

2010



62 कदम, 62 दमर  
किसानों का दमरपत्र  
सबसे पुरे अग्राना पत्रिक

*Agri'search with a human touch*

# MUSHROOM FARMING



Zonal Project Directorate, Zone-1  
Indian Council of Agricultural Research  
PAU Campus, Ludhiana-141004



भारतीय  
ICAR



Sr. No.	Name	Village (District)	Specific contribution
10.	Mrs. Rajbala	Barota (Sonapat)	First lady farmer entered in mushroom cultivation, later expanded toward spawn production.
11.	Satpal (Leela pahlvan)	Ahir Majra (Sonapat)	Big mushroom grower with success in group and direct marketing
12.	Joginder	Sahamalpura (Panipat)	Early adopter and leading mushroom grower of the district.
13.	Sunita w/o Amish Kumar	Yamunnagar	Early adopter in the district, motivating others with success
14.	Balbir Kumari w/o Mohan Singh	Yamunnagar	Leading lady in mushroom cultivation, largest producer in Yamuna Nagar
15.	Ramesh Dagar	Barota (Sonapat)	Leading mushroom grower, creating awareness among farmers for group approach
<b>(B) Spawn Producers &amp; Processors</b>			
1.	Kanwal Singh	Atema (Sonapat)	Successful mushroom grower turned farm entrepreneur by diversifying toward spawn and compost production. Established mushroom canning unit.
<b>(C) Mushroom Processors/Spawn Producers</b>			
1.	Sunil Tyagi	Gannaur (Sonapat)	Mushroom processing
2.	Raj Kumar Sharma	Gannaur (Sonapat)	Mushroom processing
3.	Pardeep Kumar	Kamaspur (Sonapat)	Mushroom farmer turned spawn producer
4.	Ashok Kumar	Gannaur (Sonapat)	Mushroom farmer turned spawn producer
5.	Yogesh & Ashok Aggarwal	Kurukshetra	Mushroom farmer turned spawn producer
6.	Jaibhagwan	Gurgaon	Mushroom farmer turned spawn producer
7.	Bhim Singh	Hisar	Mushroom farmer turned spawn producer

## MUSHROOM FARMING

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*Citation :*

Kokate K. D., Rathl Anil, Narula A.M. and Keshava 2010. Mushroom Farming.  
Zonal Project Directorate, Zone - 1,  
PAU Campus, Ludhiana - 141 004

December, 2010  
1000 Copies

*Published by :*

Zonal Project Directorate, Zone - 1,  
ICAR, PAU Campus,  
Ludhiana - 141 004

*Printed at*

Printing Service Co.  
3801/1, Pritam Nagar,  
Model Town, Ludhiana-141 001  
Ph. : 0161-2410896, 09888021624  
Email: decentpublsbl42@rediffmail.com

### Annexure I: Notable farmers whose actions have made Mushroom farming a success

Listed below are a few prominent farmers whose untiring efforts have resulted into resounding success of mushroom as an enterprise through the length and breadth of Haryana state. The list is by no means exclusive, there may be and are many more who have contributed greatly towards the success of this endeavour.

Sr. No.	Name	Village (District)	Specific contribution
<b>(A) Farmer-Producer</b>			
1.	Jagdev Singh	Bhadana (Sonapat)	Pioneer work in successful introduction of mushroom and finding low cost local solutions for cost reduction.
2.	Dalbir Singh	Jharot (Sonapat)	Early adopter and close associate of Jagdev Singh, developed low cost local solutions, started/ Installed pasteurized chamber
3.	Rajbir Singh	Bhadana (Sonapat)	Early adopter, successful group marketing, motivated others towards mushroom farming
4.	Randhir Singh	Mehlana (Sonapat)	Early adopter, prominent mushroom grower, formed a informal group for marketing
5.	Ram Kumar	Khubru (Sonapat)	Started mushroom from scratch, show a way to fellow farmers, wide adoption with a peak of more than 100 farmers adopting mushroom in the village.
6.	Bijender Singh	Khubru (Sonapat)	Modest start, now one of the largest producer, perfected low cost production using paddy straw with fellow farmers. Explored new markets with success, lead role in formation of state level co-operative Society of mushroom farmers.
7.	Katar Singh	Khubru (Sonapat)	Marginal farmer, yet providing solid support and persuasion for spread and adoption of mushroom
8.	Jasmer & Charan Singh	Bhapra (Panipat)	Early adopters and leading mushroom growers, motivating others.
9.	Harpal Singh Bajwa	Bhorsaldan (Kurukshetra)	Early adopter, prominent role in making District mushroom cooperative society



prime importance, which needs to be rectified. Opening up of 'mandi' system will invite competition, which eventually helps in curbing mal-practices. Farmers ought to be informed and educated on latest market happenings especially through e-marketing network. Here in this particular instance of mushroom marketing, the circumvent ways of unauthorized charging should be checked.

#### (iii) Contract farming regulations

In the changed agri-economic scenario, contract farming is being practiced. Government intervention in framing of regulations for transparent and effective contract farming is necessary for smooth operation and healthy growth of agri-enterprises. The successful contract farming of several agri-commodities in different regions can be indicative of the future trends.

#### (iv) Assured quality inputs

Assured supply of quality inputs at reasonable prices is a pre-requisite for survival and growth of any farming enterprise. In mushrooms, supply of quality spawn, a key ingredient, is highly required and availability of pasteurized compost through mother composting units is also of great value. At times, farmers had to suffer heavily on account of poor quality and availability of these both inputs.

### 3. For Institutions

#### (i) Proper initiatives and backup

Research institutes should be awakened to the needs of farms, firms and markets with proper research and development. These efforts should be oriented towards farmer's resources and market requirements. Improved low cost technology of mushroom production combined with cost effective post harvest technologies are needed to be developed and disseminated among the farmers. Farmers are facing serious threats of persistent disease occurrence and production technology related problems which are needed to be tackled by researchers. Financial institutions are ought to see beyond their cocooned financial schemes for a vibrant farm sector.

#### (ii) Integration of farm and industry

Vertical integration of agri and food markets from farm to firm is the best way to achieve efficiency and serve the interest of each stakeholder in the chain i.e. the farmer, the processor, the retailer and the consumer. The successful integration of this kind can be noticed in milk, vegetable and poultry sector etc. in the country. Mushroom industry too can grow and prosper on these lines, if efforts are made with sincerity by all concerned.

डॉ. एस. अय्यप्पन  
DR. S. AYYAPPAN



सचिव, कृषि अनुसंधान और शिक्षा विभाग एवं  
महानिदेशक, भारतीय कृषि अनुसंधान परिषद  
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## Foreword

The farmers of agriculturally developed states like Punjab, Haryana & Western Uttar Pradesh having witnessed the high growth and farm profits during green revolution are now facing problems like declining yield and farm profits, degrading natural resources and fragmenting small farms. The high value crops and farm enterprises with potential for increased growth and farm incomes are better options. A host of such high value crops and enterprises have been taken up by some enterprising farmers which needs up scaling in the region. Under such situations in these areas, the diversification of farm with other enterprises having market potential is of paramount importance.

In this direction, mushroom growers of Haryana State and other stakeholders have made commendable efforts. I congratulate the authors of this bulletin for documenting various aspects including successful cases of mushroom cultivation by farmers of Haryana. The exploration by the writers on other aspects of mushroom cultivation such as its marketing, economic & social impact, and present priorities for growth with future strategies alongwith the problems faced by the farmers will be of immense use for planners, administrators, researchers, extension personnel and farmers.

The efforts of contributors should be appreciated as this would encourage mushroom growers as well as other farmers to go for this and other such agri-enterprises to harvest the benefits of changing a gri-economic scenario in the region.

Dated the 6th December, 2010  
New Delhi

  
(S. Ayyappan)

### (ii) Quality consciousness

In this era of globalization 'quality at competitive price' is the key to success. Our farmers are needed to make an assertive shift from 'production mode' to 'production with quality mode' by applying latest production and marketing techniques as per market requirements. In mushroom, farmers ought to adopt pasteurization process as well as timely and rational use of chemicals for quality mushroom production at lower costs.

### (iii) Expanding cultivation beyond white button mushroom

Other popular mushroom species such as oyster/dhingri, Chinese/Tropical and Milky mushroom can be successfully cultivated in the region. There exists a strong market for these mushrooms too. These mushrooms can also be started with a comparatively lower capital utilizing locally available material. By growing these mushrooms cultivation can be done round the year with regular income.

## 2. For government

### (i) Co-coordinating trade-within country and beyond

With huge market potential and its spread of cultivation especially among



Dhingri Mushroom

marginal and small farmers, mushroom trade and export is needed to be coordinated in the same manner as that of other important commodities such as tea, coffee and eggs. Though, efforts have been made but serious thoughts and actions are required to tap the international market with consistency in supply and quality at competitive prices. Mechanism has to be evolved to face competition from some highly protective mushroom producing and exporting countries.

### (ii) Market reforms and regulations

The government has taken several steps yet, a lot is desired to be done in this direction. In spite of regulations, unlawful practices are rampant even in markets of



#### (vi) Improving family health and education

Increased income and exposure which came from mushroom farming have prompted farmers to be more conscious towards their family health and education. On the strength of raised income from this enterprise, investment in education is on the rise as reported by many a mushroom growers.

#### (vii) Broadening outlook

The on and off interaction of mushroom farmers with different persons and institutions related to mushroom enterprise has broadened their outlook. They are more open and willing to take and test the new opportunities. As mentioned, farmers now have started exploring new markets and willing to do business with traders from far-off places.

#### (viii) Increasing volume of trade

Mushroom unheard of as an agri-enterprise just thirty years back is now a well established and expanding trade. With only one wholesaler in 1985, number of traders (in different mandis) has increased and so are others associated with trade, processing and export of this enterprise. This expansion is indirectly providing for more avenues in mandis, transportation, and processing, retailing and alike fields.

#### (ix) Supporting local economy

Mushroom cultivation is playing an important role in supporting local economy of the state and nearby areas through several means. Other than production of mushroom, its trade is also generating additional employment and income at local, regional and national level. It is also helping farmers in organizing them in formal and informal ways i.e. groups, SHGs, Co-operative societies etc. for undertaking works jointly.

### Future strategies

#### 1. For farmers

##### (i) Joint efforts and co-operation

Irrespective of the enterprise(s) adopted, keeping in view the farmers vulnerability, they have to put the joint or group efforts. Joint efforts work as power of scale-bigger the scale, lesser the costs. These efforts may or may not be formal but should be practical one. Though, everyone knows the fate and working of large number of 'co-operatives' yet the spirit and principle of cooperation is there to stay. Meaningful co-operation can do wonders for the farmers be in the field of procurement, production, processing or marketing.

## Acknowledgment

We gratefully acknowledge the motivation and guidance by Dr. . Ayyappan, Secretary (DARE) and Director General (ICAR) for shaping this document.

The authors are sincerely thankful to Dr. Ramesh Shama; Dr Dharam Singh and Dr. S. S. Dahiya of KVK Sonapat; Dr Neeraj Pawar of KVK Sirsa and Dr. S.P. Goyal, KVK, Kurukshetra for providing good foundation in bringing out this publication.

We also take this opportunity to express our sincere thanks to Sh. Ashok Kumar, Agriculture Development Officer, DDA Office, Karnal for sharing his experiences in mushroom cultivation in Haryana. We are also extremely thankful to Dr. B.M. Sharma, Professor of Plant Pathology, CSKHPKV, Palampur for sharing his experience on Mushroom research and development.

We extend our sincere thanks to officers of Department of Horticulture Haryana; HAIC Centre, Murthal and also progressive farmers for providing valuable information on mushroom cultivation.

Authors

but they had to hire labour in lieu of upto 30 percent of the gross sale of mushroom to be paid to labour. Thus, mushroom cultivation is generating enormous gainful employment both for farm family and hired labour.

**(iii) Providing sustainability to the existing cropping system:**

Mushroom cultivation utilizes the crop by-products, cow-dung, fertilizers, chemicals and other locally available materials as inputs in compost and casing preparation. This spent compost or substrate (after harvest of mushroom) is then used as manure for field and horticultural crops. By applying to the soil, this substrate is helping in increasing production and productivity of existing crops with increased factor productivity through enhance soil fertility and lower cost of production. With a production of more than 2400 tonnes of mushrooms, farmers in Sonapat district are preparing more than 16000 tonnes of compost. After growing of mushroom, this much of spent compost is left with farmers to be used as manure in fields. Thus, mushroom production is helping in maintaining (if not increasing) the sustainability of existing cropping system (though at a moderate level as this much of substrate can be used for only 1600 acres or so each year) first by preparing compost and casing material using locally available inputs and then by returning the spent compost to the fields.

**(iv) Investing more in agriculture**

In the initial years of mushroom cultivation, capital was needed in smaller amount as it was modestly started by most of the small and marginal farmers. During the later years, successive income earned from mushroom enterprise is being invested as capital for improving the cultivation of crops as well as mushroom. There have been increased number of sale of tractors and other farm machinery in the villages where mushroom cultivation is concentrated. Increased level of investment in land, modern agri-machinery and implements had in turn resulted into increased productivity of both the enterprises i. e. crops as well as mushroom.

**(v) Developing business and entrepreneurial skills**

Another impact of mushroom farming, though not so visible yet, is that of transforming farmers into full scale entrepreneurs with diversifying towards mushroom spawn production, mushroom processing and mushroom trade. With experience in mushroom production, came confidence and a number of farmers have expanded volume of their mushroom production, other few have entered into mushroom spawn production and a few have joined processing also (Annexure I)



### **Impact of mushroom farming (Case study of Sonipat district)**

As indicated earlier in the text that 25% of mushroom production of the state is produced in Sonipat district. The impact studies of mushroom cultivations in the district are detailed below :

#### **(i) Raising farm income with broadening economic base**

Once introduced, the rapid adoption and expansion of mushroom enterprise in Sonipat district is related to, among other factors, its supplementary nature and comparative profitability. Apart from the traditional income generating activities of crops and animal husbandry, the farmers are reaping a good harvest of increased farm incomes from mushroom cultivation too. During 2009-10, farmers of Sonipat district produced 2407 tonnes of mushroom in addition to other farm products of crops and animal origin. This way, they were able to earn more than Rs. 12.0 crore over and above the gross income from crop and animal husbandry. With increased volume of mushroom cultivation, this enterprise is replacing or leaving behind several established crops/ enterprises in monetary terms. At the current production level, mushroom can be placed at par with important commercial crop of sugarcane in terms of gross income generation after wheat and paddy in the district. A perusal of economics of mushroom cultivation and crops being grown by farmers reveals that average family income (of farmers cultivating mushroom) from mushroom cultivation is far greater than that of what is achieved from crop husbandry. An average family income reported from mushroom in village Khubru, Sonipat was Rs. 50941 while average family income (having average holding of about 1.0 ha) from crop husbandry (paddy-wheat sequence) was Rs. 35045 in 2003-04.

#### **(ii) Creating additional employment opportunities**

Mushroom cultivation, being a complimentary enterprise, uses resources which otherwise remain idle or underutilized during that period. This enterprise when undertaken at small scale utilizes the spare or idle home or hired (permanent) labour, at a larger scale of adoption mushroom cultivation creates opportunities of huge employment generation. Number of human days generated through cultivation of mushroom with compost of 100 q straw is reported to be 140. With the production of 24070 qtl of mushroom in Sonipat district, the labour requirement comes to more than 89 thousands man days. If half of this requirement can be had from family itself then there remains a need of more than 45000 man days to be met by hiring outside hands in Sonipat district alone. Due to this huge demand, the labour costs especially for mushroom cultivation have escalated in past 2-3 years. During 2009-10 mushroom season, a large number of farmers hired labour not on cash terms as such

## *Preface*

A sustained and wide spread agricultural growth is a pre-condition of development in India because of the dependency of its population on agriculture. For the vast majority of marginal and small farmers, which also constitute the bulk of rural poor, it is not possible to improve the income level by merely raising the yields of existing crops on these holdings. The focused approach of intensive cultivation of field crops by itself is also not going to solve the problem of seasonal unemployment and under employment in agriculture owing to its low labour intensity. Moreover, in the 'green revolution' belt of Haryana, Punjab & Western Uttar Pradesh, there is a question mark on the ecological and economic sustainability of the most crucial Rice Wheat Cropping System (RWCS). Future growth of agriculture, therefore, seems primarily in high value food commodities due to their higher expenditure elasticity, high labour intensity, low gestation period with quick returns. The rising domestic and foreign demand coupled with India's competitiveness can help boost the overall performance of agriculture sector.

Thus, diversification has become the focal issue in all policy initiatives, yet, there is general resistance to it. Farmers are opposing it because of comparative profitability of rice and wheat. Section of economists and policy makers also are concerned with food security and related issues. What is needed is a smooth balance between food grains (existing cropping system) and high value commodities which help in lessen the pressure on natural resources and open up opportunities for sustainable farm incomes. This can be successfully achieved by way of adopting complementary and supplementary enterprises with market potential. Such enterprises may be hitherto new or which are already being adopted by farmers on a scale lower than its potential. Such enterprises are needed to be identified and promoted for larger adoption.

Documented here is one such success, scripted by innovative small and marginal farmers of Haryana in the form of mushroom cultivation. The bulletin depicts the journey of this success from a modest start in 1980-81 to its large scale adoption throughout the state in spite of lack of infrastructural and institutional facilities. Case studies have been reported, showcasing the farmers' efforts of evolving low cost local solutions of reducing cost of cultivation and adopting efficient marketing

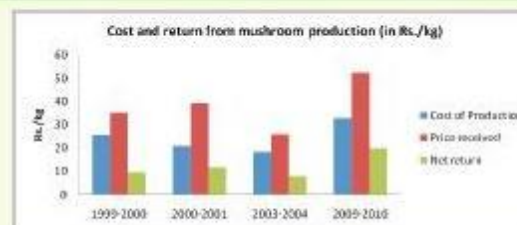


practices which paved the way for its wider adoption throughout the state and beyond. Mushroom cultivation fits well in the farming schemes of the farmers of this region. Its cultivation helped in sustaining the popular RWCS, increasing farm income and generating gainful employment with increased resource use efficiency across all categories of farms. The bulletin analyses the impact, present status and priorities for its growth along with the problems for redressal that have cropped up before the mushroom growers. The narration also entails the recommended interventions for future growth as well as strategies for smooth adoption and expansion of mushroom and other such high value enterprises by the farmers.

Since the booklet highlights the efforts of farmers in order to raise awareness about opportunities at farm and local level to increase income from mushroom (and other alike enterprises), farmers are advised to seek more information and technical support from Agricultural Universities, ICAR institutes, Govt. Departments and other sources.

It is hoped that the documented success stories will be useful for the farmers, extension workers, administrators, and planners in taking decisions regarding adoption of high value crops enterprises and allocation of resources over different competing crops and enterprises.

Authors



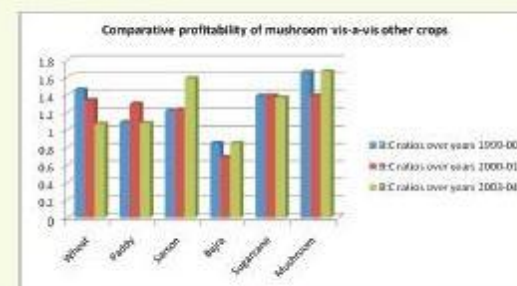
#### (ii) Profitability of mushroom vis-à-vis other crops in Haryana

Mushroom cultivation has a competitive edge over existing crops including the most popular (even profitable) crops of paddy, wheat and sugarcane and other enterprises in several respects. The results from various studies as shown in Table-5 indicate the overall comparative profitability of mushroom cultivation in comparison to other major crops (cropping sequence) of the region.

Table 5: Comparative profitability of mushroom vis-à-vis other crops in Haryana

Commodity	B:C ratios over years		
	1999-00	2000-01	2003-04
Wheat	1:1.46	1:1.34	1:1.07
Paddy	1:1.09	1:1.30	1:1.08
Gram	-	1:0.93	1:0.92
Sarson	1:1.22	1:1.23	1:1.59
Bajra	1:0.85	1:0.69	1:0.85
Sugarcane	1:1.39	1:1.39	1:1.37
Mushroom	1:1.37 (1:1.66)*	1:1.39	1:1.42 (1:1.67)*

\*production cost excluding marketing cost



contributes more than 1/4<sup>th</sup> of the mushroom produced in the state followed by Panipat, Kamal, Rohtak, Yamunsnagar and Kurukshetra district contributing significantly. Mushroom cultivation is fast becoming a major agri-enterprise involving large sum of rupees as is evident from its expansion over past twenty years or so. Economic analysis of this expanding agri-enterprise becomes important for viewing its growth and performance in right perspective.

#### (i) Cost -benefit ratio from mushroom production

Since past twenty years or so, mushroom production is on the rise in Haryana State. Being a high value commercial enterprise, its increase in production itself is an indicator of its profitability. There have been the bad years too yet, this enterprise has been maintaining its profitability (with increased demand and trade) owing to certain factors. Over the past years, several studies have been conducted on economic, marketing and other related aspects of mushroom cultivation. Though, these studies have been conducted in different years with variation in sampling, area selection and other parameters yet the inferences can be drawn for viewing economic feasibility over the years. The findings of these studies have been shown in Table-4 which clearly establishes the growing profitability of mushroom production over the years. Though, there have been increase in its cost of production as its rises from Rs. 20.57 a Kg in 2000-01 to more than Rs. 32.00 a Kg in year 2009-10, yet with increase in price received by farmers, the profitability have been maintained. Another economic indicator for evaluating economic feasibility of any crop or enterprise is Benefit-cost ratio (B: C. ratio) which indicates the return to the farmer by investing one rupee in the production of a crop or an enterprise. As shown in Table-4, there has been a steady increase in B: C ratio of mushroom production as it increases from 1:1.37 in 1999-2000 to 1:1.59 in 2009-10, clearly indicating its sound economics.

Table 4: Profitability of Mushroom Production

Year	Cost of Production	Price received	Net return	B:C ratio
1999 -2000	25.48	34.97	9.49	1:1.37 (1:1.66)***
2000 -2001	20.57	39.09	11.52	1:1.39
2003 -2004	18.21*	25.80	7.59	1:1.42 (1:1.67)***
2009 -2010**	32.60	52.30	19.70	1:1.59

\*Cost of producing mushroom utilizing paddy straw

\*\*Provisional estimates

\*\*\* B:C ratio over to total production cost (excluding marketing cost)

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- ? Imposition of additional two percent charge on sale of mushroom on farmers' sale proceed. The tax ought to be charged from purchaser but price of farmers mushroom is so fixed as to adjust this tax from farmers' share
- ? Un-authorized charging of commission/fee from farmers selling mushrooms from designated farmers sheds

#### (ii) Problems in direct marketing

In recent years, increasing number of farmers are marketing their mushrooms directly to the processors, exporters, MNCs and trade houses. This practice of marketing is also reported to be fraught with manipulative practices. There are complaints of reduction in predetermined contract (mostly oral) prices on flimsy excuses of quality and size with delay or even default in payment. At times, especially during peak production periods when prices tend to remain low, the firms/traders do not even bother to purchase at all from the contracted farmers.

#### Sale percentage of mushroom to different agencies

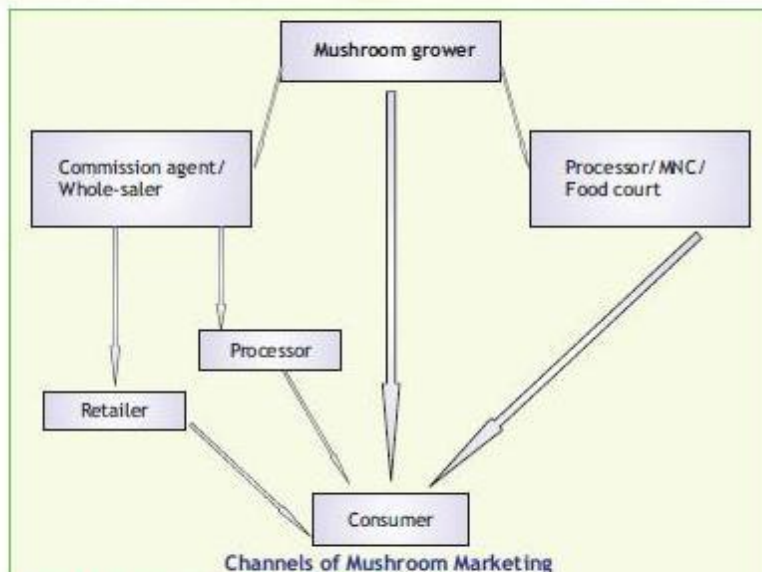
Marketing of mushroom by growers of Sonipat districts is witnessing a definite change over past few years. Now the sale percentage of mushroom through commission agents/wholesalers in Azadpur Mandi, Delhi is declining and that of traders from other states is on rise. This is happening especially with large mushroom growers as they have started exploring new avenues for marketing of their produce. Due to the entries of big trading houses, retail chain stores and awareness among farmers (especially big ones) the sale through the mandi is steadily coming down. On an average the sale of mushrooms through different agencies is shown in table-3.

Table 3 Sale of mushroom to different agencies

Agency	Market share of sale (%)
Commission agents/ wholesalers of Azadpur Mandi	45-55
Traders/ commission agents from other states eg Punjab, H.P. U.P.	30-35
Direct sale to MNCs, Processors, canning industry	05-10
Direct sale to Hotels, Food courts	05-10

#### Economic feasibility of mushroom farming in Haryana

Haryana state is a leading producer of mushroom with over 8000 tonnes of production in 2009-10. Mushroom growing is predominantly a seasonal activity in the state where only one crop is taken during winter months. Sonipat district alone



### Marketing problems faced by growers

Farmers are well aware of the importance of marketing of this high value perishable commodity. Through both the sale processes i.e. in mandi (through commission agents/wholesalers) or direct, farmers remain at the receiving end. They reported some grey areas in marketing largely owing to farmers' inability and government's apathy.

#### (i) Problems in Mandi

As per a study conducted by KVK Sonapat, mushroom growers of Haryana sell more than half of their mushrooms in Azadpur mandi of Delhi. However, farmers reported following drawbacks in mushroom marketing.

- ? Monopoly of small number of commission agents/ wholesalers
- ? Connivance of processors with wholesalers thereby exerting near- complete control on producers price
- ? Mockery of open auction system by arbitrarily fixing prices through secret dealings

## Mushroom Farming

### Introduction

Rapid economic and demographic transition in our country is having a bearing on its agri-economic scenario. The consumption patterns have diversified to high value agricultural produce such as fruits, vegetables besides dairy, poultry, fish and processed foods. New opportunities have opened up for export of such produce due to globalization. However, large scale adoption of these high value crops and agri-enterprises is not so smooth. Farmers in general and resource poor ones in particular are facing constraints of production technology, finance, marketing and lack of institutional support. If these constraints are overcome, the high value commodities may become a viable option.

Currently, the focus is centered on successful adoption of mushroom cultivation by innovative and hard working marginal farmers of Haryana. The farmers scripted this success through wide spread adoption by lowering cost of cultivation through the use of locally available raw materials and realizing fair prices by practicing efficient marketing.

### Agri-economic scenario in Haryana around 1980s

Since the advent of green revolution, Punjab, Haryana and western Uttar Pradesh have made a significant contribution towards agriculture development of the country. These states are major contributors towards national food security and even generate exportable surpluses. This technological improvement and market intervention put the region's agriculture on high growth path leading to rapid increase in area under paddy and wheat crops. Of late, the farmers in these areas practicing this crop sequence are facing the environmental stress. The problems include depletion of underground water, degradation of soil fertility, decline in bio-diversity, development of pests and weed resistance, etc. Other concerning issues at macro level include shrinking resource base, change in demand and consumption pattern, declining public investment in agriculture and international developments such as liberalization of agricultural trade and World Trade Organization (WTO) agreements etc. The resultant scenario has thrown up new opportunities and threats to the region's agriculture. The fall out of the green revolution coupled with the challenges thrown in the wake of W.T.O.'s agreements has serious repercussions for the farmers of this region.



As a result, innovative farmers on their own and on the advice of experts and scientists were experimenting with a host of new crops and enterprises keeping in view its suitability to their system and techno-economic feasibility. Several high value crops and enterprises with market potential found favour with the farmers. However, one such notable agri-enterprise which caught the eyes of large number of small, marginal and even landless farmers of Haryana is Mushroom cultivation.

### Status and Potential of Mushroom farming - A Macro View

Mushroom farming is a highly remunerative enterprise with quick return in a short span of time. Button mushroom (*Agaricus spp.*) is the most popular mushroom variety being grown and consumed all over the world. Its production is mainly centered in Western Europe, North America (USA, Canada) and south eastern Asia (China, Korea, Indonesia, Taiwan and India). There has been an increase in its production in India as it has reached to 100000 tonnes from a meager 5000 tonnes during 1990. The white button mushroom accounts for 35-45% of total mushroom production in world while it accounts for up to 85% in our country. Large units with production capacity of 2000 to 3000 tonnes per annum have been set up in the country mainly as export units in southern, western and northern regions. The demand for fresh mushroom is on the rise in international market while that of preserved or canned mushrooms is decreasing. There are greater possibilities of exporting fresh mushrooms to the markets in Middle East, Europe and USA which need to be explored. However, the pace of mushroom cultivation is slow in our country in spite of four decades of planned efforts.

It is estimated that just 1% of the available (600 million tonnes) biomass in the country can produce 3 million tonnes of mushroom and about 15 million tonnes of spent mushroom substrate, which can be utilized as organic manure for vegetables, fruits, flowers, saplings, ornamental shrubs and other field crops. There exists great scope for such an enterprise in Haryana state too.

### Expansion of Mushroom farming as an Enterprise in Haryana

Haryana occupies a prominent place in mushroom production. White button mushroom is cultivated here when climatic conditions are favourable and production expenses are minimum. The growers have revolutionized its cultivation by adopting very simple and cheap technologies. The farmers of state also have the advantages of:

- ? Nearness to market
- ? Availability of cheap raw materials
- ? Well established connectivity through transport facilities
- ? Fairly developed infrastructural and processing facilities.

producer-seller for its marketing. Steps of successful marketing include:

- ? Being aware of market demand, volume and prices
- ? Exploring marketing options depending upon infrastructure
- ? Becoming organized
- ? Sharing knowledge and experience
- ? Reducing capital investment on sharing costs through formal or informal groupings
- ? Identifying existing markets and trading routes and identifying any niches to be filled

Majority of farmers sell their produce in Azadpur Market, Delhi through commission agents/wholesalers. It is a big terminal market which attracts traders, processors, exporters in large numbers thus, can handle large volumes of mushrooms offered for sale by growers. Rest of farmers sell in other markets of big cities i.e. Patiala, Chandigarh, Ludhiana and on a small scale in other local cities too depending upon the nearness to the places and prevailing rates. In major mandies, the commission agents sell the mushrooms of farmers through open auction. The practice of selling mushrooms through commission agents/wholesalers or by themselves or through their representatives and get the account settled on the basis of the rate prevailing on that day without attending the open auction is on the rise. Volume of direct sale to retailers/consumers is not significant. Another method of sale prevalent in Sonapat district is lifting of mushroom (washed or unwashed) by processing firms and traders at predetermined price (before start of season, or weekly/daily basis).

Some farmers are also reported to receive finances from commission agents/traders in advance and supply mushroom to these financiers at an agreeable price.

As limited number of mushroom dealers are operating in major mandies, the price manipulation is easy to make. The processing firms in connivance with wholesalers have a more or less complete control on prices.

### Major channels of mushroom marketing

Mushroom growers of the state are marketing their mushrooms depending upon volume, skills, infrastructural facilities and dealing with middlemen/processors. Following are the major channels adopted for marketing of mushroom in the State.

- i) Mushroom grower - commission agent/wholesaler - consumer
- ii) Mushroom grower - wholesaler/commission agent - retailer - consumer
- iii) Mushroom grower - commission agent/wholesaler - processor - consumer
- iv) Mushroom grower - processor - consumer Mushroom grower - consumer.



? sold more than 7215kg of fresh button mushroom and 236kg of mushroom pickle

The centre has been made a cooperating centre of All India Co-ordinated Research Project on Mushroom with a number of research programmes currently



Training Centre

Spawn Lab



Mushroom Processing & Post Harvest Handling Unit



Processing of mushroom

underway. The centre has been in the fore front of conducting farmers trainings, supplying quality spawn, testing samples, doing research and organizing farmers for promoting mushroom enterprise in Haryana State.

### Marketing of mushroom

Marketing of high value commodities like mushroom is as much crucial as its production itself. Considering its perishable nature, fluctuations in prices and other factors influencing its production and availability, its marketing can be termed even more important than production. Special skills are needed to be acquired on part of

- ? Strong institutional back-up
- ? Easy availability of man-power

The chronological development of mushroom farming in Haryana is given in Annexure II.

### Initiation and adoption in Sonipat district

The mushroom cultivation was successfully experimented in Sonipat district by an innovative small farmer, Shri Jagdev Singh in year 1980 (Case Study-I). It was further expanded not only in Sonipat district but throughout Haryana. The initial success of Shri Jagdev Singh's efforts attracted his other family members and friends towards mushroom cultivation in 1984. From 1985 onwards, the success of mushroom cultivation started repeating itself through wide spread adoption over years by the farmers of Sonipat and nearby districts. Bhadana- the native village of Shri Jagdev Singh was known as Mushroom village of Haryana at that time. In 1987, the growers flooded the market with mushroom resulting into price crash as there was no corresponding increase in demand to clear the market. The market crash stirred the farmers' thinking and they (individually and in groups) earnestly started working beyond mere production and sale of mushrooms. They encompassed the work of cost reduction on one hand and popularizing its consumption among different section of population on the other hand in their mushroom cultivation arena.

Even before the market crash, the farmers had already begun the work on devising ways and means of bringing down high cost of mushroom cultivation. These efforts culminated in substantially reducing cost of cultivation through indigenous means (Case Study -II). This again gave thrust to its wider adoption by increased number of farmers with increased volume of production. The downfall in prices vis-à-vis quantum jump in production provided an opportunity of educating general public on mushroom consumption. The mushroom growers formed informal groups for spreading the message about mushroom intake. These campaigns aroused consumers' awareness and demand of mushroom kept on rising steadily over the years. The market crash of 1987 failed in deterring the farmers from mushroom cultivation, rather its production picked up as more and more farmers started its cultivation in the district.

On persistent demand of the farmers, the government intervened in mushroom cultivation and started several schemes for over all mushroom development. Farmers joined the Sonipat Co-operative Fruit and Marketing Society Limited, Sonipat to give a fillip to the activities related to sale. Government agencies like



NAFED (National Agricultural Co-operative Federation) and HAIC (Haryana Agro-Industrial Corporation) entered in mushroom marketing in 1989-90 through Market Intervention Scheme (MIS) to safeguard the interest of mushroom growers. The Krishi Gyan Kendra (KGK) - earlier version of Krishi Vigyan Kendra- Sonipat and Department of Agriculture started their programmes for technology transfer and institutional assistance for large scale adoption and successful mushroom cultivation in the district. The trade prospects attracted number of entrepreneurs in spawn production, trading and processing of mushroom. The cumulative efforts of all stake holders resulted into spectacular growth in mushroom cultivation and trade in and around Sonipat.

Thus, a tiny effort of growing mushroom developed into full-fledged enterprise (though seasonal) within a decade. It was started with 100 trays (10 q of wheat straw) and a production of mere 3 q in 1980-81 and expanded to 110000 trays with 300 tonnes of mushroom production in 1990-91 in the district. From 1990-91 onwards there was no looking back for the mushroom growers of Sonipat district. Though, old growers of several key mushroom producing areas have left this enterprise due to disease occurrence and other reasons yet, due to the new entrants (and increased volume by existing growers), its production is scaling new heights which peaked at 2350 tonnes in 2008-09 from 422260 trays as evident from Table 1.

Table 1 : Progress of mushroom production in Sonipat district over the years

Year	No. of Trays	Total Yield (In tons)
1990 - 91	110000	300
1991 - 92	114400	386
1992 - 93	151700	430
1993 - 94	180220	548
1994 - 95	220200	820
1995 - 96	223000	960
1996 - 97	230000	1040
1997 - 98	271280	1222
1999 - 2000	280136	1354
2000 - 01	301330	1371
2001 - 02	312800	1650
2002 - 03	332480	1840
2003 - 04	354060	2150
2004 - 05	354260	2280
2005 - 06	350000	1960
2006 - 07	322370	2160
2007 - 08	416810	1680
2008 - 09	422260	2350
2009 - 10	422850	2307

### VOCATIONAL TRAINING ON MUSHROOM CULTIVATION TO SELF HELP GROUPS



PACKAGING OF MUSHROOM

**VOCATIONAL TRAINING ON MUSHROOM CULTIVATION  
TO SELF HELP GROUPS**

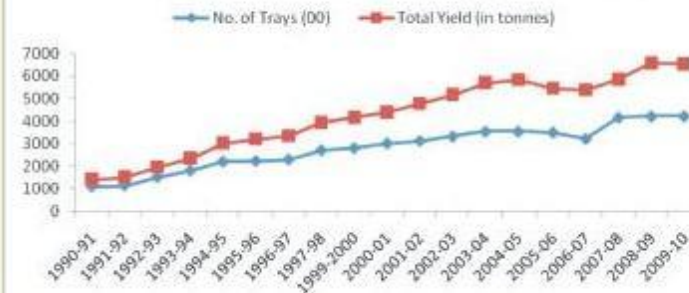


**MUSHROOM IN FULL SWING**



**VALUE ADDITION**

**Progress of Mushroom Production in Sonapat District over the years**



**Button Mushrooms**

**Case Study I**

**Small Innovative farmer paves the way for big expansion**

Mushroom cultivation in Haryana was spearheaded by Shri Jagdev Singh with a modest beginning in 1980. Shri Jagdev Singh, resident of village Bhadana, district



Sonipat, an enterprising farmer with 1.4 ha of ancestral land, was a science teacher in High School. In spite of growing paddy-wheat (the most paying crop sequence of the region) on this small land holding, his farm income was declining as a result of rising cost of cultivation with decreasing farm productivity. In order to supplement his small farm income inclusive of salaried income, he tried his hands in several agri-related activities to supplement his income.

A chance encounter with a news item from Solan, Himachal Pradesh aroused his curiosity about mushroom growing where it was stated that one can harvest 10 kg. of mushroom from one square meter of area fetching around Rs. 150/ kg. He contacted KGK Sonipat, who advised him to contact NCMRT, Solan, H.P. for literature and guidance on mushroom cultivation.

In September, 1978, he visited Solan for a bottle of spawn (mushroom seed). The scientists there were apprehensive about the viability of mushroom cultivation on such a small scale. Unfazed over the scientists' apprehensions, he prepared compost from 40 kg of wheat straw using one bottle of spawn. Eventually, he failed in his efforts due to lack of fermentation in such a small quantity of compost prepared. Not to be disheartened over his failure, Jagdev Singh came to know about successful cultivation of mushroom in Bari village of Sonipat district by an Ex. Service man in 1979.

During 1979, he regularly visited mushroom farm at Bari and learned the practical aspects of its cultivation. (The Bari mushroom farm was closed at the end of season that year for unknown reasons). Now, he was confident enough to take another chance in mushroom cultivation. As mushroom growing season was over and he could not grow it during that year. Before commencing of the next season, Jagdev Singh prepared himself further by receiving training in Mushroom cultivation from NCMRT, Solan during March, 1980. In September, 1980, well equipped with training and practical observations, he started compost making with 10 q of wheat straw available at farm itself. He specifically got prepared 100 wooden trays of 3x2x½ ft. size each and placed these in a 20 ft x 10 ft room in five racks.

The untiring efforts of Shri Jagdev Singh bore the fruits of success in the very first year when he was able to harvest an average 3 kg of mushroom per tray and fetch Rs. 20/- per Kg. of mushroom. He was able to earn profit after covering production costs in the very first year. This success encouraged him to expand mushroom cultivation. He doubled the number of trays in successive years thereby making it up to 400 trays in the year 1982.

### VOCATIONAL TRAINING ON MUSHROOM CULTIVATION TO SELF HELP GROUPS



COMPOST PREPARATION



TRAINEES LEARNING ABOUT COMPOST



? Vocational training course for rural youths	10
? Farmers Fair and exhibition	03
? Mushroom Gyan Diwas	05
? Farmer-Scientist Interaction	03
? Farmer-Processor-Trader Interface	02
? Studies on economics and marketing of Mushroom	02
? Success stories on Mushroom cultivation	04
? Training Courses conducted in collaboration with HAIC and Horticulture Dept.	12

### Efforts of other KVKs in promoting mushroom farming

The KVKs of Sonipat, Kurukshetra, Panipat and Yamuna Nagar had taken a lead in motivating farmers for group approach. The farmers have formed their own cooperative societies in Sonipat and Kurukshetra districts for promoting mushroom production and sale and safeguarding the interests of mushroom growers. Farmers in several districts have formed formal (Self Help Groups) and informal groups-notably in Kurukshetra, Yamuna Nagar and Sonipat districts.

On active advice and guidance of KVKs of Sonipat, Kurukshetra and Hisar a number of farmers have diversified their mushroom farming and started spawn labs, processing units and trading. All the KVKs are actively collaborating with department of Horticulture, HAIC and other organizations.

### Efforts of HAIC Agro R&D Centre, Murthal, Sonipat

Haryana Government has established an integrated mushroom R&D centre at Murthal, Sonipat for addressing the needs of mushroom growers with specific mandates. With the inception of this centre, mushroom growers are getting all sorts of technical help along with mushroom spawn and spawned pasteurized substrate for growing mushrooms. The centre is striving hard to make mushroom cultivation a round the year activity in the region with button mushroom in winter, Dhingri in autumn and milky mushroom in summer.

Major achievements of the centre are

- ? trained more than 6000 youths/farmers in mushroom production technology
- ? produced and supplied 400 MT spawn, 600 MT compost and 49 MT casing soil
- ? provided technical advice to more than 2000 mushroom growers
- ? checked samples of compost and diseased mushrooms

The visibly raising living standard by means of gains earned from mushroom cultivation motivated the extended family members and a friend from nearby village Jharot and they followed in Shri Jagdev Singh's footsteps. They all commenced mushroom cultivation with five hundred trays each in the year 1984.

From 1985, after gaining sufficient knowledge and practical experience in mushroom farming, Jagdev Singh himself spread the idea of mushroom cultivation and advised farmers accordingly. He also started consultancy services to help farmers in growing mushrooms. These services could not last for more than three years as through learning by doing, farmers themselves got trained and started on their own.

The markets were favorable for the farmers till 1986 in spite of jump start in mushroom cultivation in Shri Jagdev's native village Bhadana and nearby areas. Farmers experienced the jolt in 1987 with slump in mushroom prices due to overproduction with any corresponding increase in its demand. Jagdev Singh and his group of fellow farmers undertook wider campaigns of popularizing mushrooms in order to create its demand with positive outcome. In the next year itself, the markets recovered and the farmers of Sonipat district and other parts of Haryana scaled new heights with higher mushroom production in successive years.

The mushroom saga in Haryana owes its success to the untiring efforts of Shri Jagdev Singh and his fellow farmers. For rendering his valuable services for economic and social upliftment of farmers (through spreading mushroom cultivation), Shri Jagdev Singh was honoured several times by different institutions and organizations. Among others, he was honored twice by C.C.S Haryana Agricultural University, Hisar and once by Hon'ble Governor, Haryana State.

### Case Study II

#### (i) Use of low cost local inputs

The high cost involving items of package in mushroom cultivation were pucca-brick made-structure or mushroom house, wooden trays and composting material i.e. wheat straw. The first two items are part of fixed investment while the third one comes under variable investment. Lion's share of investment comes under these three items of costs. On the strengths of their shared experiences, the farmers evolved low cost solutions from locally available cheap material and succeeded in considerably reducing cost of cultivation.

#### (ii) Reducing fixed investment

In initial years, mushrooms were cultivated in pucca-bricks made-structures using wooden trays. Both of these items require quite a handsome capital to start



with. Shri Jagdev Singh and his fellow farmers from village Bhadana, Kakroi and Jharot took the lead and did pioneer work in this sphere in 1985. On the basis of experience gained in mushroom cultivation, they thought of replacing the cost intensive pucca structure with a thatched or kaccha structure. These structures/houses were in use for a limited period and farmers also do not have that much extra space for these permanent structures to build on. They constructed the thatched-kaccha houses with locally available cheap material with a fraction of cost of pucca houses which are easy to dismantle and space is used again for other purposes.

The second item of high capital cost was wooden trays. The farmers evolved the idea of racks/shelves instead of trays. The racks prepared from polythene sheets spread over daincha sticks to give support to the racks. The daincha sticks were locally available from the green manure crop. Later on, these dhaincha sticks were replaced by bamboos keeping in view its cheapness, strength, durability and reusability. A wooden tray was prepared at an average cost of Rs. 20 yet, the same size of equal area rack could be prepared at an average cost of Rs. 5/- at that time. Prices of wood escalated high in the coming years besides posing an environmental problem.

### (iii) Reducing variable investment

Large scale mushroom cultivation started affecting the prices and availability of wheat straw. This indirectly affects the live stocks. Facing this situation, some farmers tried paddy straw instead of wheat straw in compost making for mushroom cultivation. Where other farmers failed or got little success, the enterprising farmers of Khubru village perfected the technique of compost making with paddy straw. The practice found favour with many farmers depending upon several factors. Nearly one third of mushroom growers now use paddy straw in varying degrees for mushroom production. This farm level refinement in technology is being adopted by farmers with reduction in cost of mushroom cultivation and increased availability of quality wheat straw for their livestock. These low cost local solutions attracted many a number of resource poor farmers towards successful adoption of mushroom cultivation in the year to come.

### Case Study III

#### Khubru: An exemplary success in mushroom cultivation

The 1980s witnessed the rise and expansion of mushroom cultivation in Haryana. In the first half, adoption was steady and confined to Bhadana, Kakroi and nearby

mushroom cultivation in the state with technical back up and active help from CCS Haryana Agricultural University, Hisar, Haryana. Before KVKs came in existence the activities were conducted by Krishi Gyan Kendras (KGKs) in right earnest. KGK Sonipat took an early lead in its efforts as this enterprise was catching on fast in Sonipat District.

### Intervention by KVK Sonipat

The KVK Sonipat guided the volunteer of mushroom growing Sh. Jagdev Singh to Solan, H.P. and then closely monitored the gradual progress of mushroom cultivation and its successful adoption in Sonipat district from 1980-81 to 1986-87. The scientists realized mushroom potential and its compatibility with existing farming system(s). With technical back up from Haryana Agricultural University, Hisar and other institutions, the scientists charted a comprehensive programme of extension activities for educating and motivating farmers for large scale adoption of this high value agri-enterprise with market potential.

Likewise linkages with financial institutes were developed by involving commercial banks. Programmes on farmer processor/trader- interface were organized by bringing together the stakeholders on common platform to develop understanding on mutual requirements.

Studies on economic and marketing aspects of mushroom cultivation were conducted and published. Budgets were prepared for different categories of farmers for wider knowledge regarding financial and economic aspects of mushroom cultivation. KVK scientists helped farmers in generating and popularizing low cost mushroom production technology by utilizing indigenously available material. Literature on mushroom cultivation, marketing and processing was developed and distributed among farmers. Medicinal and nutritional aspects of mushrooms were highlighted for popularizing its consumption among various sections of population. Complete technical guidance is being provided by KVKs ranging from construction of low cost mushroom house, composting, spawn and spawning, casing, management of environmental parameters in compost and mushroom shed, management of insect-pests, diseases, mushroom disorders, post harvest techniques, value addition to marketing. The Subject Matter Specialists of KVKs actively participate in programmes and activities conducted by department of Horticulture/ Agriculture, HAIC Agro R & D centre Murthal and other institutions. The major activities related to mushroom cultivation and marketing conducted by KVK Sonipat during last five years are summarized below:



organizations. He was awarded with 'Best Farmer of the district' award by Haryana Government. He has been honoured by department of Horticulture, HAIC Mushroom centre, ICAR, CCS HAU, Hisar and others on several occasions.

Shri Kanwal Singh's progression from a farmer to a successful agri-preneur has proved that small farm holding by any means is not hindrance to the growth of a farmer.



Paddy Straw

### Compatibility with existing farming system(s)

Mushroom cultivation utilizes the crop residues or by-products of wheat and/or paddy in compost (substrate) preparation. Cow dung from buffalos/cows is best suited for preparing casing material. The huge amount of spent mushroom substrate



Commonly adopted Faulty Way of Preparing Compost



Preparing Compost with long method on Kutchra floor.

is being utilized as organic manure for field and vegetable crops. This substrate is useful in enhancing soil fertility, soil aeration and water retention capacity and improving C: N ratio of soil thereby helping in increasing production and productivity of the crops. Thus, mushroom cultivation is providing sustainability to the existing cropping system through recycling of organic matter which is used as substrate and then returned to fields/soil as manure. Successful mushroom cultivation and its trade is also providing for improved nutritional uptake which in turn strengthen livelihood assets, reduce vulnerability to shocks and enhance an individual's as well as community's capacity to act upon other economic opportunities.

### Role of KVKs and HAIC Agro R & D centre, Murthal in promoting mushroom farming in Haryana

The KVKs operating in different districts of the state are popularizing the

## Reducing Cost of Cultivation by Means of Low Cost Local Solutions



Low Cost Compost Preparation



Low Cost Mushroom Shed



Mushroom Processing





Inside view of kutcha mushroom house with Multiple rows & three racks.



Mushroom ready for harvest

villages only. Its cultivation spread gradually to other parts of Haryana during the second half of 1980s. Bhadana village was rightly recognized as mushroom village of Haryana. More than 76% farm families (out of a total of about 360 families) from all categories of farmers including landless were engaged in mushroom cultivation in Bhadana village in late 1980s and early 1990s. Though, in later years, its cultivation was abandoned by many farmers of this village due to disease incidence. However, the success saga of mushroom cultivation continued albeit in other villages. One such prominent village is Khubru under Gaur tehsil of Sonapat district. There are about 700 families in the village with an average holding of about 2 acres only. Mushroom was first taken up by a resource poor marginal farmer Shri Ram Kumar in 1985-86. To start with, he prepared compost from 20q of wheat straw purchased from the village itself. In the year 1988-89, two other fellow farmers followed the footsteps of Shri Ram Kumar. Then since 1990-91, ten to twelve farmers joined mushroom cultivation each year. Total number of mushroom growers in village Khubru peaked up to 54 in the year 1996-97. From 1999-2000 onwards, near about fifty farmers remained in mushroom cultivation in the village. As per a study conducted by KVK Sonapat, there were 47 mushroom growers in Khubru in 2003-04. In total, they prepared compost with 9210 q of dry straw and produced more than 3150 q of mushroom which was nearly 15% of the total mushroom produced in Sonapat district.

Farmers tried to prepare compost from paddy straw too as it is abundantly available in this region. Where other farmers failed, Khubru mushroom growers perfected the technique of making good quality compost from paddy straw. Now, almost all growers in Khubru use paddy straw with considerably reduced cost. This technique has spread to other parts of the state and 20 to 30% of the farmers are now preparing compost using paddy straw. Likewise, Khubru farmers succeeded in

each subsequent year thereby having 20 sheds for mushroom growing in 2009 with compost prepared from 1200 qt. of straw.

By way of expanding mushroom cultivation, Shri Kanwal Singh concentrated on understanding mushroom trade, and its various facets and challenges. He also observed the production pattern and demand of mushroom in the region. Farmers here are able to produce mushroom (white-button) from November-December to February-March only against round the year demand for it. He thought of expanding its cultivation beyond white button mushroom. He started with milky mushroom in 2003 with 150 bags and Dhingri mushroom in 2004 with 100 bags.

The successful cultivation of these two kinds of mushroom motivated him to increase their cultivation. He produced 250 bags of milky mushroom and 500 bags of dhingri mushroom in 2010. He also got success in cultivating another medicinal mushroom i.e. Ganoderma (Reishi) at his farm which he is planning to expand. As is the case with other growers, Shri Kanwal Singh too faced the problems of quality spawn and uncertainty in prices of mushroom in the market. Inter alia, his prolonged session with KVK scientists enlightened him on specific aspects of mushroom and spawn production technology, value addition, marketing and finance. He also experienced set back of yields stagnation and disease occurrences. These problems motivated him for finding solutions as he visualized growth in mushroom sector because of excellent business opportunity in these areas eventually. His quest for providing solutions to himself and problems of other farmers resulted into establishment of 'Integrated unit for Mushroom Development' at his farm in the village in 2008-09. The Unit has four components :

- i) Compost making
- ii) Spawn Lab.
- iii) Canning/post harvest handling
- iv) Training of farmers.

Shri Kanwal Singh's idea of establishing this unit is to provide solutions to core problems of mushroom growers and growth of mushroom enterprise. He is offering complete solutions to the mushroom growers through strong backward and forward linkages. He organizes training programmes for farmers' capacity building and upgradation on latest production, marketing and post harvest handling of mushrooms. He also provides quality compost (prepared by short method) and spawn. He purchases mushrooms from farmers when prices are down there by supporting them in times of low prices. He was having processing facility of one tonne per day and 60 tonnes of mushroom and corn were processed in the very first year of its operation.

Shri Kanwal Singh has been honoured several times by different institutions and



range of activities related to mushroom enterprise are undertaken by non-growers be it spawn producing, trading or processing. Yet there are a number of mushroom growers who saw opportunities beyond cultivation and established themselves as successful spawn producers, suppliers, processors and traders (Annexure I).

The farmers encountered many problems in mushroom cultivation right from compost preparation to spawning, disease management, and marketing and beyond. They have to depend on others for the solutions which at times do not come cheap or not come at all. The problem of quality spawn availability and resultant loss in production and quality forced some growers to explore the possibility of producing spawn. Likewise hardships in marketing and expanding trade opportunities motivated some farmers to turn towards processing and trading. These agripreneurs are now not only earning handsomely but also assisting fellow farmers by way of providing quality inputs (spawn), purchasing and processing mushrooms and rendering technical help and guidance. One of the success story of a farmer's advancement from mushroom grower to an accomplished agripreneur is narrated (Case Study-V).

### Case Study V

Shri Kanwal Singh s/o Shri Abhay Ram of village Aterna is a well known agripreneur of Sonapat district. A few years earlier, he was contented with the traditional farming of paddy-wheat on 7.2 ha of his family land. A separation in family left him with only 1.8 ha of land. His farm land is of good quality with assured irrigation facilities and having easy connectivity with nearby markets of Delhi and Sonapat. His enterprising mind started exploring the means of earning enhanced farm income from his shrunk farm land. He turned towards vegetable cultivation.

Shri Kanwal Singh rested his selection of vegetables on market survey, interaction with scientists of KVK and other institutions and extension personnel. He especially opted the high value low volume vegetable crops having market demand. He earned his name particularly for baby corn cultivation. Shri Kanwal Singh rightly claims credit for expanding baby corn and sweet corn cultivation in Aterna and nearby villages.

Shri Kanwal Singh started mushroom cultivation after having training from KVK and HAIC mushroom centre in the year 2002 with 120 Qtl of wheat straw in two kacha sheds. He was able to harvest up to 30 qt. of mushroom from one shed of 60 qt. dry straw in the very first year. In the year 2003 he doubled the quantity of dry straw and number of sheds as well. From second year itself, he started preparing compost from paddy straw for half of his sheds. He kept on adding one or two sheds

Table - 2 Progress of Mushroom production in Haryana over Years ( Area in Trays and Production in tonnes)

Sr. No. of Name of Dist.	2002-03		2003-04		2004-05		2005-06		2006-07		2007-08		2008-09	
	No. of Trays	Prod- uction	No. of Trays	Prod- uction	No. of Trays	Prod- uction	No. of Trays	Prod- uction	No. of Trays	Prod- uction	No. of Trays	Prod- uction	No. of Trays	Prod- uction
1. Panchkula	11000	90	15000	40	20000	30	27000	80	29000	100	72270	364	28550	331
2. Ambala	23200	141	28630	146	29600	144	40220	172	24000	219	7000	90	9200	43
3. Yamuna Nagar	54490	259	58110	268	65000	330	62780	336	72600	350	70000	445	72450	425
4. Kurukshetra	32000	130	32000	166	37500	163	45130	197	42890	214	52300	310	69230	415
5. Karnal	25000	115	225000	100	26300	127	34000	145	25210	145	26900	165	40000	275
6. Karnal	68000	320	68000	350	71000	310	70000	385	70000	385	80472	322	87000	471
7. Panipat	150000	600	223000	900	250000	900	250000	1222	250767	110	239285	1360	295500	1460
8. Sonapat	112480	1840	354060	2150	35414	2280	365070	2020	392870	2171	416830	2063	422260	2260
9. Rohtak	51000	350	56500	295	51500	340	52500	270	52600	395	51500	350	67330	440
10. Jhajjar	15000	48	15000	75	5230	38	6000	12	8000	42	5000	25	3820	20
11. Faridabad	5000	35	5000	25	2000	11	5000	28	6000	35	6000	28	40000	138
12. Narnaul	0	0	0	0	500	1	500	3	0	0	783	10	2330	5
13. Rewari	2210	7	1500	4	190	0	300	1	0	0	600	2	800	2
14. Gurgaon	163820	861	279760	1095	243742	1218	17500	775	80763	476	80000	460	52160	341
15. Meerut	0	0	0	0	0	0	0	0	2200	11	62000	300	20000	41
16. Shikhar	0	0	4000	6	1000	2	1000	1	10000	60	2000	70	1000	6
17. Hisar	27000	100	35000	115	35000	110	40000	165	45000	225	55000	130	50000	115
18. Fatehabad	6300	25	8200	30	8500	35	9800	45	9000	60	10500	65	10500	70
19. Sirsa	1500	4	2000	49	4000	7	4000	22	25000	106	2000	4	10000	30
20. Jind	27000	65	27500	140	27000	95	40500	165	30200	190	29200	165	32750	170
Total	1000000	4950	1231780	5954	1232190	6163	1228760	6044	1155000	6164	1232020	6790	1315120	7178



reducing cost of mushroom production by saving on other inputs to e.g. by using lesser quantities of choker (wheat bran), fertilizers and chemicals in the compost of paddy straw.

Learning from initial experience especially in marketing, the mushroom farmers of Khubru have formed an informal group for this purpose. The growers' co-operation has also helped in reducing transportation cost.

### Progress in other districts

In the later half of 1980s, farmers from other districts too started mushroom cultivation in a big way. The prominent districts where farmers started its cultivation during that period include Gurgaon, Panipat, Karnal, Rohtak, Hisar, Jind and Kurukshetra. The farmers themselves come forward and even formed their groups and societies for successful adoption (Case Study IV).

Apart from farmers' initiatives, the KVKS; Department of Agriculture/ Horticulture; Haryana Agro Industrial Corporation-Agro R & D Centre; District Administration; Directorate of Mushroom Research, Solan; other institutions and organisations including spawn producers and processors came forward to help and guide the farmers in different aspects of mushroom cultivation. The area under mushrooms in the Haryana increased more than 2.5 times reaching 671333 trays during the triennium ending 1999-2000 over the triennium ending 1992-93. A considerable jump in area was recorded in all the districts of Haryana. Area under most of the districts was doubled whereas in Kurukshetra, it increased to more than 8 times, in Karnal and Rohtak more than 4 times and in, Hisar and Yamuna Nagar it escalated to more than thrice. There was hardly any district where mushroom is not grown in Haryana. The overall production of mushroom in the state was 7178 tonnes from 1315120 trays in 2008-09, where Sonapat district is maintaining its lead with 2350 tonnes of mushrooms from 422260 trays. The other leading districts are Panipat, Karnal, Rohtak, Yamuna Nagar followed by districts of Kurukshetra, and Panchkula with a production of 1450 tonnes, 471 tonnes, 440 tonnes, 425 tonnes, 415 tonnes and 351 tonnes respectively in the year 2008-09 as shown in Table -2.

### Case Study IV

#### Farmers' co-operative efforts ensure success in mushroom farming in Kurukshetra district

Though, mushroom farming as such does not replace the rice-wheat system yet, it fits well in this sequence and adds to its sustainability. The Kurukshetra farmers were attracted to its cultivation way back in 1990s. Initially, the enterprise could not

find favour with farmers owing to problems related to quality of compost and spawn and marketing. To tackle these problems, the farmers came forward to form a co-operative with active help and guidance from KVK Kurukshetra and local administration. The farmers formed 'Kurukshetra khumb utpadan avum vipanan sahkari samiti limited' (The Kurukshetra Mushroom Production and Marketing Society Ltd) in 1994 with its headquarter at village Bhorsaida, Kurukshetra. The society has two pasteurization chambers, composting yard and one model demonstration centre with other facilities such as spawn lab, canning unit and mushroom training centre in the offing. The society was established with financial help from District Rural Development Agency, Kurukshetra under Sauraj Jayanti Gram Saurajgar Yojana. Besides supplying quality pasteurized compost, the Society undertook marketing of mushrooms in a big way.



Zonal Project Director interacting with members of cooperative society

The easy availability of quality pasteurized compost and marketing facilities provided by the society helped farmers in getting good harvests and increased income from mushroom cultivation. The society is also empowering the resource poor women by supplying the prepared compost to the SHGs of these women farmers. From time to time, the society also conducts different extension activities for promotion of the mushroom cultivation in the district.

On the strength of the activities of the society, mushroom farming received a well deserved boost in the district as mushroom production increased up to 415 tonnes from 40,000 trays in 2008-09 from only 8 tonnes of produce out of 1846 trays in the triennium ending 1992-93.

### Expansion beyond cultivation

The enterprising farmers of Haryana achieved commendable success in mushroom cultivation. As is the case with other agri-enterprises, most of the growers remain confining to the cultivation alone. Apart from cultivation, the whole

## Annexure II : Chronological development of mushroom farming in Haryana.

Year	Development
1980-81	Modest beginning by small and innovative farmer Shri Jagdev Singh of village Bhadana, Sonpat.
1984-85	Cultivation started by extended family members and friends of Shri Jagdev Singh.
1985-86	Shri Jagdev Singh and group of his fellow farmers succeeded in reducing cost of cultivation by replacing costly pukka mushroom house and wooden trays with thatched house and polythene beds with bamboos. Mushroom production started in village Khubru by marginal farmers.
1987-88	First ever market crash, starting of promotional activities by farmers through informal group activities.
1989-90	NAFED and HAIC entered in mushroom marketing through MIS
1990-91	<ul style="list-style-type: none"><li>• Farmers' group in Khubru perfected the low cost compost making techniques using paddy straw.</li><li>• Separate Directorate of Horticulture was formed in Haryana.</li><li>• HAIC-R &amp; D centre established to give R&amp;D and Institutional back up to mushroom growers of the region.</li><li>• State level mushroom co-operative society of mushroom growers was established with its H.Q at Murthal, Sonpat.</li></ul>
1993-94	Mushroom production in Haryana crossed 1000 tonnes mark for the first time.
1996-97	Mushroom growers of Sonpat district produced more than 1000 tonnes of Mushroom for the first time.
1994-95	The Kurukshetra Co-operative mushroom production and Marketing Society Ltd., formed with its H.Q. at Bhorsaidan, Kurukshetra.
1994-95	Dalbir Singh, a progressive mushroom grower of Jhorat village constructed first pasteurised tunnel for compost preparation by short method.
2003-04	Seasonal mushroom production in Haryana crossed 5000 tonnes mark.
2009-10	8050 tonnes of mushroom produced in Haryana State