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Economics and post-harvest losses of soybean crop in Dimapur district of Nagaland

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ABSTRACT

A research investigation was carried out during the agricultural year 2017-2018 to fulfil the specific objectives. Niuland block located in Dimapur district was selected purposively for the present study, then village and respondents were selected by following stratified random sampling methods. Altogether 60 sample farmers, 10 wholesalers and retailers were selected purposively engaged in the business of soybean in and around the Dimapur district. Then based on the land holding farmers were further categorized into marginal, small, medium and large groups. Primary data were collected with the help of pre-tested interview schedule and analyzed using suitable statistical techniques. The results showed that majority of the respondents were literate and the average size of land holding was 2.36 hectares. The average net cropped area and cropping intensity was found to be 6.09 ha 235.47 per cent, respectively. The average cost of cultivation and yield per ha was around ₹ 80531.62 and 43.03 q, respectively with an average net return of ₹ 2,52,621.67. The average benefit cost ration was found to be 1.36, 2.71, 2.67 and 3.05 for marginal, small, medium and large sample farmers, respectively with an average of 2.62. The percentage of losses was highest at large farm group which was 16.45 per cent followed by medium, small and marginal farmers at 16.14 per cent, 15.28 per cent and 13.11 per cent, respectively. At the traders' level, the percentage post harvest losses were 8.01 per cent and 20.22 per cent at wholesalers and retailers level. The constraints were worked out with the help of Garrett's ranking technique. Poor seed quality, pests and diseases problem, lack of knowledge about plant protection measures and high labour cost were some of the major problems faced by the sample farmers in soybean cultivation.

1. Introduction

India is the largest producer of oilseeds in the world and oilseed sector occupies an important position in the agricultural economy of the country. India is the fifth largest vegetable oil economy in the world, next to USA, China, Brazil and Argentina. With its rich agro-ecological diversity, India is ideally suited for growing all the major annual oilseed crops. Among the nine oilseed crops grown in the country, seven are of edible oils (soybean, groundnut, rapeseed-mustard, sunflower, sesame, safflower and niger) and two are of non-edible oils (castor and linseed). India ranks first in the production of most of the minor oilseeds (castor, niger, safflower and sesame). In the case of major oilseeds, India ranks first in the production of groundnut, second in rapeseed-mustard, and fifth in soybean (Dupare *et al.,* 2012).

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The botanical name of Soybean is *Glycine max* belonging to the legume crop family. Soybean originated in China and was introduced to India centuries ago through the Himalayan routes. As a result, soybean has been traditionally grown on a small scale in the Naga Hills and parts of central India covering Madhya Pradesh. It thrives well in warm and moist climate with temperature ranging from 26 to 32°C. Day length is the key factor in the soybean varieties as they are short day plants. Best season to plant soybean is from June to July (Patel *et al.*, 2014).

Soybean is looked upon not merely as a means to supply food for humans and animals, but it also improves the soil fertility by fixing atmospheric nitrogen (Jamanal and Sadaqath 2017). Soybean, the 'Golden Bean' or 'Miracle Bean' has come to be recognised as one of the premier agricultural crops today for various reasons. In brief, it is a major source of vegetable oil, protein and animal feed. Soybean, with over 40.00 per cent protein and 20.00 per cent oil, has now been recognized all over the world as a potential supplementary source of edible oil and nutritious food. Soybean oil contains a large percentage of non-saturated fatty acids. The total yield of these nutrients and B vitamins per acre of land is very high and difficult to surpass. Thus, soybean is perhaps the most nutritious crop one can grow (Singh *et al.*, 2013).

Though productivity of soybean is higher in North East states, total area under cultivation is very low. Soybean is consumed by every household in Nagaland in the form of fermented soybean as a traditional food since time immemorial called Akhuni, particularly in Zunheboto district. Akhuni is the Naga's special food additive, a probiotics, fermented soy bean product with high culinary and health values. Soybean is grown in almost all the districts of Nagaland (Anon. 2016). Post-harvest food loss (PHL) is defined as measurable qualitative and quantitative food loss along the supply chain, starting at the time of harvest till its consumption or other end uses (Perke *et al.*, 2018). It can occur either due to food waste or due to inadvertent losses along the way. Thus, food waste is the loss of edible food due to human action or inaction such as throwing away wilted produce, not consuming available food before its expiry date, or taking serving sizes beyond one's ability to consume. In order to know and understand the constraints faced by the soybean growers, a careful and detailed study of economics of cultivation and estimation of post-harvest losses is essential. Hence the study on "*Economics and Post-harvest Losses of Soybean crop in Dimapur district of Nagaland*" will be undertaken.

The study on economic analysis of post-harvest losses in soybean at different stages of handling would help assess the extent and magnitude of losses and identify the factors responsible for such losses. This in turn would help develop proper measures to reduce these losses. The following objectives were undertaken:

a) To find out the economics of soybean crop,
b) To work out the post-harvest losses of soybean,

To study the constraints faced by the soybean growers

2. Research Methodology

Table 1. Selection of soybean sample farmers on different farm size groups

S. N.	Group	Land holding (ha)	No. of selected sample farmers	Marketing Pattern & Post harvest losses
1.	Marginal	Less than 1.00	7 (11.67)	10 wholesalers and 10 retailers both were selected from Dimapur district
2.	Small	1.01 to 2.00	20 (33.33)	
3.	Medium	2.01 to 4.00	26 (43.33)	
4.	Large	4.01 and above	7 (11.67)	
Total			60 (100.00)	20 Marketing agenccies

(Parenthesis indicate percentage to the total)

For studying the post-harvest losses in soybean on-farm and off-farm losses the Egyir *et al.,* 2008 method of estimating post-harvest losses were adopted as below:

$$\%TQ_L = Q / TQ \times 100$$

Whereas: Percentage TQ_L = percentage post-harvest loss per commodity.

Q = mean quantity loss of the commodity.

TQ = mean total quantity produced/procured of the commodity.

To capture comprehensively the constraints faced by the farmers, Garret's ranking technique was used. Some major prevailing constraints were highlighted during preliminary survey and the order of the merit given in ascending order was converted into ranks by using the formula. Accordingly, these ranks were converted to scores by referring to Garrets table. Garret's formula for converting ranks into per cent is given by

Per cent position = 100 (R_{ij}-0.50) / N_j

Whereas: R_{ij} = rank given for ith item by jth farmer or individual.
N_j = number of items ranked by jth farmer.

The per cent position of each rank was converted into scores by referring to tables given by Garret and Woodworth (1969). Then for each factor, the score of the individual respondents was summed up and divided by the total number of respondents for whom scores were gathered.

The mean scores for all the factors were arranged in descending order and the most influencing factors were identified through the ranks assigned.

3. Results and Discussion

Table 2 reveals the input cost for the cultivation of soybean in the study area, the various costs structure in soybean cultivation based on Total Variable Costs (TVC) and Total Fixed Costs (TFC) were workout. The transportation cost was the highest among the variable expenditure as it shared an average of 45.25 per cent of the total costs and it can be seen from the table that the cost was highest for medium and large size farm groups as more labour is needed for larger areas. The other variable costs incurred were on family labour which accounted an average 18.98 per cent of the total costs, hired labour 16.94 per cent, interest on working capital 10.48 per cent, FYM cost 2.28 per cent, tools 2.18 per cent and seeds with 1.70 per cent. Among the fixed costs, depreciation was the most important item with 1.38 per cent of total cost followed by imputed rental value of land with 0.62 per cent and interest on fixed capital with 0.20 per cent, respectively. Similar trend were also reported by Sharma and Singh (2001); Sharma *et al.,* 2018 and Dinesh and Sharma (2019).

The share of variable cost in total cost was 96.72 per cent, 97.53 per cent, 98.01 per cent and 98.25 per cent, while the share of fixed cost was only 3.30 per cent, 2.47 per cent, 1.99 per cent and 1.75 per cent for marginal, small, medium and large group of farmers, respectively. The fixed cost was small due to the reason that the farmers did not use any bullock or machinery power. The cost of cultivation per ha for marginal, small, medium and large group of farmers was worked out to be ₹ 47,595.62, ₹ 67,777.36, ₹ 93,260.4 and ₹ 1,13,493.1, respectively with an average of ₹ 80,531.62.

Table 3 reveals the Cost A_1 which included the direct expenses incurred on crop production in cash and kind per hectare was found to be ₹ 5,521.32, ₹ 8,991.96, ₹ 20,135.23 and ₹ 37,158.30 for marginal, small, medium and large group farmers, respectively with an average of ₹ 17,951.70. The Cost A_1 was found to be highest in large and lowest in marginal farmers.

Cost A_2 per hectare which included rent paid for leased-in land to cost A_1 was found to be equal to Cost A_1 since rent paid for leased-in land was zero. The Cost A_2 was highest in large and lowest in marginal. Per hectare Cost B_1 which includes Cost A_2 and imputed interest on owned capital assets excluding land was found to be ₹ 5,663.39, ₹ 9,144.08, ₹ 20,303.70 and ₹ 37339.12 for marginal, small, medium and large group of farmers, respectively with an average of 18112.57. The cost was highest in large farmers and lowest in marginal farmers.

Per hectare Cost B_2 with the inclusion of rental value of owned land to Cost B_1 was found to be ₹ 6,163.39, ₹ 9,644.08, ₹ 20,803.7 and ₹ 37,839.12 for marginal, small, medium and large group of farmers, respectively with an average of ₹ 18,612.57, while the Cost B_2 was highest in large farmers and lowest in marginal. Per hectare Cost C_1 with the inclusion of imputed value of family labour to Cost B_1 was found to be ₹ 16,163.39, ₹ 22,494.08, ₹ 38,893.7 and ₹ 56,039.12 for marginal, small, medium and large group of farmers, respectively with an average of ₹ 33,397.57. Per hectare Cost C_2 with the inclusion of imputed value of family labour to Cost B_2 was worked out as ₹ 16,663.39, ₹ 22,994.08, ₹ 39,393.7 and ₹ 56,539.12 for marginal, small, medium and large group of farmers, respectively. The average was found out to be ₹ 33,897.57 / hectare.

Table 2. Cost structure in Soybean cultivation across various farm groups (in ₹)

S. N.	Particulars	Farm size group				Average
		Marginal	Small	Medium	Large	
1.	**Variable cost:**					
a.	Transportation cost	25500 (53.58)	36500 (53.85)	41500 (44.50)	42250 (37.23)	36437.5 (45.25)
b.	Labour:					
i.	Hired human	2000 (4.20)	5000 (7.38)	15560 (16.68)	32000 (28.20)	13640 (16.94)
ii.	Family labour	10500 (22.06)	13350 (19.70)	18590 (19.93)	18700 (16.48)	15285 (18.98)
c.	Seeds	1050 (2.21)	1300 (1.92)	1530 (1.64)	1600 (1.41)	1370 (1.70)
d.	FYM	1550.6 (3.26)	1670.8 (2.47)	1860.5 (1.99)	2250.08 (1.98)	1832.99 (2.28)
e.	Tools	500.14 (1.05)	1200.7 (1.77)	2573.07 (2.76)	2757.14 (2.43)	1757.76 (2.18)
f.	Interest on working capital	4932.09 (10.36)	7082.58 (10.45)	9793.63 (10.50)	11946.87 (10.53)	8438.79 (10.48)
Total variable costs (TVC)		**46032.83 (96.72)**	**66104.08 (97.53)**	**91407.2 (98.01)**	**111504.1 (98.25)**	**78762.05 (97.80)**
2.	**Fixed cost:**					
a.	Imputed rental value of land	500 (1.05)	500 (0.74)	500 (0.54)	500 (0.44)	500 (0.62)
b.	Rent paid for leased-in land	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
c.	Depreciation	920.72 (1.93)	1021.16 (1.51)	1184.73 (1.27)	1308.22 (1.15)	1108.71 (1.38)
d.	Land revenue	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
e.	Interest on fixed capital	142.07 (0.30)	152.12 (0.22)	168.47 (0.18)	180.82 (0.16)	160.87 (0.20)
Total Fixed costs (TFC)		**1562.79 (3.3)**	**1673.28 (2.47)**	**1853.2 (1.99)**	**1989.04 (1.75)**	**1769.58 (2.20)**
Total cost (TVC + TFC)		**47595.62 (100)**	**67777.36 (100)**	**93260.4 (100)**	**113493.1 (100)**	**80531.62 (100)**

(The figure in the parenthesis indicate percentage to the total cost)

Table 3. Farm profit measures on sample farms (in ₹)

S. N.	Particulars	Farm size group				Average
		Marginal	Small	Medium	Large	
1.	**Average yield(q/ha)**	15.86	35.65	50.12	70.50	43.03
2.	**Average price per q (₹)**	7000	7000	6800	6500	6825
3.	**Total fixed cost (TFC)**	1562.79	1673.28	1853.2	1989.04	1769.58
4.	**Total variable cost (TVC)**	46032.83	66104.08	91407.2	111504.1	

						78762.05
5.	**Total cost (TVC + TFC)**	47595.62	67777.36	93260.4	113493.1	80531.62
6.	**Gross return**	111020	249550	340816	458250	289909
7.	**Cost A_1**	5521.32	8991.96	20135.23	37158.3	17951.70
8.	**Cost A_2**	5521.32	8991.96	20135.23	37158.3	17951.70
9.	**Cost B_1**	5663.39	9144.08	20303.7	37339.12	18112.57
10.	**Cost B_2**	6163.39	9644.08	20803.7	37839.12	18612.57
11.	**Cost C_1**	16163.39	22494.08	38893.7	56039.12	33397.57
12.	**Cost C_2**	16663.39	22994.08	39393.7	56539.12	33897.57
13.	**Cost C_3**	18329.73	25293.49	43333.07	62193.03	37287.33
14.	**Farm business income**	105498.68	240558.04	320680.77	421091.7	271957.30
15.	**Family labour income**	104856.61	239905.92	320012.3	420410.88	271296.43
16.	**Net income**	92690.27	224256.51	297482.93	396056.97	252621.67
17.	**Farm investment income**	94998.68	227208.04	302090.77	402391.7	256672.30
18.	**BCR**	1.36	2.71	2.67	3.05	2.62

The per hectare Cost C_3 was worked out by the inclusion of Cost C_2 to 10 per cent of the total cost on account of managerial function undertaken by the farmers. Cost C_3 was found to be ₹18,329.73, ₹ 25,293.49, ₹ 43,333.07 and ₹ 62,193.03 for marginal, small, medium and large farm size groups, respectively with an average of ₹37,287.33.

The average price of soybean per quintal was ₹ 7,000 for both marginal and small group of farmers and ₹ 6,800 and ₹ 6,500 for medium and large group of farmers, respectively. The Gross income was found to be ₹ 1,11,020, ₹ 2,49,550, ₹ 3,40,816 and ₹ 4,58,250 for marginal, small, medium and large group respectively, from the yield of 15.86, 35.65, 50.12 and 70.50 quintals per hectare for the same group of farmers. The average yield was 43.03 q with a gross income of ₹ 2,89,909. The table indicates that the gross income was highest in large group and lowest in marginal group of famers.

The farm business income was worked out to be ₹ 1,05,498.68, ₹ 2,40,558, ₹ 3,20,680.77 and ₹ 4,21,091 for marginal, small, medium and large group of farmers, respectively with an average of ₹ 2,71,957.30. The family labour income was worked out to be ₹ 1,04,856.61, ₹ 2,39,905.92, ₹ 3,20,012.3 and ₹ 4,20,410.88 for marginal, small, medium and large group of farmers, respectively with an average of ₹ 2,71,296.43. The net return for marginal, small, medium and large group of farmers was ₹ 92,690, ₹ 2,24,256.51, ₹ 2,97,482.93 and ₹ 3,96,056.97, respectively with an average of ₹ 2,52,621.67. The net return was highest for large group of farmers which indicate that the income increases with increase in the size of farms.

The farm investment income was found to be highest in large group of farmers with ₹ 4,02,391.7 followed by medium, small and marginal group with ₹ 3,02,090.77, ₹ 2,27,208 and ₹ 94,998.68, respectively. The benefit cost ratio was worked out by dividing the gross returns by the total cost. The BCR was found to be 1.36, 2.71, 2.67 and 3.05 for marginal, small,

medium and large group of farmers, respectively with an average of 2.62. Similar report cited by Choudhary *et al.,* 2017 and Sharma and Sharma (2019).

Table 4 reveals that the assessment of Post harvest losses, Egyir method was used to evaluate the losses incurred in soybean cultivation and the losses incurred by the sample farmers of soybean. It depicts that an average estimated losses at each farmers' level were 2.08 q, 5.45 q, 8.09 q and 11.45 q for marginal, small, medium and large group, respectively. The percentage of losses of soybean produced was found to be highest at large farmer group which was 16.45 per cent followed by medium, small and marginal farmers at 16.14 per cent, 15.28 per cent and 13.11 per cent, respectively. The total average quantity loss and total percentage loss were found to be 27.2 q and 60.98 per cent, respectively at all farmers' level. The average quantity left with the marginal, small, medium and large group of farmers were worked out as 13.78 q, 30.2 q, 42.03 q and 58.92 q, respectively. According to the farmers, the losses occurred more under storage conditions as they use to store their produce for a long time and as a result the seeds are attacked by rodents and insect pests, similar findings were report by Jamir and Sharma (2014) and Sharma and Sharma (2019).

Table 4. Estimation of Post-harvest losses at the farmers' level

S. N.	Farm size group	Average quantity produced (q)	Average quantity loss (q)	Average quantity left (q)	% Estimated loss to quantity produced
1.	Marginal	15.86 (9.21)	2.08 (7.65)	13.78 (90.51)	13.11 (21.50)
2.	Small	35.65 (20.71)	5.45 (20.04)	30.2 (20.84)	15.28 (25.06)
3.	Medium	50.12 (29.12)	8.09 (29.74)	42.03 (29.00)	16.14 (26.47)
4.	Large	70.50 (40.96)	11.58 (42.57)	58.92 (40.65)	16.45 (26.98)
Total		**172.13 (100.00)**	**27.2 (100.00)**	**144.93 (100.00)**	**60.98 (100.00)**

(The figure in the parenthesis indicate percentage to the total)

Table 5 reveals that the post harvest losses at the traders' level were also worked out and the average quantity losses at wholesalers and retailers level were 80.05 q and 7.45 q, respectively. Whereas, the percentage post-harvest losses of soybean was 8.01 per cent and 20.22 per cent at wholesalers and retailers level. The losses were found to be higher at retailers' level. Also similar findings were reported by Sharma (2011) and Sharma (2016).

Table 5. Estimation of Post-harvest losses at the trader's level

S. N.	Traders	Average quantity procured (q)	Average quantity loss (q)	Average quantity left (q)	Estimated losses to quantity procured (%)
1.	Wholesalers	1000 (96.44)	80.05 (91.49)	919.95 (96.90)	8.01 (28.37)
2.	Retailers	36.85 (3.55)	7.45 (8.51)	29.4 (3.10)	20.22 (71.63)
Total		**1036.85 (100.00)**	**87.5 (100.00)**	**949.35 (100.00)**	**28.23 (100)**

(The figure in the parenthesis indicate percentage to the total)

Table 6. Constraints faced by the sample farmers in soybean cultivation

S. N.	Constraints factors	Average score	Rank
1.	Poor seed quality	73.13	I
2.	Pests and diseases problem	66.6	II
3.	Lack of knowledge about plant protection measures	59.51	III
4.	High labour costs	54.23	IV
5.	Lack of training	46.48	V
6.	Lack of knowledge about proper application of fertilizers	44.68	VI
7.	Lack of proper storage houses	44.55	VII
8.	Lack of irrigation facility	43.9	VIII
9.	High cost of inputs	43.81	IX
10.	Lack of Government support	37.03	X
11.	Lack of capital and fund	36.05	XI

The constraints faced during the cultivation of soybean crop, indicating the severity of various constraints faced by the selected sample farmers in cultivation of soybean crop. The constraints were worked out with the help of Garrett's ranking technique. The problems faced by the farmers were collected and were given the degree of severity as expressed by the respondents.

Table 6 reveals there were eleven major problems in soybean cultivation as stated by the sample farmers. Poor seed quality was the major problem which was ranked I with an average score of 73.13. This usually occurs due to adverse climatic condition and when the moisture content of the seed during storage is not checked properly which results in low yield. Pests and diseases problem was ranked II with 66.6 average score, followed by lack of knowledge about plant protection measures ranked III with average score of 59.51. The major pests and diseases identified in the study area were gram pod borer and leaf spot disease which causes significant losses in the production of soybean crop. The IV rank given by the sample farmers was high labour cost with an average score of 54.23. The sample farmers expressed that with increase in the wages of human labour the cultivation of soybean will become an expensive business. The farmers lacked training on soybean cultivation which was ranked V by the sample farmers with average score of 46.48 followed by lack of knowledge about proper application of fertilizers, ranked VI with 44.68 average score. Lack of storage houses was also another problem faced by the sample farmers with an average score 44.55 average score ranked VII, followed by lack of irrigation facility which was ranked VIII with 43.9 average score. Some other problems faced by the sample farmers in soybean cultivation are high cost of inputs ranked IX with an average score of 43.81, lack of Government support ranked X with 37.03 average score and lack of capital and fund ranked XI with 36.05 average score. Similar finding were reported by Sharma (2016) and Sharma and Sharma (2019).

4. Conclusions

The average per hectare cost of cultivation was ₹ 80,531.62. The transportation cost was the highest among the variable expenditure with an average of 45.25 per cent of the total costs. The cost benefit ratio was worked out by dividing the net returns by the total cost. The CBR was found to be 1.94, 3.31, 3.19 and 3.49 for marginal, small, medium and large group of farmers, respectively with an average of 2.98. The post harvest losses at the traders' level was also worked out which is given in table 4.3.2. The average quantity losses at wholesalers and retailers level were 80.05 q and 7.45 q, respectively. Whereas, the percentage post-harvest losses of soybean was 8.01 per cent and 20.22 per cent at wholesalers and retailers level. The losses were found to be higher at retailers' level. The constraints were worked out with the help of Garrett's ranking technique. Poor seed quality was the major problem which was ranked I with an average score of 73.13. Pests and diseases problem was ranked II with 66.6 average score, respectively.

Policy implications

- Pests are the major in the cultivation of soybean. Timely pesticides, insecticides and herbicide should be made available to the farmers at reasonable prices.

- A good number of high yielding varieties of soybean crop should be introduced in the respective area to increase the productivity.
- Ever increasing prices of farm inputs is another constraint faced by the farmers and hence, should be kept in control by checking the prices charged by private traders.
- Since the price of soybean varies from year to year, the Government should take necessary steps for the pricing of soybean.
- The farmers use to thresh their products manually, which is time consuming. Therefore, they should be trained for proper use of threshing machines.
- Storage is another problem faced by the farmers. Two principal factors involved in safe storage of soybean are moisture content and temperature. Hence, proper infrastructure should be made available to the farmers to their produce.
- Sometimes the farmers get low price of their soybean produce. Hence, the Government should procure the crop and should have proper marketing channels so that the farmers get satisfactory price.
- If storage facilities, threshers, transportation and labour will be made available on the required time, then it may reduce post harvest losses.
- Proper transportation system should be made for the farmers so that they can easily access to nearby towns and market their produce with less damage and losses in the process of transportation.
- Since the state has ATMA and KVKs in all the districts of the state, regular training should be given to enrich the farmers about the technology like doses of fertilizers, insecticides and pesticides required for the crop.

5. References

Anonymous. 2016. Top five soybean growing states of India. Ministry of Agriculture and Farmer's welfare. Government of India. Accessed on 23rd May 2020.

Choudhary, Ramjilal.; Rathore, D.S. and Sharma, Amod. 2017. An Economics Analysis of Production and Marketing of Groundnut in Porbandar District of Gujarat. *Economic Affairs*. 62(3). September: 547-553.

Dinesh, V. and Sharma, Amod. 2019. Marketing Margin, Price spread and Marketing Efficiency analysis of different Poultry Farms. *International Journal of Current Microbiology and Applied Sciences*. 8(6): 1039-1046.

Dupare, B.U., Billore, S.D. and Joshi, O.P. 2012. Farmers' problems associated with cultivation of soybean in Madhya Pradesh, India. *Journal of Agricultural Science and Technology* 4(631): 23-28.

Jamanal, S.K. and Sadaqath, S. 2017. Constraints faced by the soybean growers in Karnataka. *Journal of Pharmacognosy and Phytochemistry* 6(6): 31-32.

Jamir, Moanukshi. and Sharma, Amod. 2014. A Sustainable Production and Marketing of cucumber crop in the Hilly Zone of Nagaland. *Technofame*. 3(1). May: 61-66.

Patel, D., Agrawal, S., Singh, S.R.K. and Rajan, P. 2014. Constraints perceived by the soybean growers in Damoh district of Madhya Pradesh. *Agriculture Update* 9(2): 170-173.

Perke, D.S., Nagargoje, S.R. and Singarwad, P.S. 2018. The economics of soybean in Hingoli district of Maharashtra. *Journal of Pharmacognosy and Phytochemistry* SP1: 1264-1266.

Sharma, A. and Singh, A. K. 2001. Price Spread of Potato Farmers by Different Farm Size Group in Firozabad District of UP. *Andhra Agricultural Journal*. 48(1-2). January to June: 124-127.

Sharma, Archana. and Sharma, Amod. 2019. Marketing Pattern and Marketing Efficiency of Organic Large Cardamon and Ginger Spices Grown in East District of Sikkim. *International J. of Current Microbiology and Applied Sciences.* 8(5): 1359-1368.

Sharma, Amod. 2011. Economic and Constraints of King Chilli Growers in Dimapur District of Nagaland. *Journal of Interacademicia*. 15(4): 710-719.

Sharma, Amod. 2016. Sustainable economic analysis and constraints faced by the Naga King chilli growers in Nagaland. *Indian Journal Agricultural Research*. 50(3). March: 220-225.

Sharma, Amod.; Kichu, Yimkumba. and Sharma, Pradeep. Kumar. 2018. Sustainable economic analysis and constraints faced by the pineapple growers in Nagaland. *Progressive Agriculture*. 18(1). February: 27-33.

Sharma, Archana. and Sharma, Amod. 2019. Postharvest Losses during the Marketing of Large Cardamon and Ginger Spices Crops in East District of Sikkim. *International J. of Current Microbiology and Applied Sciences.* **8**(5): 1274-1282.

Sharma, P. 2016. Costs, returns and profitability of soybean cultivation in India: Trends and prospects. *Economic Affairs* **61**(3): 413-425.

Singh, H.P., Srivastava, S.C. and Singh, D. 2013. Constraints faced by soybean growers of Mandsaur district in Malwa plateau of Madhya Pradesh. *International Journal of Farm Science* **3**(2): 34-38.