by the Sharma and Singh (2001); Choudhary *et al.,* (2017).

Table 2 reveals per hectare yield, cost and return of various horticultural crops across size group in the Nagaland state, the BCR was found to be maximum (9.89: 1) on marginal potato farm, whereas it was minimum (2.43: 1) on medium farm of pineapple farm. The average yield was found to be on maximum with 257.50 q on marginal potato farm and it was found to be least with 24.39 q on marginal pineapple farm, respectively. The total net-income of Rs 469483.69 was found on small potato farm and it was found least of Rs 58331.54 on small pineapple farm. The total family labour income of Rs 492907.72 was found to be maximum on small potato farm and it was found least of Rs 81530.84 on small pineapple farm. The total maximum investment of Rs 470733.70 was found on medium potato farm and it was found to be least on Rs 59931.54 on medium pineapple farm. The gross income/ha was found to be on maximum of Rs 309000.40 on marginal potato farm and it was found to be least of Rs 98928.75 on small pineapple farm,

Table 1: Cost and return structure for different horticultural crops in Nagaland state.

S.N.	Items of cost	Pineapple				Potato				Cabbage			
		Marginal	**Small**	**Medium**	**Average**	**Marginal**	**Small**	**Medium**	**Average**	**Marginal**	**Small**	**Medium**	**Average**
1.	Seeds	3770.00 (10.32)	3699.00 (9.11)	3466.60 (8.62)	3645.20 (9.12)	10665.00 (20.56)	11725.00 (21.54)	12160.00 (23.02)	12015.00 (22.42)	2300.00 (5.66)	1870.89 (4.37)	1765.57 (4.07)	1978.79 (4.66)
2.	FYM	-	2000.00 (4.92)	1560.00 (3.88)	1780.00 (4.40)	3000.00 (5.78)	3450.00 (8.33)	3657.00 (6.92)	3369.00 (6.28)	2000.00 (4.92)	2100.00 (4.90)	2300.00 (5.31)	2133.30 (5.02)
3.	Bio-Fertilizer	-	-	-	-	-	-	-	-	-	-	-	
4.	Pl. Prot. Easures	-	300.00 (0.73)	450.00 (1.10)	375.00 (0.93)	-	-	-	-	-	-	-	
5.	Stacking materials	-	-	-	-	1230.00 (2.37)	1400.00 (2.57)	1000.00 (1.89)	1210.00 (2.25)	-	-	-	-
6.	Labour i)Hired	7006.50 (19.19)	8619.50 (21.23)	9785.00 (24.34)	8470.33 (21.21)	8308.50 (16.01)	9930.50 (18.24)	10940.70 (20.72)	9726.56 (18.15)	7997.50 (19.68)	8317.90 (19.44)	8619.50 (19.90)	8311.63 (19.58)
7.	Deprecation on impl.	410.74 (1.12)	662.55 (1.63)	754.55 (1.87)	609.28 (1.52)	358.81 (0.69)	408.45 (0.75)	457.79 (0.86)	424.64 (0.79)	670.65 (1.65)	641.43 (1.49)	543.54 (1.25)	618.54 (1.45)
8.	Int on work cap.	671.12 (1.83)	916.86 (2.25)	760.96 (1.80)	892.78 (2.23)	1413.73 (2.72)	1614.80 (2.96)	1692.92 (3.20)	1604.71 (2.99)	778.08 (1.91)	775.81 (1.81)	793.71 (1.83)	982.53 (2.31)
9.	Total cost A_1	11858.36 (32.48)	16197.91 (38.98)	16777.11 (41.74)	15772.59 (39.50)	24976.04 (48.15)	28528.78 (52.41)	29908.41 (56.64)	28349.92 (52.91)	13746.23 (33.83)	13706.03 (32.08)	14022.32 (32.38)	14024.79 (33.04)
10.	Cost A_2	11858.36	16197.91	16777.11	15772.59	24976.04	28528.78	29908.41	28349.92	13746.23	13706.03	14022.32	14024.79
11.	Rental value of owned land	1295.00 (3.54)	1200.00 (2.95)	1150.00 (2.86)	1215.00 (3.04)	1200.00 (2.31)	1300.00 (2.30)	1250.00 (2.36)	1250.00 (2.33)	1350.00 (3.30)	1400.00 (3.27)	1400.00 (3.20)	1383.33 (3.20)
12.	Cost B	13153.36 (36.02)	17397.91 (42.85)	17927.11 (44.60)	16987.59 (42.54)	26176.04 (50.46)	29828.78 (54.80)	31158.41 (59.01)	29599.92 (55.24)	15096.23 (37.15)	15106.03 (35.30)	15422.32 (35.62)	15408.12 (36.60)
13.	Imputed value of family labour	23355.00 (63.97)	23199.30 (57.14)	22265.10 (55.39)	22939.80 (57.09)	25690.50 (49.53)	24600.60 (45.19)	21642.30 (40.98)	23977.80 (44.75)	25534.80 (62.84)	27679.00 (64.69)	27870.30 (64.37)	27028.03 (63.69)
14.	Cost C	36508.36 (100.00)	40597.21 (100.00)	40192.21 (100.00)	39927.39 (100.00)	51866.54 (100.00)	54429.38 (100.00)	52800.71 (100.00)	53577.71 (100.00)	40631.03 (100.00)	42785.03 (100.00)	43292.62 (100.00)	42436.15 (100.00)

(Figure in the parentheses indicate percentage to the total).

Table 2: Per hectare yield, cost and return of various horticultural crops across farm size group in Nagaland state (Rs).

S.N.	Items of cost	Pineapple				Potato				Cabbage			
		Marginal	Small	Medium	Average	Marginal	Small	Medium	Average	Marginal	Small	Medium	Average
1.	Average yield (q)	28.28	25.53	24.39	26.06	257.50	243.70	239.80	247.00	85.60	82.30	78.17	82.02
2.	Average price (per q)	3875.00	3875.00	4250.00	4000.00	1200.00	1200.00	1150.00	1183.33	1523.10	1632.40	1689.70	1615.07
3.	Gross income per hectare	109585.00	98928.75	110755.00	104240.00	309000.00	292440.00	275770.00	292287.51	130377.36	134346.52	132083.85	132467.79
4.	Net Income	73076.64	58331.54	70562.79	64312.60	452833.46	468307.12	469483.69	462995.88	89746.33	91561.49	88791.23	90031.63
5.	Net returns (Rs / q)	2584.03	2284.82	2893.10	2467.86	1758.57	1921.65	1957.81	1874.47	1048.43	1112.53	1135.87	1097.67
6.	Farm business income	97726.44	82730.84	93977.89	88467.41	479723.96	494207.72	492375.99	488223.68	116671.33	120640.49	118061.53	118443.00
7.	farm labour income	96431.64	81530.84	92827.89	87252.41	478523.96	492907.72	491125.99	486973.68	115281.13	119240.49	116661.53	117059.67
8.	Farm investment income	74371.64	59531.54	71712.79	65527.60	454033.50	469607.10	470733.70	464245.90	91096.33	92961.49	90191.23	91414.96
9.	B: C Ratio on paid out cost	1:9.00	1:6.00	1:6.00	1:6.00	-	-	-	-	-	-	-	-
10.	B: C Ratio	1:3.00	1:2.43	1:2.75	1:2.61	1:9.70	1:9.60	1:9.89	1:9.64	1:3.20	1:3.10	1:3.05	1:3.12

respectively. Similar studies were carried out by the Sharma (2005); Singh *et al.,* (2018); Imlibenla and Sharma (2019).

Table 3 reveals the cost and return structure for different selected horticultural crops in Manipur state. The total investment on seed for the pineapple farming was found to be maximum with 10.60 percent on marginal farm size group and it was minimum with 9.67 percent on medium farm size group, while on potato it was found to be maximum 23.79 percent on marginal farm and it was found to be minimum 17.54 percent on medium farm size group and on cabbage it was found to be maximum 11.18 percent on marginal farm and it was found to be minimum 10.47 percent on medium farm size group, respectively. Similar studies were carried out by the Jamir and Sharma (2014); Kulshrestha *et al.,* (2020).

Table data reveals that the total investment on the FYM was found to be maximum 3.85 percent on Potato marginal farm and it was minimum 2.04 percent on medium pineapple farm size group, even the investment on the bio-fertilizer was found to be maximum on 11.78 percent on medium potato farm and it was found to be minimum on pineapple marginal farm size group, further the plant protection measures were found to be maximum on 3.15 percent on potato medium farm and it was minimum 1.27 percent on marginal pineapple farm size groups, respectively. Similar studies were carried out by the Jamir and Sharma (2014); Tangjang and Sharma (2018).

Even the total investment on labour was found to be maximum 9.98 percent on small pineapple farm and it was found to be minimum 12.76 percent on medium potato farm size group, respectively. Total cost/Cost A_1 was on pineapple farming was found to be maximum with Rs 16270.08 on medium farm size group and it was minimum with Rs 31478.68 on marginal farm size group, even for the potato it was found to be maximum Rs 54132.38 on medium farm and it was found to be minimum Rs 35612.35 on marginal farm size group and on cabbage farm it was found to be maximum Rs 31140.45 on medium farm and it was found to be minimum Rs 25705.48 on marginal farm size group, respectively. Similar studies were carried out by the Sharma *et al.,* (2000); Sharma (2011); Sharma *et al.,* (2012); Vengoto and Sharma (2018).

The cost B on pineapple farming was found to be maximum with Rs 38488.68 on medium farm size group and it was minimum with Rs 19645.68 on marginal farm size group, even for the potato it was found to be maximum Rs 61082.38 on medium farm and it was found to be

Table 3: Cost and return structure for different horticultural crops in Manipur state.

S. N.	Items of cost	Pineapple				Potato				Cabbage			
		Marginal	**Small**	**Medium**	**Average**	**Marginal**	**Small**	**Medium**	**Average**	**Marginal**	**Small**	**Medium**	**Average**
1.	Seeds	5660.00 (10.60)	6550.00 (9.68)	7392.00 (9.67)	6534.00 (9.69)	18559.00 (23.79)	18701.00 (19.1)	18218.00 (17.54)	18492.67 (19.63)	7447.00 (11.18)	7899.00 (11.00)	8109.00 (10.45)	7818.33 (10.72)
2.	FYM	-	2000.00 (2.95)	1560.00 (2.04)	1780.00 (2.64)	3000.00 (3.85)	3450.00 (3.52)	3657.00 (3.52)	3369.00 (3.57)	2000.00 (3.00)	2100.00 (2.92)	2300.00 (2.96)	2133.30 (2.92)
3.	Bio-Fertilizer	2100.00 (3.93)	6500.25 (9.61)	8400.32 (10.99)	5666.86 (8.40)	1200.00 (1.54)	9456.78 (9.66)	12208.90 (11.78)	7621.89 (8.09)	6894.00 (10.35)	7175.00 (9.99)	7251.00 (9.34)	7106.66 (9.74)
4.	Plant protection measures	678.40 (1.27)	1345.98 (1.90)	2000.00 (2.62)	1341.46 (1.99)	1228.75 (1.57)	2566.60 (2.62)	3276.60 (3.15)	2357.31 (2.50)	898.81 (1.35)	942.31 (1.31)	1774.25 (2.28)	1205.12 (1.65)
5.	Stacking materials	—	-	-	-	-	-	-	-	-	-	-	-
6.	Labour i)Hired	6000.00 (11.23)	6750.00 (9.98)	9250.00 (12.10)	7333.33 (10.87)	9250.00 (11.86)	12500.00 (12.77)	13250.00 (12.76)	11666.67 (12.38)	6250.00 (9.38)	7250.00 (10.10)	9000.00 (11.59)	7500.00 (10.28)
7.	Deprecation, repair of implements etc.	910.74 (1.70)	1062.55 (1.57)	1094.55 (1.43)	1022.61 (1.51)	358.81 (0.46)	408.45 (0.41)	457.79 (0.44)	408.35 (0.43)	760.65 (1.14)	883.43 (1.20)	943.54 (1.22)	862.54 (1.18)
8.	Interest on working capital	920.94 (1.72)	1452.52 (2.14)	1781.81 (2.33)	1420.69 (2.10)	2015.79 (2.58)	2824.96 (2.88)	3064.09 (2.95)	2634.95 (2.79)	1455.02 (2.18)	1574.98 (2.19)	1762.66 (2.27)	1597.55 (2.19)
9.	Total cost A_1	16270.08 (30.47)	25661.30 (37.95)	31478.68 (41.18)	25098.95 (37.23)	35612.35 (45.66)	49907.79 (51.00)	54132.38 (52.13)	46550.84 (49.42)	25705.48 (38.60)	27824.72 (38.76)	31140.45 (40.13)	28223.51 (38.68)
10.	Cost A_2	16270.08	27961.30	34978.68	27998.95	35612.35	52207.79	57632.38	49450.84	25705.48	30124.72	34640.45	31123.51
11.	Rental value of owned land	3375.00 (6.30)	3400.00 (5.02)	3450.00 (4.51)	3408.30 (5.05)	3375.00 (4.32)	3400.00 (3.47)	3450.00 (3.32)	3408.30 (3.61)	3375.00 (5.06)	3400.00 (4.73)	3450.00 (4.44)	3408.30 (4.67)
12.	Cost B	19645.08 (36.79)	31361.3 (46.38)	38428.68 (50.28)	31407.25 (46.59)	38987.35 (49.99)	55607.79 (56.82)	61082.38 (58.82)	52859.14 (56.11)	29080.48 (43.67)	33524.72 (46.70)	38090.45 (49.09)	34531.81 (47.33)
13.	Imputed value of family labour	33750.00 (63.20)	36250.00 (53.61)	38000.00 (49.71)	36000.00 (53.40)	39000.00 (50.01)	42250.00 (43.17)	42750.00 (41.17)	41333.33 (43.88)	37500.00 (56.32)	38250.00 (53.29)	39500.00 (50.90)	38416.67 (52.66)
14.	Cost C	53395.08 (100.00)	67611.30 (100.00)	76428.68 (100.00)	67407.25 (100.00)	77987.35 (100.00)	97857.79 (100.00)	103832.40 (100.00)	94192.48 (100.00)	66580.48 (100.00)	71774.72 (100.00)	77590.45 (100.00)	72948.48 (100.00)

(Figure in the parentheses indicate percentage to the total).

Table 4: Per hectare yield, cost and return of various horticultural crops across farm size group in Manipur state (Rs).

S.N.	Items of cost	Pineapple				Potato				Cabbage			
		Marginal	Small	Medium	Average	Marginal	Small	Medium	Average	Marginal	Small	Medium	Average
1.	Average yield (q)	63.38	65.34	67.45	58.38	107.50	114.80	123.81	98.70	122.30	124.30	128.90	115.50
2.	Average price (per q)	2300.00	2212.00	2000.00	2170.00	3100.00	3045.00	3040.00	3061.67	1660.00	1500.00	1652.00	1604.00
3.	Gross income per hectare	145774.00	144532.08	134900.00	136684.60	333250.00	349566.00	376382.40	302186.82	203018.00	186450.00	212942.80	200803.60
4.	Net Income	92378.92	76920.80	58471.32	59277.35	255262.70	251708.20	272550.00	207994.30	136437.50	114675.30	135352.40	127855.10
5.	Farm business income	129503.90	118870.80	103421.30	101585.70	297637.70	299658.20	322250.00	255636.00	177312.50	158625.30	181802.40	172580.10
6.	Family labour income	126128.90	113170.80	96471.32	95277.35	294262.70	293958.20	315300.00	249327.70	173937.50	152925.30	174852.40	166271.80
7.	Farm investment income	95753.92	80320.80	61921.32	62685.65	258637.70	255108.20	276000.00	211402.60	139812.50	118075.30	138802.40	131263.40
8.	BCR on paid out cost	1:8.91	1:5.63	1:4.28	1:5.04	1:9.35	1:7.00	1:6.95	1:6.49	1:7.80	1:6.70	1:6.80	1:7.10
9.	BCR on total cost	1:2.73	1:2.13	1:1.76	1:1.87	1:4.27	1:3.57	1:3.62	1:3.20	1:3.04	1:2.59	1:2.74	1:2.75

minimum Rs 38987.35 on marginal farm size group and on cabbage farm it was found to be maximum Rs 38090.45 on medium farm and it was found to be minimum Rs 29080.48 on marginal farm size group, respectively. Similar studies were carried out by the Sharma and Singh (2001); Sharma (2013); Kulshrestha *et al.,* (2020).

Cost C on pineapple farming was found to be maximum with Rs 76428.68 on medium farm size group and it was minimum with Rs 53395.08 on marginal farm size group, even for the potato it was found to be maximum Rs 103832.40 on medium farm and it was found to be minimum Rs 77987.35 on marginal farm size group and on the cabbage farm it was found to be maximum Rs 77590.45 on medium farm and it was found to be minimum Rs 66580.48 on marginal farm size group, respectively. Similar studies were carried out by the Sharma *et al.,* (2016); Das and Sharma (2018); Kulshrestha *et al.,* (2020).

Table 4 reveals per hectare yield, cost and return of various horticultural crops across size group in the Manipur state, the BCR was found to be maximum (4.27: 1) on marginal potato farm, whereas it was minimum (1.76: 1) on medium farm of pineapple farm. The average yield was found to be on maximum with 128 q on medium cabbage farm and it was found to be least with 63.38 q on marginal pineapple farm, respectively. The total net-income of Rs 272550.00 was found maximum on medium potato farm and it was found least of Rs 58471.32 on medium pineapple farm. The total family labour income of Rs 315300.00 was found to be maximum on medium potato farm and it was found least of Rs 96471.32 on medium pineapple farm. The total maximum investment of Rs 276000.00 was found on medium potato farm and it was found to be least on Rs 61921 on medium pineapple farm. The gross income/ha was found to be on maximum of Rs 376382.40 on medium potato farm and it was found to be least of Rs 134900.00 on medium pineapple farm, respectively. Similar studies were carried out by the Sharma *et al.,* (2000); Sharma (2011); Sharma *et al.,* (2012); Vengoto and Sharma (2018).

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