Original Research Article

"Constraints and suggestions regarding supply chain of Mushroom cultivation in Dehradun District of Uttarakhand"

Abstract:

The present study indicated that the majority of the respondents encountered key challenge for accepting inputs of mushroom is 'inadequate availability of spawn at appropriate time'. It was also shown that the bulk of crop management problems were caused by 'unfavorable weather conditions'. The main concern identified by producers in terms of infrastructure/transportation was a 'lack of cold storage facilities' and a 'lack of refrigerated vehicles', it is suggested that establishment of cold storage near Mandi. The survey also indicated that 'poor marketing avenues' is the most significant marketing barrier that stakeholders confront, mushroom is a perishable vegetable revenue crop with limited market choices so, it is suggested to improve shelf life through value addition. The biggest societal barrier, according to the majority of respondents, is that "most people regard mushrooms as non veg."

Keywords: Supply chain, Mushroom, Constraints.

1. Introduction

Mushroom has a great potential of producing high amount of protein per unit area which is not possible by any other form of agriculture and technology at par at level Mushrooms contain 20 to 35% protein (on dry wet basis) with all essential amino acids required for human body.

The fleshy and spore-bearing fruiting body of a fungus, that generally grows above ground o soil or on its food supply, is known as a mushroom (or toadstool). Chinese were the first to artificially cultivate the tropical and subtropical mushrooms about thousands year back (*Auriculariapolytricha* in 600 AD: *Flammulinavelutige* in 800 AD; and *Lentinulaedodes* in 1000 AD) but real commercial ventures started when Europeans started cultivation of button mushroom in caves during 16th and 17th centuries **(Singh *et.al.*, 2011).**

The cultivated white button mushroom (*Agaricus bisporus*) serves as the benchmark for the term "mushroom" is the leading mushroom crop having worldwide production about 30%,

Pleurotus ranks second i.e., 25% and *Lentinula* is third most cultivated mushroom worldwide i.e., 10%. Asian countries continue to dominated world production and consumption.

The top producers are China, the USA, the Netherlands, Poland, Spain, France, Italy, Ireland, Canada, and the United Kingdom. Among these, China is the leading mushroom producing country, accounts for 47% of total world mushroom production followed by USA. The world mushroom production as per **FAO**, is 3,4 Million Tonnes in 2010.

Global export of canned mushrooms amounted to around 458,137 tonnes in 2008. China accounting for 87% of total export volume in 2008 i.e., 4,05,112 tonnes. Other major exporter of canned mushrooms includes Indonesia and India i.e., 18,392 tonnes and for fresh mushrooms, global export averaged around 34,802 tonnes in 2008 with Canada and United States as the largest global exporters of fresh mushrooms in 2008, together accounting for nearly 80% of total fresh mushroom export **(Dhar, 2014).**

Mushroom is a unique non-traditional cash crop grown indoors, both as a seasonal crop and round-the-year under the controlled environmental conditions. About 2000 species of fungi are used as food by tribes and various communities, however, only a few are cultivated. Climatic conditions in India are favourable for natural occurrence of mushrooms and some of them are regularly collected and used as food by the natives particularly those belonging to tribes

2. Review of literature

- **Harsh and Joshi (2008)** found that though India's present share in the world production is meagre but still the potential for future growth is rated high. The natural advantages for mushroom cultivation in India are the availability of cheap labour as this is a labour-intensive process, presence of seasonal variations enabling us to cultivate different mushrooms under natural conditions in the form of crop rotation in different seasons and region and lastly the abundance & availability of variety of agro-wastes at low prices for mushroom cultivation.
- **Deliya *et.al.* (2012)** reported wastages of nearly 30% of food commodities and also less remuneration for the farmers due to non-availability of cold storage and unorganized market and retail prices.
- **Negi and Anand (2015)** found that cold chain facilities, fragmented supply chain, linkage and integration between the partners, taxation issues, infrastructure facilities, cost packaging material, technology and techniques, supply inefficiency, supply chain losses are the factor

which constitute serious challenge and are affecting the overall growth of the agricultural growth of India.

- **Rais and Sheoran (2015)** reported that India is the world largest producer of many horticultural produces including mushrooms, but there still exist huge gap between per capita demand and supply due to enormous waste during post-harvest storage and handling caused by lack of temperature-controlled vehicles, unavailability of cold chain facilities in various parts of country for preserving the produce which results in immense losses to the nation.

3. Objective

- To identify the constraints faced by various stakeholders and traders and suggestions to overcome these constraints.

4. Research methodology

Study was conducted in Dehradun District of Uttarakhand State due to great production of mushroom and availability of growers and traders. Various levels of screening were performed for the selection of district, block, villages and respondents. Out of 13 districts Dehradun was selected, as the production of mushroom there was high. There is total 6 blocks in Dehradun out of which Raipur block was selected due to the maximum availability of mushroom growers and traders. The data was collected from the respondents on the basis of purposive sampling.

Primary data was collected from personal interview and pre-structured questionnaire. Further secondary data was collected from total 80 respondents, out of which 60 were growers (Small- 35, medium- 27 and large- 18 growers and the growers were divided on the basis of their annual income) and 20 were traders (Wholeseller- 8 and retailer- 12).

Analytical tools and techniques:

The data were analyzed using Garret ranking. The results have been presented using tables. Garrett ranking technique was employed to determine the most faced factor (constraints) in supply chain of mushroom. On the basis of primary and secondary data respondents' perception was analyzed and suggestion were gathered.

5. Results and discussion

The objective of this project shows various constraints faced by stakeholders and traders. From cultivation to providing the produce to end customers various procedures are there and with it comes various constraints.

Table 1 : Input constraints

Factors	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**Garret value**	**Garret score**	**Total**	**Mean**	**Rank**
Poor quality of spawn	16	12	9	7	8	5	3	7.14	78	3497	58.28	**II**
Procurement of raw material is time consuming	15	10	9	8	7	6	5	21.42	66	3373	56.21	**III**
Inadequate supply of spawn at appropriate time	18	12	10	9	6	4	1	35.71	58	3646	60.76	**I**
Non availability of compost when needed	3	6	12	6	10	11	12	50	50	2705	45.08	**VI**
Unavailability of chemicals	7	6	5	12	10	12	13	64.28	43	2968	49.46	**IV**
Lack of training and technical knowledge	5	10	8	8	9	10	10	78.57	35	2871	47.85	**V**
Difficulty in arranging loan	1	4	7	10	10	12	16	92.85	22	2450	40.83	**VII**

According to the response received from the growers. It was found that the main problems faced by the growers regarding input were problem of inadequate supply of spawn at appropriate time was ranked Ist (with mean score60.76). Farmers having problem of poor quality of spawn ranked IInd (with mean score 58.28), problem of procurement of raw

material at IIIrd rank (with mean score 56.21), unavailability of chemical ranked IVth (with mean score 49.46), lack of technical and training knowledge ranked Vth (with mean score 47.85), non-availability of compost when needed ranked VIth (with mean score 45.08) and difficulty in arranging loan was ranked VIIth (with mean score 40.83) as presented.

Table 2 Challenges related to crop management

Factors	**I**	**II**	**III**	**Garret value**	**Garret score**	**Total**	**Mean**	**Rank**
Frequent occurrence of diseases in mushroom	10	15	35	16.6	69	2525	42.08	**III**
Poor and irregular production	15	25	20	50	50	2905	48.41	**II**
Unfavourable climatic condition	35	20	5	83.3	31	3570	59.5	**I**

According to the response received from the growers, it was identified that major problem farmer facing during crop management was 'unfavourable climate condition at Ist rank 9with mean score 59.5), followed by poor and irregular production at IInd rank (with mean score 48.41) and frequency of disease in mushroom at IIIrd rank (with mean score 42.08) respectively.

Table 3 Infrastructural/ transportation constraints

Factors	**I**	**II**	**III**	**IV**	**V**	**Garret value**	**Garret score**	**Total**	**Mean**	**Rank**
No cold storage facility	22	18	12	6	2	10	75	3618	60.3	**I**
Seasonal activity	5	9	14	10	22	30	60	2543	42.38	**IV**
Lack of space	3	7	12	14	24	50	50	2381	39.68	**V**
Lack of refrigerated	16	15	12	12	5	70	40	3300	55	**II**

vans										
High cost of transportation	14	11	10	18	7	90	24	3098	51.63	**III**

According to the response received from the farmers. It was found that the major problem in infrastructural/ transportation was 'lack of cold storage facility' at Ist rank (with mean score 60.3), followed by lack of refrigerated vans at IInd rank (with mean score 55), high cost of transportation at IIIrd rank (with mean score 51.63), seasonal activity at IVth rank (with mean score 42.38) and lack of space at Vth rank (with mean score 39.68) respectively.

Table 4 Marketing constraints faced by stakeholder in mushroom supply chain

Factors	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**Garret value**	**Garret score**	**Total**	**Mean**	**Rank**
Distant location of markets	0	0	5	5	7	7	8	5	8	11	5	81	2256	37.6	**X**
Poor marketing avenues	11	12	10	8	8	4	3	1	2	1	15	70	3672	61.2	**I**
Less demand for mushroom	1	1	3	5	7	7	5	9	9	13	25	63	2368	39.46	**IX**
Non availability of proper agency to purchase mushroom	8	11	8	7	5	4	4	4	6	3	35	58	3324	55.4	**IV**
Erratic local demand for mushroom	13	10	9	7	6	5	4	3	2	1	45	52	3633	60.55	**II**
Malpractices of middlemen (less share of producer in consumer rupees)	7	9	6	6	6	5	7	6	5	3	55	48	3190	53.16	**V**
Lack of transport facility	2	1	1	7	4	8	10	8	8	11	65	42	2439	40.65	**VIII**

Perishable commodity result in losses	10	10	7	5	7	5	6	4	2	4	75	37	3375	56.25	**III**
No demand of other varieties of mushroom	3	2	4	6	5	8	9	9	7	7	85	29	2667	44.45	**VII**
No control over price fixation	5	4	7	4	5	6	7	8	8	6	95	18	2836	47.26	**VI**

Response received from the farmers shows that "poor marketing avenues" has been ranked Ist (with mean score 61.2), "erratic local demand for mushroom" has been ranked IInd (with mean score 60.55), "high perishable commodity causes losses" has been ranked IIIrd (with mean score 56.25) as their major problem. Due to high perishability and lack of refrigerated transport, farmer sells the major produce in nearby region.

Table 5 Social constraints

Factors	**I**	**II**	**III**	**IV**	**Garret value**	**Garret score**	**Total**	**Mean**	**Rank**
Negative attitude of society toward women entrepreneur	7	10	18	25	12.5	73	2538	42.3	**IV**
People regard mushroom as a non-veg food	24	19	10	7	37.5	56	3445	57.41	**I**
Misconception about mushroom consumption is injurious to health	18	17	16	9	62.5	44	3213	53.55	**II**
Lack of awareness about nutritional value of mushroom	11	14	16	19	87.5	27	2804	46.73	**III**

This response includes the entire three stakeholders in mushroom supply chain i.e., producer, commission agent and retailer.

Social constraints regarding mushroom which effects the sales was, “people regard mushroom as nonveg” has been ranked Ist (with mean score 57.41) as the major problem, followed by “people misconceive it as poisonous food” has been ranked IInd (with mean score 53.55), rest is represented in the table and the ranks are given accordingly.

6. Conclusion

The study showed that problem of inadequate supply of spawn at appropriate time has been ranked Ist as input constraint. In the study area it was found that highly ranked problem that growers are facing during crop management was unfavourable climatic conditions. According to the responses it was found that most ranked problem in infrastructural/ transportation constraint was lack of cold storage. The study revealed that highly perishable commodity causes losses, faced by stakeholders has been considered as a major marketing constraint. It was noticed that the major social constraint is people regard mushroom as a non-veg got the first rank.

7. Suggestions

- **For input problems**

  Most mushroom producers had limited choice to spawn and substrate. As a result, they are constrained to produce mushroom using only wheat straw. Therefore, having substitute substrate ensure sustainable mushroom production in addition, spawn should be available in terms of quantity, quality and sustainability. Thus, there is a need to link higher educational and research institutes to KVKs and producers to scale up suitable spawn and substrate technologies.

- **Establishment of small cold storage near Mandi**

  To extent the self-life and maintain round the year mushroom supply cold storage is recommended. This will reduce the post-harvest losses.

- **Processing of mushroom**

  In the studied region most of the mushroom is sold in raw form no value addition is being done in any stage. Mushroom is perishable vegetable cash crop and producers have limited

market options. As a result, they dispose it during over supply. Therefore, there is a need to increase the shelf life through value addition process.

- **For market problems**

  Mushroom and spawn market are concentrated in the hands of spawn suppliers which makes mushroom market imperfect. As a result, most of the mushroom producers are exploited and discouraged. Therefore, government intervention required in terms of generating mushroom market information like other agricultural commodities, establish standard and quality control mechanism and link producers with potential markets. In addition, producers should communicate with each other and establish cooperatives and unions to overcome the problem.

- **Awareness**

  In addition, continuous promotion may contribute to improve the awareness of the society about the nutritional and medicinal values of mushroom. Moreover, providing mushroom processing technologies at fair price needs focus of relevant body.

  Addressing these constraints and implementing the suggested improvement can lead to more efficient and sustainable mushroom supply chain. It would benefit not only traders and stakeholders but also the entire industry, consumer and the economy as well.

8. References

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