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Exploring Microeconomic Dynamics and Challenges in Vegetable-Based Farming System

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Horticulture based farming could be one of the potential sources to increase the income of farmers and employment generation in agrarian agriculture, as well as meeting the demand for healthy foods with changing consumption habit of the growing population. Therefore, during 2020-21,

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present study was conducted in Nagaon district of Assam with a sample size of 100 farmers using multistage random sampling where pretested schedule was used by PRA and interview method to examine the status, income, employment, and problems associated with horticulture-based farming system. Arecanut and coconut are found to be the common crops grown by all the selected farmers and the highest net return of Rs.298480 per ha from Vegetables+ Livestock component+ Spices +Coconut/Arecanut farming system out of the 6 selected farming systems. The labour employment was highest in Rice +Vegetables +Toria +Fishery+ Coconut/Arecanut farming system. In order to prioritize the problem, Pareto analysis is done and it has been found that animal menace and pest and disease are the major production problems causing (› 80 %) out of total 10 production problems. Marketing problems like processing, assembling and storage facility are major problems causing (› 80 % problems) among the sample farmers. To deal with the problems these farmers should be given proper training on management of animal and pest menace, proper storage facilities and post-harvest management. This may be the best strategy to address the yield loss occurs due to spoilage.

Keywords: Farming system; income; employment; production problem; marketing problem.

1. INTRODUCTION

Horticulture sector can play an important role for income and employment opportunities for small and marginal farmers of Assam, as traditionally horticultural crops are grown in each household of Assam. Moreover, to meet the supply for food demand among the growing population horticultural may be considered also a ray of hope. Pattanaik et. al stated that to mitigate climate change and disaster IFS could be an option for increasing income of farmers [1]. However success in horticulture requires careful planning, knowledge like market demand, location specific crop selection, pest and disease management etc. in addition to collaboration with local agricultural extension services in order to achieve maximum income with minimum cost. In Nagaon district, production of winter vegetables and summer vegetables are 343454MT and 73950MT with a productivity of 16560 kg/ha and 13248kg/ha respectively during 2020-21. Various factors may affect horticulture-based farming system in income and adoption among farmers. It may provide opportunity to gain more income in short cycle, higher profit per unit land, employment opportunities, creation of export market, enhancement of crop value, risk management through diversification, ultimately improve overall livelihood of farmers by creating better access to education, healthcare etc. Kashyap et al. (2020) revealed that net return had been increased to 119% w.r.t. adoption exotic vegetable-based farming system along with supporting sufficient data for potential enhancing the income of farmers through adoption of horticultural farming [2]. Horticulture can come up with parallelly with other component of Agriculture and allied sector by allocating the resources optimally. Kashyap et al. also stated that in case of small and marginal farmers IFS plays an important tool for long-term income and employment generation with livelihood security [3]. Similarly, Pattanaik et. al stated that to mitigate climate change and disaster IFS could be an option for increasing income of farmers [4].

2. MATERIALS AND METHODS

The present study is to examine different economic implications of vegetable-based farming system in terms of income, employment and problem associated with production and marketing in Nagaon district of Assam. Multistage random sampling was used to collect primary data covering 100 sample farmers with the help of specially designed pre-tested schedules through personal interview and Participatory Rural appraisal approach. Kathiatali and Khagorijaan blocks were selected in the first stage of data collection. Collected data were compiled and tabulated for the purpose of analysis percentages and averages were calculated and presented in the report. Cropping pattern, cropping intensity, human labour employment were calculated by utilization for each enterprise in terms of adult man days of eight hours of work per day. Moreover, in case of women and child labour, in converting to standard man equivalent, a ratio of one (1) women labour is equal to 0.75 adult male labour and one (1) child labour is equal to 0.50 adult male labour was used. The wage rate prevailing in the study area was considered in calculating the value of labour. Various cost components were used in order to calculate income from different farming systems. Deka et. also used different cost concept in order to analyse rice-

based cropping system with a view to worked out the most profitable cropping system and found that Rice-Potato sequence was the most profitable one in Udalguri district of Assam [5]. With the help of informal survey ten production and marketing problems each were identified. The Pareto analysis was used for analysing data to investigate major potential occurrence of problems. Pareto analysis was done in Microsoft excel. Sah and Arora (2022) also used Pareto analysis to generate line chart has been determined through the Pareto analysis of potential critical operational risk, and demand risk analyses to define the severity of risk factors [6].

3. RESULTS AND DISCUSSION

Table shows the different major farming systems adopted by the sample farmers. Out of those, six major farming systems identified in the study area. Table 1 revealed that most practicing farming system Rice+ vegetables+ poultry component+ toria+ coconut/arecanut by the 30% of the sample farmers covering an area of 29.86 ha. Cropping intensity was highest in case of Vegetables+ Livestock component + Spices +Coconut/Arecanut at 195 %. Arecanut and coconut are found to be the common crops grown by all the selected farmers. Highest net return per ha from Vegetables+ Livestock component+ Spices +Coconut/Arecanut (Rs.298480) farming system followed by Rice +Vegetables +Toria +Fishery+ Coconut/Arecanut out of the 6 selected farming systems. Vegetables+ Livestock component + Spices +Coconut/Arecanut labour involvement was lowest (47.50 MD) but net return per ha was highest and more remunerative than the other systems as it requied less labour involvement reducing cost of cultivation ultimately increased in net return which involves cultivation of spices viz., ginger and turmeric with high return from less area. But most of the farmers was not it practiced which might be due to lack of technical knowledge and awareness about spices cultivation. The labour employment was highest (222.86 MD) in Rice +Vegetables +Toria +Fishery+ Coconut/Arecanut farming system. Total income received from different cropping system relative share from Vegetables+ Livestock component + Spices +Coconut/Arecanut was highest at 33.75%. Out of total labour employment share from Rice+ Vegetables+ Poultry component+ Toria+ Coconut/Arecanut was highest at 39.55. This might be due rice is labour intensive crop and rice area among that group was highest. Barman and Deka (2019) found that in case of mechanized farming Labour employment was less as compared to non-mechanized farm [7].

Based on interview method problems faced by the farmers across different farming situation are categorified into two parts; Production problems and marketing problems. Production problems are Animal menace, Pest and disease, Poor farming skill, Poor soil fertility, Expensive input, Poor input access, Lack of finance, Irrigation system, Shortage of labour, Seasonal production, and low volume where all farmers felt that Animal menace is the major production problem (Rank I) in the study area. The finding is contradictory with the with the findings reported by Ponnusamy and Devi (2017) found that major factors that hindrance the IFS adoption were inability to get return from the IFS model, high initial overhead cost and demand for human labour during that urgent period were got highest ranked among

Table 1. Status of farming system among sample farmers

Sl No	Farming system	Number of households	Net Cropped area	Gross cropped area	Cropping intensity (%)
1	Vegetables+ Coconut/Arecanut	5	2.53	3.95	156
2	Rice + Vegetables + Coconut/Arecanut	15	12.13	12.13	100
3	Rice+ Vegetables+ Poultry component+ Toria+ Coconut/Arecanut	30	29.86	53.75	180
4	Rice+ Livestock and Poultry component+ vegetables+ toria+ coconut/arecanut	21	19.60	36.26	185
5	Vegetables+ Livestock component + Spices +Coconut/Arecanut	22	14.66	28.59	195
6	Rice +Vegetables +Toria +Fishery+ Coconut/Arecanut	7	16.8	31.25	186
	Total/pooled	100	95.58	165.93	174

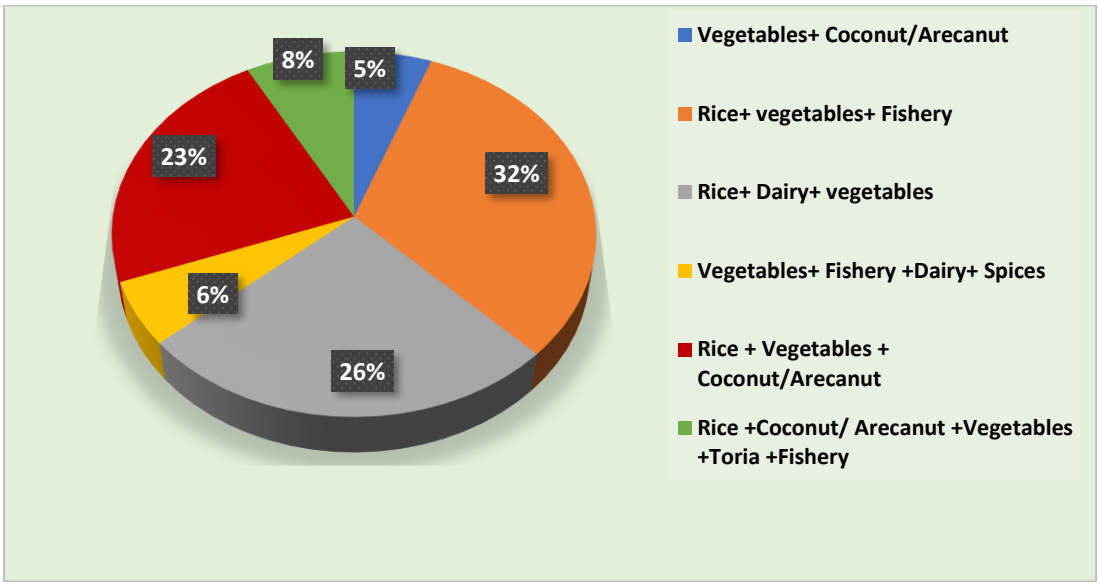

Fig. 1. Percentage share of different vegetable based farming system among sample farmers

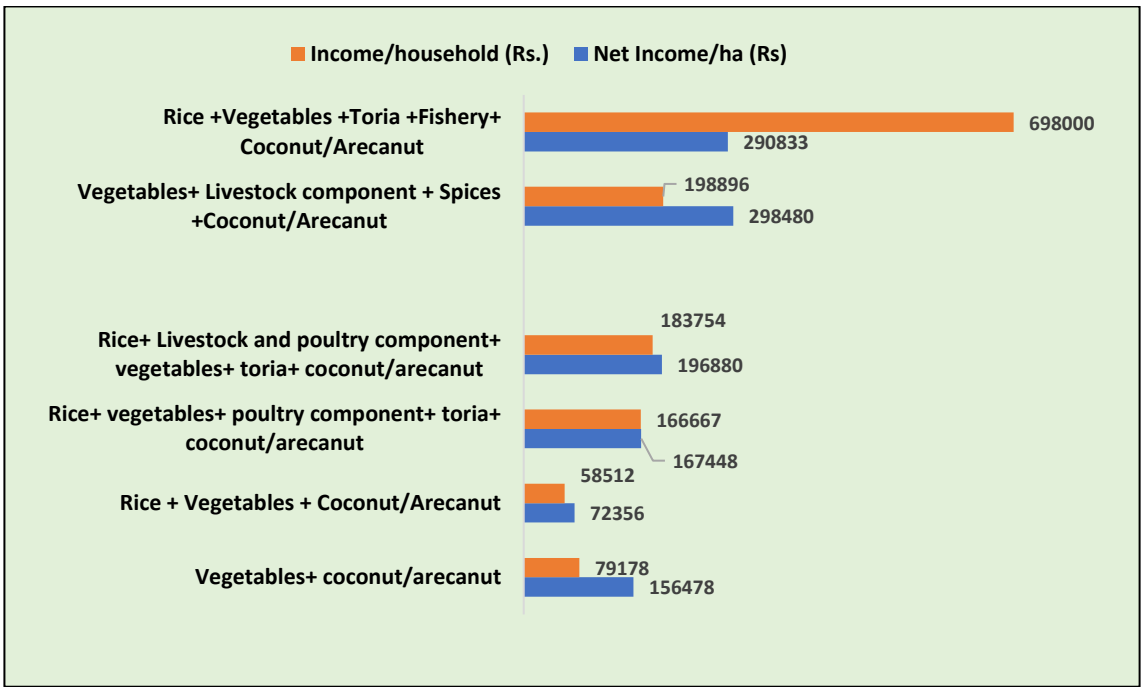

Fig. 2. Farming system wise income accross sample farms

all the problems [8]. Similarly, marketing problems included Storage facility, Processing, Assembling, Inadequate demand, Poor marketing infrastructure and facility, Poor quality of produce, Inconsistent supply of local produce, High Transportation cost, Insufficient Production where majority of the farmers felt that inadequate Storage facility was the most serious problem (Rank I) in the area. In order to prioritize the problem, Pareto analysis is done and it has been found that animal menace and pest and disease are the major production problems causing (› 80 %) out of total 10 production problems. Marketing problems like processing, assembling and storage facility are major problems (causing › 80 % problems) among the sample farmers. Baliyan and Kgathi also examined horticultural production and marketing problems using Pareto analysis and found that poor access to inputs, high fuel costs, pests and diseases, high input

costs, insufficient infrastructure, lack of finance, shortage of skilled labour, and breakdown of irrigation systems contributed 85.23% of the total problems identified [9]. Sewhag et.al examined the problems associated with IFS adoption and found that lack of proper market facilities, high wage rate and high initial overhead cost was found to be major constrains [10].

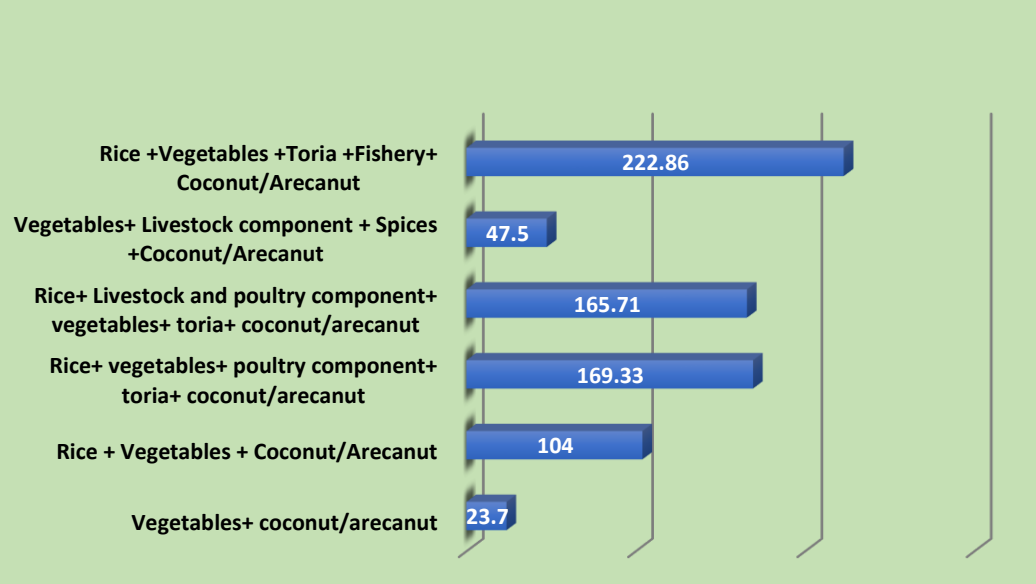

Fig. 3. Labour empolyment (MD) accross differenet farming system

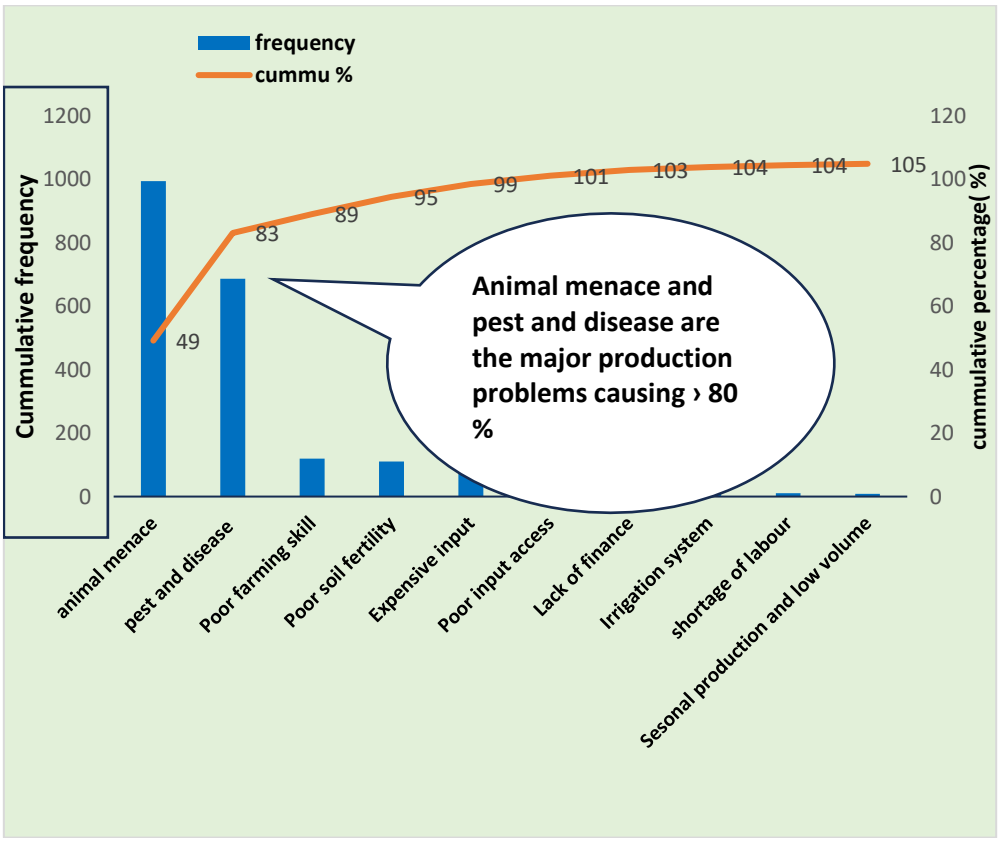

Fig. 4. Pareto graph for production problems

Table 2. Farming system wise net income and employment

Sl No	Farming system	Net Income/ha (Rs)	Income/household (Rs.)	Permanent labour (nos.)	Labour employment (MD)/ha			Total Labour employment (MD)/household
					Family labour	Hired labour	Total	
1	Vegetables+ Coconut/Arecanut	156478.00	79178.00	-	22.41	7.59	30.00	23.70
2	Rice + Vegetables + Coconut/Arecanut	72356.00	58512.00	-	29.68	98.93	128.61	104.00
3	Rice+ Vegetables+ Poultry component+ Toria+ Coconut/Arecanut	167448	166667	-	38.7	55.81	94.51	169.33
4	Rice+ Livestock and Poultry component+ vegetables+ toria+ coconut/arecanut	196880	183754	1	57.36	38.61	95.97	165.71
5	Vegetables+ Livestock component + Spices +Coconut/Arecanut	298480	198896	2	17.49	19.06	36.55	47.50
6	Rice +Vegetables +Toria +Fishery+ Coconut/Arecanut	290833.3	698000.00	-	28.48	21.44	49.92	222.86
	Total	194588.00	180682.00	4	36.15	41.25	77.40	128.43

Table 3. Relative share of various enterprises in farm income across different size groups

Sl. No	Farming system	Total Income (Rs.)	Percentage of the total
1	Vegetables+ Coconut/Arecanut	782390	4.02
2	Rice + Vegetables + Coconut/Arecanut	1085340	5.58
3	Rice+ Vegetables+ Poultry component+ Toria+ Coconut/Arecanut	5023440	25.82
4	Rice+ Livestock and Poultry component+ vegetables+ toria+ coconut/arecanut	4134480	21.25
5	Vegetables+ Livestock component + Spices +Coconut/Arecanut	6566560	33.75
6	Rice +Vegetables +Toria +Fishery+ Coconut/Arecanut	2030231	10.43
Pooled		19458800	100.00

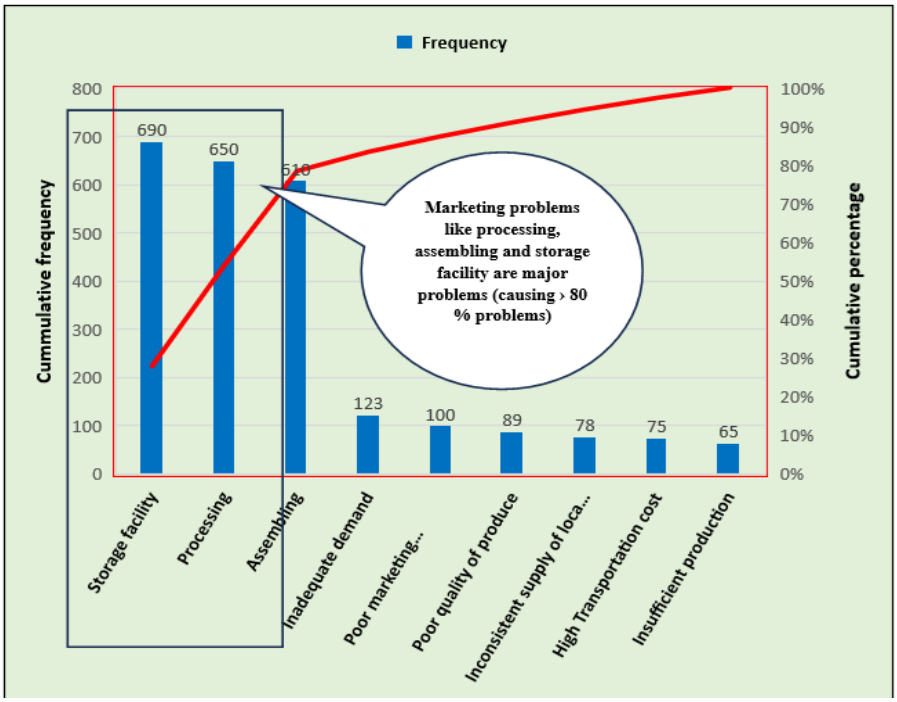

Fig. 5. Pareto graph for marketing problem

Table 4. Problems faced by farmers across different farming system

Production problems	Rank	Marketing Problem	Rank
Animal menace	I	Storage facility	I
Pest and disease	II	Processing	II
Poor farming skill	III	Assembling	III
Poor soil fertility	IV	Inadequate demand	IV
Expensive input	V	Poor marketing infrastructure and facility	V
Poor input access	VI	Poor quality of produce	VI
Lack of finance	VII	Inconsistent supply of local produce	VII
Irrigation system	VIII	High Transportation cost	VIII
Shortage of labour	IX	Insufficient Production	IX
Seasonal production and low volume	X		

4. CONCLUSION

From the above study it can be concluded that Vegetables+ Livestock component + Spices +Coconut/Arecanut is most profitable in terms of income can effectively diversified with scientific intervention. The labour employment was highest in Rice +Vegetables +Toria +Fishery+ Coconut/Arecanut farming system by adding livestock and forestry component as Integrated farming system model (IFS)can generate opportunities for unskilled and skill labour, contributing to rural livelihoods and agricultural sustainability. Das et. al (2021) revealed that the labour employment was higher in case of Integrated Farming system (IFS) as many components were to be maintained as compared to non-IFS system [11]. ICT can also plays an important role in the dissemination of technologies or awareness for certain aspects. Barman et al (2021) stated that Agricultural information could be sent to farmers through the Kisan Mobile Advisory System (KMAS) which is one of the efficient forms of communication in extension system [12]. To deal with the major problems faced by farmers proper training on management of animal and pest menace, proper storage facilities and post-harvest management. This may be the best strategy to address the yield loss occurs due to spoilage. Barman et. al (2022) revealed from their study that dissemination of recent technologies for horticultural sector should be done in order to increase effectiveness of the KVK system according to Progressive farmers [13].

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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