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Effect of different Spawning Time on Profit Margin of Button Mushroom Cultivation

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ABSTRACT

The present investigation was carried out in District Sangrur of Punjab State by conducting on-farm trials at three different locations in Sunam, Bhawanigarh and Moonak blocks during *Rabi*2018-19, 2019-20 and 2020-21 to assess the suitable time of spawning at farmer field.The different treatments on spawning time of button mushroom production were: T_1 - Spawning during first week of October as farmer practice, T_2- Spawning during second week of October asfirst recommended sowing time by PAU, Ludhiana, T_3 - Spawning during last week of Novemberas an intervention and T_4- Spawning during first week of January assecond recommended sowing time by PAU. The experiment was conducted to assess the more suitable time for higher profit realization.The results of the studyrevealed that spawning during second week of October (T_2)and spawning during first week of January (T_4)wasfound to be the most beneficial time to get maximum production as well as highernet returns from button mushroom production under Punjab conditions.

Key Words: -Button mushroom, spawning time, economics, harvesting span.

INTRODUCTION

The white Button mushroom (*Agaricus bisporus*) is very popular throughout the world and is the most important mushroom of commercial significance in India. It is also called 'white vegetables' or 'boneless vegetarian meat' which contains ample amount of proteins, vitamins and fibre (Sharma *et al ,* 2016). Mushroom production in the country was started very late in the 1970s but growth rate, both in terms of productivity as well as production has been phenomenal. In seventies and eighties button mushroom was grown as a seasonal crop in the hills, but with thedevelopment of the technologies for environmental controls and increased understanding of the cropping systems, mushroom production shot up and contributed about 90 per cent of total country's production (Mehta *et al,* 2011).It is estimated that approximately 500-550 Mt of crop residues are produced per year in the country (IARI, 2012).India is exporting 105.4 tons of white button mushroom with a contribution of 15 percent of its share in the world market (Singh *et al,* 2017).Besides this, Indoor cultivation of mushrooms, utilizing the vertical space, is regarded as the highest protein producercrop per unit area and time, almost 100 times morethan the conventional agriculture and animal husbandry. It can be successfully cultivated in places where the environmental conditions are favorable optimum temperature for mycelial growth is 22 - 25°C and that for fruit body formation is14°C -18°C with high relative humidity (Maheshwari, 2013). Diversification in any farming system imparts sustainability. Mushroom cultivation is one such component that not only imparts diversification but also help in addressing the problems of quality food, health and environment related issues.

In Punjab, diversification is need of the hour. Introduction of such a component can make the system holistic and more sustainable. This can also contribute towards goal of conservation of natural resources as well as increased productivity by recycling of agro-wastes including agro-industrial waste. There is huge potential for production

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of mushrooms under Punjab conditions and the primary reason is the easy availability of raw materials and appropriate environmental conditions (season) for its cultivation. Mushroom cultivation is looked upon as the most appropriate occupation for marginal and landless farmers in Punjab by which farmers can earn more with less input and help to reduce poverty and improve the life style. Some of the farmers have started mushroom cultivation after acquiring vocational training from Krishi Vigyan Kendra, Sangrur but are practicing different time of spawning on the basis of availability of raw material and time regardless of recommendations of Punjab Agricultural University, Ludhiana. This result in low production of mushroom as spawning time is very important for mushroom cultivation which ultimately affects the mushroom production. The growing of more than one crop in the same season for better returns can be practiced to enhance the income of mushroom growers. Keeping this in view, the present investigation was undertaken to evaluate the best spawning time of mushroom production and maximization of economic returns at farmer field.

MATERIALS AND METHODS

The on-farm trials were conducted to evaluate different spawning time of mushroom for three years at three different locations in Sunam , Bhawanigarh and Moonak blocks of district Sangrur during three successive years viz. *Rabi* 2018-19, 2019-20 and 2020-21.Each location was considered as one replication. The experiment further consisted of four treatments viz. T_1- spawning during first week of October as farmer practices,T_2-spawning during second week of October as first recommended time by Punjab Agricultural University, Ludhiana,T_3-spawning during last week of November as an intervention andT_4- spawning during first week of January as second recommended time by PAU, Ludhiana for second crop. Fifty spawned compost bags (prepared through short method of composting)

Table 1. Effect of different treatments on yield attributes and economics of mushroom (pooled data of three years).

Treatment	Harvesting time (days)	Span of harvest (days)	Production (q/100q compost)	Gross income (Rs in Lakh)	Cost of cultivation (Rs in Lakh)	B:C ratio
T_1- Spawning during first week of October (Farmer practice)	29	130	19.0	1.80	1.45	1.24:1
T_2- Spawning during second week of October(Recommended practice)	31	127	21.8	2.07	1.36	1.52:1
T_3- Spawning during last week of November (Intervention)	37	88	20.5	1.74	1.42	1.22:1
T_4 -Spawning during first week of January (Recommended practice)	30	60	20.9	1.98	1.38	1.43:1
Mean	31.75	101.25	20.55	-	-	-
LSD (0.05)	3.84	5.07	2.00	-	-	-

were given to selected mushroom growers as per the treatments. The mushroom crop was raised with recommended practices of PAU, Ludhiana.

Environmental factors affecting mushroom cultivation include temperature, humidity, light and ventilation. The growing rooms/sheds are simple rooms with modifications for obtaining necessary air changes during growing to maintain various growth parameters. The cropping rooms / sheds were maintained at 23-25°C temperature from spawning to about one week after casing for case run but after this temperature in sheds was brought down to 15-18°C. At this stage lot of fresh air was circulated in the growing room by ventilation through opening of windows/doors etc.The humidity in growing rooms /sheds was built up by frequently sprinkling the water on floor and walls as well as putting the wet gunny bags on doors and windows. Desirable Carbon dioxide level was achieved by re-circulating air within the spawn running room.

The most important factor for mushroom growing is to provide an appropriate environment both for vegetative and reproductive growth. Optimal levels of these parameters at vegetative stage differ from those at reproductive stage. Cultural and plant protection measures were followed as per recommendations of Punjab Agricultural University, Ludhiana. Data on Harvesting time(days),Span of Harvest (Number of Days) and production (q/100q of compost) were recorded from three different locations during each year. The harvesting time was recorded as starting from first picking to the last picking of the crop. Span of harvest was calculated by counting the days from first picking to the last picking of the crop. The data on mushroom yield and market rate were recorded during the crop period. The data collected on various parameters under study were statistically analyzed and comparisons were made at 5 per cent level of significance. To compare benefit-cost ratio, cost of cultivation and net return were calculated for the crop which varied with weather conditions and fluctuating market price. The initial cost for preparation of shed and compost came to be approximately Rs.95,000/- for producing mushroom from 100 quintal compost and the expenditure on other inputs including seed, casing material, pesticides, labour, transportation charges etc. was Rs 40,000/season.

RESULTS AND DISCUSSION

The data showed significant differences among all the treatments tested at farmer field (Table 1). The data indicated that the harvesting time of the crop spawned during 1st week of October (T1) was found to be the shortest (29d) and longest (37d)in crop spawned during last week of November(T3) whereas harvesting time was found statistically at par in T2 (31d)and T4(30). This might had happened due to variation in temperature as low temperature for long period during spawn run was observed in the month of November. Ahlawat (2011) also described this fact that low temperature for long period enhances the spawn run period considerably. The harvesting span (days) was total number of days from the date of 1st picking to end date of harvesting. Harvesting span (days) was found to be the maximum i.e. 130d for T1 and minimum of 60 days in T4 (Table 1). The data were recorded for different treatments and discussed as; for T1 *i.e.,* spawning during first week of October, produce was ready for harvest in 1st week of November and lasted up to 2nd week of March whereas for T2 *i.e.,* spawning in 2nd week of October, harvesting started in mid-November and continued up to 3rd week of March and in case of T3, harvesting of late spawning in last week of November started in 1st week of January and endedinend march whereas for T4 the harvesting of late spawning in 1stweek of January started in 1st week of February which got completed up to the end march depending upon the prevailed weather. The data depicted that the average yield (q/100 q compost) of three years of mushroom was recorded to be the highest in T2 (21.8q) followed by T4 (20.9q) which was statistically at par with T3 (20.5q). Lesser yield was recorded in T1 (19.0q) as compared to other treatments under experimentation. This might be

due to appropriate environmental condition both at vegetative and reproductive phase at particular time which enhanced mushroom production in T2 and T4. The higher yield wasr ecorded in December and January compared to February showed that temperature and relative humidity are the main climatic factors that alter the spawn growth and ultimately affects yields (Chitra et al 2019).

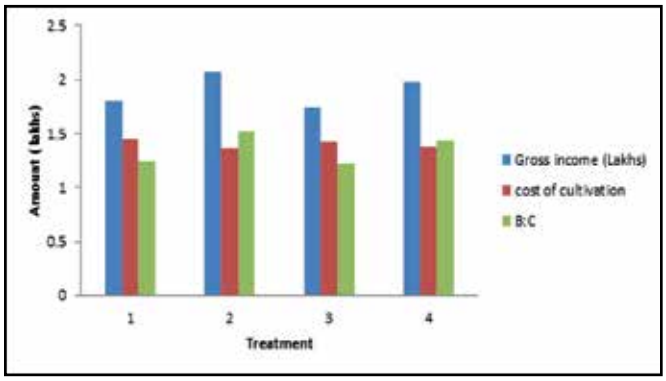

Fig 1:Effect of different treatments on economics of button mushroom

The economic analysis of mushroom production was also carried out. There was significant difference among all the tested treatments (Table 1 and Figure 1).The highest gross income of Rs. 2.07lakh/100 q compost was observed in T2 where spawning was performed during second week of October as main crop. This might be due to the fact that more production was achieved with temperature ranging from 22-25^{o} C and 12-16^{o} C for timely spawn run and crop growth period, respectively (Ahlawat,2011). This period was found to be the most suitable to fulfill the desired temperature requirement. Moreover no energy input is required to maintain this temperature and it ultimately reduces the cost of cultivation. Another factor that aids the growth during the period is no insect-pest and disease attack on crop that reduces the economic burden on the grower. Similarly, the yield obtained in T3was also better but very low temperature during spawn run period resulted in delay of first picking and increased cost of cultivation to maintain required temperature. The market price of produce was low due to glut in the market as main season crop also arrived in the market.

Although crop harvesting was early along with the longest span of harvest in T1but yield reduction may be attributed to prevalence of high temperature during spawn run. The results were in line with Anonymous (2020). The cultivation of button mushroom under delayed spawning wasalso observed as beneficial as it has the shortest span of harvest along with yield of 20.9q/100 q of compost which was also significantly profitable as compared to the other treatments as temperature remained favorable during the crop growth period and market price started increasing due to less availability of mushroom in the market. Hence, the growers were advised that they canfollow the button mushroom cultivation upto this season (spawning during first week of January) to get the better economic returns.

CONCLUSION

The present study suggests that spawning during second week of October and spawning during first week of January as recommended by PAU, Ludhiana are the most beneficial spawning period to fetch the highest net returns for getting two crops in a season. The expenses on treatments viz; T1&T3were comparatively more because it was difficult to control temperature and relative humidity during this period. So, still there is a need to work on development of high and low temperature resistant button mushroom strains for Punjab region to further reduce the cost of production intended for more benefit to the mushroom growers of the state. This occupation could certainly enhance the economic and nutritional status and livelihood of marginal and landless community of Punjab.

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