COST-BENEFIT ANALYSIS OF VEGETABLE CULTIVATION: A CASE STUDY OF PATIALA DISTRICT

Taranjeet Singh*

Harsimran Singh*

Jagdev Singh*

Abstract

Agriculture in Indian economy is main source of livelihood security because more than 50 percent of population depends upon agricultural sector directly or indirectly. In the rural areas its importance is more relevant. Green revolution has made us self-sufficient in food grains. But present trends in agricultural particularly in Punjab, demands diversification of agricultural crops. Many experts and policy makers give more importance to horticultural crops such as vegetables, fruits as well as production of flowers. Vegetables are not only important as protective food and highly beneficial for the maintenance of health and prevention of disease, but these are also a source of livelihood for farmers. Vegetables are a source of income support as well as important for food security of the people of India. So cost-benefits analysis is very essential in economics because this tell us about the benefits and losses of a particular field. The present study is an attempt to analyses the cost-benefits of vegetables production in Patiala District, Punjab. For this study, different cost concepts have been used. Two representative villages have been selected from the Sanour Block (highest vegetable producing block of Patiala) of Patiala district.

JEL Codes: Q00, Q12, Q13

* Research Scholars, Department of Economics, Punjabi University Patiala

Introduction

Agriculture is main source of livelihood of Indian economy. Agriculture has remained the single largest sector of national economy which is primary employment to the larger section of the population. Contribution of agriculture in the Indian GDP is nearly 14.2 percent. But it provides employment to more than 55 percent of the total labour force. Its contribution in real terms is far beyond farm output. Its contribution includes its role as a supplier of raw materials to industry, income support and food security to a large number of rural households, protection of natural environment, a market for industrial products and an earner of significant portion of foreign exchange.

Indian agriculture has been experienced a considerable degree of crop diversification in term of changes in the area under various crops since the Green Revolution which was largely in favour of foodgrains to meet the objective of self- sufficiency and country's food security. During the last one decade, the changes in cropping pattern are more towards the horticulture sector and commercial crops like cotton thus diverting green revolution towards golden revolution. Agricultural diversification is an important instrument for economic growth. Changes in cropping pattern are responsive to these factors (Singh et. al. 2008).

Diversification in cropping pattern or productivity enhancement in agriculture therefore, not only contributes to overall economic growth but it also provides immediate microeconomic benefit for a large number of rural households. In agriculture, horticultural crops including vegetables have a significant place. These crops not only contribute to the share of agriculture in national economy, but possess a great potential and comparative advantage to compete in the liberalized economy.

Vegetables are not only important as protective food and highly beneficial for the maintenance of health and prevention of disease, but these are also a source of livelihood for farmers. Vegetables are a source of income support as well as important for food security of the people of India. Vegetables are rich source of vitamins, carbohydrates, salts and proteins. With increased health awareness in the general public and changing dietary patterns, vegetables are now becoming an integral part of average household's daily meals. In addition, high population growth rate has also given rise to high demand in basic dietary vegetables. Increased health

awareness, high population growth rate, changing dietary patterns of increasingly affluent middle class and availability of packaged vegetables has generated year the round high demand for vegetables in the country in general and in major city centres in particular. However, our farmers have yet not been able to fetch this opportunity and still follow traditional sowing and picking patterns. This results in highly volatile vegetable supply market wherein the market is flooded with seasonal vegetables irrespective of demand presence on one hand and very high priced vegetables in off-season on the other. Lack of developed vegetable processing and storage facility robs our farmers from their due share of profit margins (Indian Institute of Vegetable Research, 2011).

Cost of cultivation studies are necessary for formulating rational price policies for agricultural products which in turn provide an incentive to producers adopting improved technology and thus maximize production. An increase in agricultural output is of additional significance as it greatly affects agricultural prices. The latter plays a vital role in fixing the level of wages for workers in various fields of economic activities and wages which as a result affect the price of consumer goods. Thus, a study of cost of cultivation of cash crops and vegetables, which contribute significantly to economy, can therefore be of great importance for planning.

Objectives of the Study

Vegetables are normally higher yielding and labour and capital intensive as well as short duration high value crops. Vegetables are produced in areas where physical and economic resources are suitable. Vegetables are produced by all categories of farmers. Present study has been undertaken in vegetable cultivation area with a view to accomplish the following objectives:

(1) to study the sources and pattern of income generation on vegetable farms;

(2) to examine the income generation by farmers belonging to different size groups through cultivation of vegetables; and

(3) to look into the cost and benefit aspect of cultivation of vegetables.

Methodology, Concepts and Definitions

For this study, different cost concepts have been used. Two representative villages have been selected from the Sanour Block (highest vegetable producing block of Patiala) of Patiala

district. These are FatehpurRajputtan and Asarpur. These villages selected on distance basis nearly half the distance between Block Headquarters and its boundaries on opposite directions.FatehpurRajputtan is a village on state highway that is why it has easy transport facilities and Asarpur is linked to block headquarters via a link road and does not have direct link to district headquarter. From both the villages, a sample of 166 farm households comprising 68 households fromFatehpurRajputtan and 98 households fromAsarpur has been selected.Thirty percent of the farming households are selected for the analysis. The sample consist of 20 marginal farm households, 18 small farm households, 9 medium farm households and 5 large farm households.

Data Collection

The investigation and data collection was started during the year 2011. Two different schedules, namely village survey schedule and household survey schedule were prepared. The village schedule was prepared for general information about the location of village, area of village, population and facilities available etc. For household survey a detailed questionnaire was prepared to enquire about the economies of cultivation of vegetables.

Concepts and Definitions Used in this Study

Marginal Farmer: A farmer who operates land up to 2.5 acres and his major source of income is farm business.

Small Farmer: A farmer who operates land more than 2.5 acres and up to 5 acres and his major source of income is farm business.

Medium Farmer: A farmer who operates land more than 5 acres and up to 10 acres and his major source of income is farm business.

Large Farmer: A farmer who operates land more than 10 acres and his major source of income is farm business.

Unit of Analysis: In the present study, household has been taken as a unit for sample survey. A household consist of members of a family who are taking their meals from the same kitchen.

Cost Concepts

Cost A1- includes

(1) Value of hired human labour

(2) Value of owned machine labour

(3) Hired machinery charges

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

(5) Value of insecticides and pesticides

(6) Value of manure (owned and purchased)

(7) Value of fertilizers

(8) Marketing commission

(9) Interest on working capital (seed, fertilizers, insecticides and pesticides, threshing and combine cost)

Cost A2 includes Cost A1 + rent paid for leased-in land.

Cost B1 consists of Cost A1 + interest on value of owned fixed capital assets (excluding land).

Cost B2 is consisted by Cost B1 + rental value of owned land and rent paid for leased-in land.

Cost C1 includes Cost B1 + imputed value of family labour.

Cost C2 includes Cost B2 + imputed value of family labour.

Results and Discussion: Cost and Income from Vegetable Cultivation

Farming as a business is greatly influenced by the level and structure of the cost of cultivation. Traditional agriculture was carried out by conventional practices, mainly supplied with homemade inputs. But modern agriculture is characterized by new practices and modern implements and machinery and requires large use of purchased inputs. The cost benefit analysis has been done for cultivation of vegetables on different farm-sizes in the Patiala district. All this is measured on per acre basis and village-wise.

Village-Wise Situation

The average per acre cost of cultivation for vegetable farming for different farm groups in FatehpurRajputtanvillage has been presented in Table 1. In FatehpurRajputtan village, the average return per acre from vegetable cultivation was Rs. 54157. For large farmers it was Rs. 40142, for medium, small and marginal farmers it was Rs. 60808, Rs. 68101 and Rs. 52878 respectively.

The returns from vegetable cultivation in FatehpurRajputtan have been presented in table 2. In this village returns from vegetable cultivation covered the operational cost (A1). It was Rs. 29964 on an average for all farm size categories but it was highest among small farmers, i.e.,Rs. 40267 and lowest among large farmers (Rs. 21780). If cost A2 is considered for net income, the result was the same, i.e., highest among small farmers (Rs. 32790) and lowest among large farmers (Rs. 13393) respectively. Cost B1 and B2 also covered by total income with same results, i.e., highest among small farmers and lowest among large farmers. But the results alter in case of cost C1 and C2. For both of these costs medium farmers has lowest net income. Even for cost C2 medium farmers did not cover the cost and large farmers has more returns as the case of both costs. Reason behind medium farmers negative returns is the combination of high rental value of owned and leased in land as well as excess of machinery owned by medium farmers equivalent to the large farmers that increase their per acre cost.

Table 3 and 4 present the per acre average costs and returns from vegetable cultivation for different farm groups in Asarpur village. Per acre average total return wasRs. 177441 for all farm categories. It wasRs. 158935 for large farmers, Rs. 184540 for medium farmers, Rs. 205128 for small farmers and Rs. 161123 for marginal farmers. These high returns were result of high price of Tomatoes that the farmers of Asarpur village collected because there was low production of Tomatoes in nearby villages and almost every farmer in that village cultivated Tomatoes. But these returns were highly volatile because in previous year most farmers were facing losses from the cultivation of Tomatoes.

This average income per acre covers all types of costs for all farm groups. Small farmers again in this village have highest returns from vegetable cultivation if all costs are considered. The small and medium farmers earned double net income in comparison to large and marginal farmers if Cost C2 is taken into account. The net income after deducting Cost C2 wasRs. 64222

for large farmers, Rs. 72263 for medium farmers, Rs. 104583 for small farmers and Rs. 44052 for marginal farmers.

There is big difference in net income earned by the farmers in both villages. This is because in village FatehpurRajputtan only one or two vegetable crops are produced but in Asarpur village on average three or four vegetable crops are produced. That is why in this village costs were also higher than FatehpurRajputtan and returns were higher because of more production per year. Usually a farmer of FatehpurRajputtan leaves free land after harvesting Green Peas to obtain 'Karnouli' a harbel product that Germinate by self and gives them income. But in Asarpur village farmers were cultivating sunflower, Tomato (second time in same year) or Gourd. Gourd was preferred by most of the farmers.

Aggregate Analysis

Table 5 and 6 present the information relating average costs and returns from vegetable cultivation at aggregate level. Average per acre operational cost was lowest among large farmers, i.e.,Rs. 36337.50 and highest among medium farmers, i.e., Rs.51736.50.

There is uncertainty about production and prices. Sometime there occurs huge loss to farmers caused by low price or uncertain production. Even there are more chances of pest attack on vegetables than food crops. If the rent of leased-in land is included then the highest increase in cost per acre, i.e., Rs.7705 was in the case of small farmers but still cost was lowest for large farmers. If the imputed value of family labour is considered in cost then again in case of the large farmers have lowest cost but now the difference between the costs per acre on large and small farms has almost doubled against the operational costs.

The average total income per acre all categories of farmers wasRs. 116459.4. Small farmers had the highest average per acre total income, i.e.,Rs. 136614.50 and large farmers had lowest, i.e., Rs.99528.50. Net income per acre after deducting operational cost from total income per acre was highest among small farmers (Rs. 90711) and lowest among large farmers (Rs. 63191). Same results were there if net income is obtained after deducting rent of land, interest on working and fixed capital. But when Cost C1 and C2 (imputed value of family labour) are used to get net average income per acre then the situation changes. Now the marginal farmers have lowest average net income per acre, i.e.,Rs. 36292 at Cost C1 and Rs.22378.50 at Cost C2.

Vegetable-Wise Cost and Income

Information about vegetable-wise costs and income has been shown in Table 7 and 8. Average operational cost for all vegetable cultivation wasRs. 23380.42. Operational cost per acre was highest for Tomato, i.e.,Rs. 71003.54 and for other vegetables it was relatively less. The cultivation of six vegetables was costing less than Rs. 20000 per acre and the cultivation of other two was costing about Rs. 25000 per acre. These costs were very less than cost of cultivation of Tomato.

Cultivation cost for Tomato was highest even when all types of costs were taken on to account as for land and imputed value of family labour. Cost C2 wasRs. 127657.90 for Tomato and it was very low for Cucumber, Ladyfinger, Gourd and Chilies.

Tomato dominates not only in cost of production but also in income generated per acre. Income per acre from the cultivation of Tomato wasRs. 247104.20 per acre and average income per acre from all vegetables wasRs. 64463.03. This high income for Tomato makes it most remunerative vegetable among the vegetables under analysis.

Net income for Tomato wasRs. 141537.02 per acre if operational costs, interest on fixed capital and rent of land (leased-in and owned) was deducted from the income, for Cauliflower it wasRs. 25565.00 per acre, for Potato it wasRs. 15517.94 per acre, for Chilies it wasRs. 50051.98 per acre and average for all vegetables wasRs. 27282.28 per acre.

But it was negative in case of Ladyfinger and Green Peas. When imputed value of family labour was deducted from total income then net return from Bitter Gourd cultivation became negative. And average net income come down to Rs. 21824.49 per acre.

This analysis shows that the cultivation of some vegetables gives very high returns and the cultivation of some others was not even the costs of cultivation. This difference was mainly due to fluctuating prices and production of vegetables. Returns were high for those vegetables which have sudden rise in prices at the time of selling. And returns were low or even negative in case of those vegetable which experience decline in their prices at the time of marketing.

Suggestions and Policy Recommendations

As it comes out from survey, vegetables are grown by small-scale farmers who are unorganized and scattered in different locations. Concentration on production is important because low production can affect all the players in agribusiness. By organized production and marketing through cooperative societies could lower the cost and hence will create push for higher returns.

At the production level, external factors such as weather and susceptibility to diseases and pests have significant effects on the output and quality of agricultural produce. Low production is also a result of limited access to inputs like irrigation, seeds, fertilizers, and credit, as well as of poor cultural practices, poor soil, and low levels of management skills. In addition, the two most important factors affecting the quality of the output are the choice of the right quality seeds/plants and the maturity at which the crop is harvested. To cover the risk related to external factors the different insurance schemes are needed to be accessible for all the farmers. This can be achieved only through financial inclusion for all the farmers. The loans should be given to farmers by market board and banks when farmers want to delay selling.

For Punjab, the identification of constraints in regard to the expansion of vegetable production is important. The supply of vegetables is quite irregular. The vegetable growing farmers have mentioned that they do not produce on a large scale due to unpredictable returns from the sales of vegetables. Moreover, the farmers have informed that sometimes their cost of production is higher than the selling price. In addition, an uncertain level of production hampers the supply chain. Thus the continuous production of vegetables and a sufficient supply of vegetables are essential for establishing business in vegetable production. The availability of raw materials, along with price and quality, is the prime concern.

Price fluctuations are a cause of worry for the vegetable growers. Sometime prices are too low to cover the costs of cultivation. To improve this situation, price fixation and storage facilities at the village level should be assured. Price fluctuations could also be covered by providing quick transport to deficit areas. Therefore, it is very necessary to reach at the every nook and corner of the district in general and the State in particular by building extensive network of transport.

Extension staff needs to make a personal contact with the farmers so that vegetable growers can be informed and educated regarding various aspects of vegetable cultivation, cost of

inputs and sources for procurement. It is important to work intensively for disseminating information regarding quality and reliability at block and district level.

Several measures are recommended for improving the marketing of vegetables in the country. The major recommendations are: Firstly, it is important to bring more markets under regulation and put them under the supervision of a well-represented market committee. Secondly it is important to promote and enforce the rules or laws in regard to the practice of open auction in the markets. Thirdly, more number of buyers and sellers should be involved in the wholesale markets so as to encourage healthy competition close to the perfect market conditions this may result in better price realization to the producer farmers.

One of the solutions to the existing problems, of the vegetable cultivators lies in the establishment of food processing industries on the priority basis which will give benefit to vegetable producers and will also create employment opportunities. This can be done through Self Help Groups (SHG) and/or Co-operatives.

During the past one decade, the changes in cropping pattern are in favour of horticulture sector and commercial crops like cotton. Agricultural diversification is an important instrument for economic growth. The changes in cropping pattern are required to get the expected results.

Conclusion

The State of Punjab occupies an important place in India. Punjab's economy is mainly agricultural and enjoys an enviable position among states in regard to yield per hectare, irrigation intensity, consumption of fertilizers and cropping intensity etc. (Gupta, 2004).

Vegetables production in Punjab region has increased due to the efforts by small-scale farmers who are unorganized and scattered in different locations. Concentration on production is important because low production can affect all the players in agribusiness. At the production level, external factors such as weather and susceptibility to diseases and pests have significant effects on the output and quality of agricultural produce. Low production is also a result of limited access to inputs like irrigation, seeds, fertilizers and credit as well as of poor cultural practices, poor soil, and low levels of management skills. In addition, the two most important factors affecting the quality of the output are the right choice of the cultivator and the maturity at which the crop is harvested. In addition, a low level of production may ultimately hamper the

agro-industry supply chain. Continuous production and a sufficient supply of vegetables are essential for establishing business in vegetables production. The availability of raw materials, along with price and quality, is the prime concern.

For Punjab, identifying the constraints on the expansion of vegetables production is important as the supply of vegetables is quite irregular. The vegetable farmers mention that they do not produce on a large scale due to unpredictable returns from their sales. Moreover, the farmers are of the view that sometimes their cost of production is higher than the selling price. The farmers' identification of the low prices of their products as a marketing constraint is also significant.

The cost of production of vegetables varies depending on crop, variety, time, place, and season. During the survey, farmers were asked to identify the major types of production costs on which they usually spend. According to the respondents, the production cost of vegetables can be categorized into these major categories: land preparation, seeds and seedlings, manure and fertilizer, irrigation, pesticide, labor, lease/rent of land, and other expenses like fencing, shedding, mulching etc. During the last one decade, the changes in cropping pattern are more towards the horticulture sector and commercial crops like cotton thus diverting green revolution towards golden revolution.

It is clear from the above discussion that major share of the vegetables production in the Punjab region is marketed by the farmers. However, the problem arises with the inconsistency of the year-round supply of the same commodities in the market. In one sense, the supply of fresh produce in the market is abundant, during seasonal production. Nevertheless, the region is unable to ensure a continuous availability in the domestic market from its own production. It has been reported that buyers as well as consumers are expecting year round availability of vegetables in the market. To solve the seasonal issues, many of the horticulture crop growing countries are adopting new technologies in production such as using green houses and/or biotechnology for production.

Annexure

Table 1: Average Cost of Vegetable Cultivation for Different Farm Groups in FatehputRajputtan Village (Rs. per Acre)

Village	Costs	Large Farmers	Medium Farmers	Small Farmers	Marginal Farmers	Average
FatehpurRajputtan	Cost A1	18342	34089	27834	21787	25513
	Cost A2	26729	39070	35311	24310	31355
	Cost B1	19773	36626	31372	24138	27978
	Cost B2	33893	53752	48561	39222	43857
	Cost C1	21127	46208	48505	37090	38232
	Cost C2	35247	63334	65693	52173	54112

Source: Field Survey 2011

Table 2: Average Return from Vegetable Cultivation for Different Farm Groups in FatehputRajputtan Village (Rs. per Acre)

Village	Return	Large Farmers	Medium Farmers	Small Farmers	Marginal Farmers	Average
FatehpurRajputtan	Total Income	40142	60808	68101	52878	55477
	Net Income at Cost A1	21780	26719	40267	31091	29964
	Net Income at Cost A2	13393	21738	32790	28568	24122
	Net Income at Cost B1	20349	24182	36729	28740	27499
	Net Income at Cost B2	6229	7056	19540	13656	11620
	Net Income at Cost C1	18995	14600	19556	15788	17245
	Net Income at Cost C2	4875	-2526	2808	705	1365

Source: Field Survey 2011

Table 3: Average Cost of Vegetable Cultivation for Different Farm Groups in Asarpur Village (Rs. per Acre)

Village	Costs	Large Farmers	Medium Farmers	Small Farmers	Marginal Farmers	Average
Asarpur	Cost A1	54333	69384	63973	56725	61104
	Cost A2	54333	70755	71906	58849	63961
	Cost B1	56810	72013	66274	59241	63584
	Cost B2	75726	91577	81660	78659	81906
	Cost C1	75796	92753	85159	97653	87840
	Cost C2	94713	112317	100545	117071	106162

Source: Field Survey 2011

Table 4: Average Return from Vegetable Cultivation for Different Farm Groups in Asarpur Village (Rs. per Acre)

Village	Return	Large Farmers	Medium Farmers	Small Farmers	Marginal Farmers	Average
Asarpur	Total Income	158935	184540	205128	161123	177441
	Net Income at Cost A1	104602	115196	141155	104398	116338
	Net Income at Cost A2	104602	113825	133222	102273	113481
	Net Income at Cost B1	102125	112567	138854	101881	113857
	Net Income at Cost B2	83208	93003	123468	82463	95536
	Net Income at Cost C1	83139	91827	119969	63470	89601
	Net Income at Cost C2	64222	72263	104583	44052	71280

Source: Field Survey 2011

Table 5: Average Cost of Vegetable Cultivation for Different Farm Groups in Patiala (Rs. per Acre)

Costs	Large Farmers	Medium Farmers	Small Farmers	Marginal Farmers	Average
Cost A1	36337.5	51736.5	45903.5	39256	43308.38
Cost A2	40531	54912.5	53608.5	41579.5	47657.88
Cost B1	38291.5	54319.5	48823	41689.5	45780.88
Cost B2	54809.5	72664.5	65110.5	58940.5	62881.25
Cost C1	48461.5	69480.5	66832	67371.5	63036.38

Cost C2	64980	87825.5	83119	84622	80136.63

Source: Field Survey 2011

Table 6: Average Return from Vegetable Cultivation for Different Farm Groups in Patiala District (Rs. Per Acre)

Return	Large Farmers	Medium Farmers	Small Farmers	Marginal Farmers	Average
Total Income	99528.5	122694	136614.5	107000.5	116459.4
Net Income at Cost A1	63191	70957.5	90711	67744.5	73151
Net Income at Cost A2	58997.5	67781.5	83006	65420.5	68801.38
Net Income at Cost B1	61237	68374.5	87791.5	65310.5	70678.38
Net Income at Cost B2	44718.5	50029.5	71504	48059.5	53577.88
Net Income at Cost C1	51067	53213.5	69782.5	39629	53423
Net Income at Cost C2	34548.5	34868.5	53495.5	22378.5	36322.75

Source: Field Survey 2011

Table 7: Average Cost of Vegetable Cultivation for Different Vegetables (Rs. Per Acre)

Vegetables	Various Average Costs Per Acre (Rs.)					
	Cost A1	Cost A2	Cost B1	Cost B2	Cost C1	Cost C2
Tomato	71003.54	87037.96	74398.04	105567.2	96488.74	127657.9
Cauliflower	15578.88	18276.26	16149.92	21393.33	19866.11	25109.52
Ladyfinger	12165.48	13139.53	12371.69	14265.14	13713.65	15607.1
Potato	23740.64	26288.16	24279.95	29232.06	27789.69	32741.79
Green peas	18454.46	43330.28	23720.7	72076.56	57992.25	76086.23
Bitter Gourd	25695.89	32439.34	27123.48	40232	36413.96	49522.48
Cucumber	12426.18	12875.74	12521.35	13395.26	13140.72	14014.62
Chili	19619.45	20630.97	19833.59	21799.87	21227.16	23193.44

Gourd	11739.26	14024.54	12223.06	16665.39	15371.5	19813.83
Average	23380.42	29782.53	24735.75	37180.75	33555.98	42638.55

Source: Field Survey 2011

Table 8: Average Return from Vegetable Cultivation for Different Vegetables

(Rs. Per Acre)

Vegetables	Total Income Per Acre	Average Net Return Per Acre using different Costs (Rs.)					
		Net Return at Cost A1	Net Return at Cost A2	Net Return at Cost B1	Net Return at Cost B2	Net Return at Cost C1	Net Return at Cost C2
Tomato	247104.20	176100.66	160066.24	172706.16	141537.02	150615.46	119446.30
Cauliflower	46958.33	31379.45	28682.07	30808.41	25565.00	27092.22	21848.81
Ladyfinger	12200.00	34.52	-939.53	-171.69	-2065.14	-1513.65	-3407.10
Potato	44750.00	21009.36	18461.84	20470.05	15517.94	16960.31	12008.21
Green peas	44047.29	25592.83	717.01	20326.59	-28029.27	-13944.96	-32038.94
Bitter Gourd	48993.33	23297.44	16553.99	21869.85	8761.33	12579.37	-529.15
Cucumber	22000.00	9573.82	9124.26	9478.65	8604.75	8859.28	7985.38
Chili	71851.85	52232.40	51220.88	52018.26	50051.98	50624.69	48658.41
Gourd	42262.30	30523.04	28237.76	30039.24	25596.91	26890.80	22448.47
Average	64463.03	41082.61	34680.50	39727.28	27282.28	30907.06	21824.49

Source: Field Survey 2011

References

Gupta, S. P. (2004), *The Punjab: An Overview*, ESS PEE Publication, Chandigarh, p.12

Indian Institute of Vegetable Research (2011), "Vision 2030", *Indian Institute of Vegetable Research*, Varanasi, U.P., India, P. 1.

Sidhu, Kiranjot, Varinder Kumar and Tarsem Singh (2009), Diversification through Vegetable Cultivation, *Journal of Life Science*, Vol. 1, No. 2, pp. 107-113.

Singhet. al. (2008), *The Political Economy of Vegetable in India*, KrishiVigyan Kendra, Central Arid Zone Research Institute, Pali, Rajasthan, India, pp. 2-13.