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# Mushrooms and Mushroom Composts in Integrated Farm Management

**Chandan Singh*[1], Priya Pathak[1], Neelam Chaudhary[1], Apeksha Rathi[1], Poonam Dehariya[2] and Deepak Vyas[1]**

[1]Lab of Microbial Technology and Plant Pathology, Department of Botany,
Dr. Harisingh Gour Central University, Sagar - 470 003, Madhya Pradesh, India

[2]Lab of Mushroom Biology, Department of Botany, Dr. Harisingh Gour Central University, Sagar - 470 003, Madhya Pradesh

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## A B S T R A C T

Mushrooms are the source of food and medicine. There are numbers of mushrooms added to the diet and are easy to cultivate on the agric residue riched in carbon source. Mushroom cultivation not only provides a source of food but also helps in the management of agric residue. Moreover, mushroom compost or spent mushroom substrate are used as a biofertilizer and could be included in various components of Integrated farm management. Many research studies reported that mushrooms and mushroom compost would be effective components in increasing farmer's income and reduce the input cost in farms. In this review, we have discussed and compiled the possible integration of mushrooms and mushroom composts in different components of the integrated farming system and farm management.

**Key words:** Integrated farm management, Integrated farming system, Mushrooms, Agric residue, Farmer income

The rising population at an alarming rate has resulted in the reduction of arable land, and there is no possibility of increasing additional area for cultivation i.e. there is hardly any scope for horizontal expansion of land for food feed and fiber production, therefore, to feed the people with proper nutrient and quality food the vertical expansion farming by integrating appropriate farming component would be the alternate way to challenge the needs of food (Shivmurthy *et al*. 2014). The farming system and its management is the key and become thumb rule to check the food insecurities of the present population of the world and the numbers of the population in upcoming years. The changing climatic condition now become serious threats and constraints for agriculture production, in response to the climatic conditions and the changes, technological intervention with the effective farming system should be adopted, the integrated farming system and management would become the scientific approach to maximize the production by integration of different components of the agriculture in a specific space and place, accounting the periods. One of the components of agriculture is mushroom cultivation. In Mushroom cultivation, the Agric residue, plant waste, and different biomass are used as a substrate for edible mushroom cultivation, growing edible mushroom is an eco-friendly activity as it utilizes the waste from agriculture, horticulture, poultry, brewery, etc. (Ahlawat and Sagar 2007). The spent left after harvesting mushroom crop create a nuisance in the environment but several studies have shown that these spent(called spent mushroom compost: SMC) has potential use in the different farming system as soil conditioners to grow crops, vegetable, and grains to yield good production, the spent mushroom compost (SMC) or spent mushroom substrate(SMS)can be used in various soil organic mixtures (Castro 2008) to produce grain in organic methods and could achieve sustainability in any farming system and could be the best soil amendments. Whereas the mushroom crop is a cash crop that can be cultivated indoors under the limited area, less labor and it is women-friendly cultivation serving an additional income to the farmers with low input.

***Corresponding author:** Chandan Singh, Research Scholar, Lab of Microbial Technology and Plant Pathology, Department of Botany, Dr. Harisingh Gour Central University, Sagar - 470 003, Madhya Pradesh

**e-mail:** chandan.singhx20@gmail.com

*Major types of farming system*

Agricultural practices were started since human civilization, in due course of time the ways of farming gradually started varying, and as time passes new methods and techniques were developed in the agricultural sector to meet the demands of people, therefore we find wide

heterogeneity in structure and function of framing system depending upon the market opportunity, agroclimatic conditions, demands of the population of the region, resource endowment, infrastructure, economic development of the farming communities, etc. However, based on the farming system adopted by the farmers from time to time and region to region, let us highlight some of the important and visible forms of the farming system prevalent in different regions of the world.

*a. Integrated farming system*: The integrated farming system may be defined as the linking together of two or more normally separate farming systems which become subsystems of a whole farming system. Two major features of an integrated farming system are: (i) waste or by-product utilization in which the wastes of one subsystem become an input to a second subsystem; and (ii) improved space utilization in which the two sub-systems essentially occupy part or all of the space required for an individual sub-system (Behera *et al*. 2013). The integrated farming system may also be defined as the biological integration of farming system which integrates natural resources and regulation mechanism into farming activities to achieve maximum replacement of off-farm inputs (Choudhary *et al*. 2019); secure sustainable production of high-quality food and other products through ecologically preferred technologies; sustained farm income; eliminate or reduce sources of present environment pollution generated by agriculture, and sustains the multiple functions of agriculture ((“What is sustainable agriculture | Agricultural Sustainability Institute,”).

*b. Specialized farming system*: The specialized farming system is set for the production of a single cropping system or sequential farming and is the only source of income is said to be a specialized farming system, there are lots of variation if we compare specialized farming with the integrated framing system in respect to their structure, function, and management.

*c. Conventional subsistence farming system*: This system of farming is where the farmers usually follow single cropping or multiple crops that farmers manage for the subsistence of the farm family. There is no much emphasis given on resource management, optimization of resources in the farming system to enhance farm income.

*d. Indigenous farming systems*: Indigenous technical knowledge (ITK) is the knowledge that people in a given community have developed overtimes, and continue to develop. Indigenous farming is not just farming practiced by the indigenous people but it is the product of indigenous cultures that have always been deeply connected to their particular place. In the words of one of the indigenous farmer, Vena A-dae Romero, “indigenous people are as much part of the land as the land is part of us, we cultivate the land while the land cultivates us, this relationship that has supported my people since time immemorial is remembered daily when we place our fingers in the dirt, pull the weeds out from our fields, or plant our seeds with water, prayer, and hope, cook the food which we grow, and ingest the world with each bite of food we eat” (Pace, 2015).

*e. Organic farming system*: According to IFOAM (International Federation of Organic Agriculture Movement), “Organic agriculture is a production system that sustains the health of the soil, ecosystem, and people”. It relies on ecological processes, biodiversity and cycles adapt to local conditions, rather than the use of inputs with adverse effects, and the major objective of organic farming is the development of a sustainable farming system in harmony with nature (Barik 2017).

*The merit of IFM*

As we discussed the concept of integrated farm management that it is a system of farming in which various types of agricultural components included or enterprises are taking place simultaneously. It helps farmers to boost their economy using resources sustainably. The merit of IFM depends on the components included in the farming system, however, the basic merit of all type of integrated farming system (IFS) are mentioned below:

- Enhance productivity
- Profitability
- Adoption of new technology
- Environmental safety
- Promotion of agro-industry
- Increased input efficiency
- Minimization of input cost
- Fodder security for livestock
- Recycling
- Continuous income throughout the year
- Energy saving
- Helps in disease management
- Can be applied to smallholder, medium and large farms
- Supportive biodiversity conservation
- Intensification of nutrient cycling
- Diversification of crop varieties
- Achievement of sustainable agriculture

The advantage and merit of IFM depend on the type of components included, every model develops for the effective production need to analyze which is depends on the resource availability, climatic condition, present level of resource utilization, the economics of the proposed model of integrated farming, and the farmer's skills (Rana 2015, Fig 1) is an example model of integration of crops, livestock and forestry as a system.

*Why integrated farm management?*

All over the world farmers do hard works but they do not make money, especially marginal farmer because there is very little left after they pay for all inputs (seed, livestock breeds, fertilizers, pesticides, labor, energy, feeds, etc.) but the emergence of the IFS enable the people of concerned to develop a feasible framework to improve the small size farmers to a larger one (CARDI 2010). Integrated farming may ensure to feed the world and fulfill the multiple

objectives of making farmers self-sufficient by ensuring the family members a balanced diet, improving the standard of living through maximizing the total net returns and providing more employment, recycling of crop residue, optimizing resource use, minimizing risk and uncertainties and keeping harmony with the environment (Patel and Dutta 2004). In the present scenario, the crop production is declining day by day despite maximization of chemical inputs, higher input requirements of chemical resulted in poor soil quality and excess use of pesticides and other Agric chemicals has now made a standing point in the food chain which imparting human health risk as well as the environment (Barik 2017). The current world population is around 7.6 billion and is expected to reach 8.6 billion in 2030 and projected to be 9.8 billion in 2050 with roughly 83 million people being added to the population of the world every year, this upward trend in population size is seen to be continued (UN 2017). Therefore, the need for IFM is urgent to check the hunger. Below points are some of the points which can be managed by the IFM.

- Demand for food
- Changing climate
- Unproductive land
- Sustainability
- Helpful for the small landholder farmer

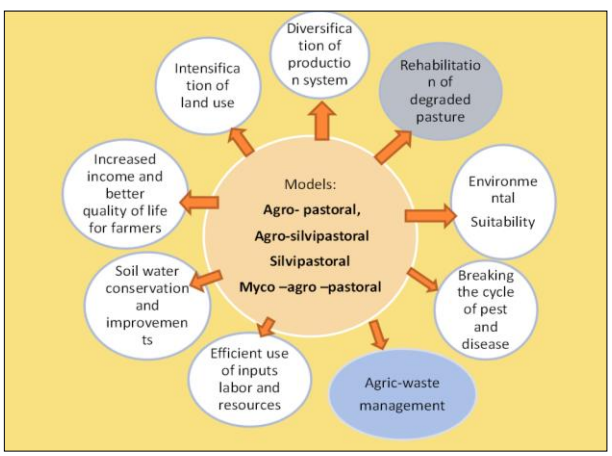


Fig 1 Immediate goals and results of integrated system application in agro-ecosystems (Source: Balbino *et al*. 2014)

*Mushroom production as a part of integrated farming*

Mushroom is a fruiting body of fungi, most of the cultivated mushrooms belong to the phylum *Basidiomycota*, although some Ascomycota such as members from the genera *Morchella* or *Tube*r has also been successfully cultivated and commercially exploited (Liu *et al*. 2017, Rubini *et al*. 2014). Mushrooms need substrate to grow, a mushroom substrate is a just a substance where mushroom mycelium will grow. Mushroom cultivation is landless farming using various substrates like paddy straw, wheat straw, sawdust, and other agricultural residues that are rich in carbon and nitrogen sources. There are generally two methods or formulas used for substrate preparation that employed in mushroom cultivation which is optimized depending on the species. Both are derived from agricultural residues such as cereals straw, plant fiber/husk, manure, or sawdust (Carrasco *et al*. 2018):

I. Composted materials
II. Non-composted materials

Edible mushrooms need substrate either composted or non-composted if it is cultivated under the control condition for commercial production. The agric residue generated from the cropland after crop harvesting is generally burned in the crop field causing environmental problems. Therefore, this residue alternatively managed by using residues as a substrate for mushroom cultivations. In the (Table 1) the range of agric residue required for most common mushrooms has been listed, which shows the utility of agric residue. Growing mushroom on agric residue generates additional income for the farmers according to Sharma *et al*. (2017) the total mushroom production in India is approximately 0.13 million tons, out of the total mushroom produced, white button mushroom share is 73% followed by oyster mushroom (16%), paddy straw mushroom (7%) and milky mushroom (3%) and Indian mushroom industry generated revenue of ₹ 7282.26 lacs by exporting 1054 quintals of white button mushroom in canned and frozen form. In India, approximately 500-550 million tonnes (Mt) of crop residue is generated on-farm and off-farm annually from its production of 110 Mt of wheat, 122 Mt of rice, 71 Mt of maize, 26 Mt of millets, 141 Mt of sugarcane, 8 Mt of fiber crops (jutemesta, cotton) and 28 Mt of pulses (Devi *et al*. 2017). Agric waste generated from agriculture can be beneficially utilized in a various agro-based application and other industrial application however the cost of collection and transportations is higher than the revenue it generated by beneficial use of such agric residues (Bhuvaneshwari *et al*. 2019) but it could be utilized beneficially if mushroom farm established on the site of the farm, therefore mushroom would be good components to be integrated into the agricultural enterprise.

*Importance of mushroom and its by-product in supplementation to farmer income*

Mushrooms production and consumption are on the set of a rise in the world, whereas India responds positively to the growths. Mushroom cultivation activities can play an important role in supporting the local economy by contributing to subsistence food security, nutrition, and medicine; generating additional employment and income through local, regional, and national trade; and offering opportunities for processing enterprises (Marshall and Nair 2009). Mushroom cultivation contributes to strengthening the livelihoods through reducing vulnerability to poverty and generating reliable sources of income. Mushroom cultivation does not require access to land, so it becomes an attractive activity for both the rural farmers and peri-urban dwellers. Mushroom cultivation might serve as a means of generating employment, particularly for rural women and youths to raise their social status (Hassan 2012). Mushrooms are a good source of nutrition like protein, carbohydrate, minerals, vitamins, fat, ash and fiber. The percentage of nutritional value varies from mushroom to mushroom (Table 2).

Table 1 Showing a range of substrate used in most common edible mushrooms

| Mushroom | Substrate | | Remark |
|---|---|---|---|
| | Composted | Non-Composted<br>Range of substrate | |
| *Pleurotus* | -- | Wheat straw, sawdust, paddy straw, soybean residue, groundnut skull, maize cob, bagasse, cornstalks, waste cotton, stalks and leaves of banana, rice bran, etc. | In a matter of a week, these fungi convert 100kg Agaric residue into 50 to 70 kg fresh mushroom |
| *Tremella* | -- | Wood log and sawdust, cottonseed hulls | |
| *Flammulina* | -- | Hardwood logs, Sawdust, and rice bran. | Fruits only at low temperature |
| *Volvariella* | Composting substrate depends on the material used in the composting, Wheat straw, paddy straw and cottonseed hulls are generally composted. | Paddy straw | It grows at relatively high temperature |
| *Lentinus* | Composted sawdust use in bag logs methods | Wood logs | Highly medicinal tonic |
| *Agaricus* | Composting material is subject to substrate availability, the most common material used is wheat straw, paddy straw, cow dung, buffalo dung, horse manure, chick manure, etc. | --- | Most popular edible mushroom in the world |
| *Ganoderma* | - | Wood log and sawdust bag log | Highly medicinal use for medicine, mushroom of Immortal |

Table 2 Nutritive values of different mushrooms (dry weight basis g/100g)

| Mushroom | Carbohydrate | Fiber | Protein | Fat | Ash | Energy (kcal) |
|---|---|---|---|---|---|---|
| *Agaricus bisporous* | 46.17 | 20.90 | 33.48 | 3.10 | 5.70 | 499 |
| *Pleurotus sajor caju* | 63.40 | 48.60 | 19.23 | 6.70 | 6.32 | 412 |
| *Lentinus edodes* | 47.60 | 28.80 | 32.93 | 3.73 | 5.20 | 387 |
| *Pleurotus ostreatus* | 57.60 | 8.70 | 30.40 | 2.20 | 9.80 | 265 |
| *Volvariella volvaceae* | 54.80 | 5.50 | 37.50 | 2.60 | 1.10 | 305 |
| *Calocybe indica* | 64.26 | 3.40 | 17.69 | 4.10 | 7.43 | 391 |
| *Flammulina veltipes* | 73.10 | 3.70 | 17.60 | 1.90 | 7.40 | 378 |
| *Auricularia auricula* | 82.80 | 19.80 | 4.20 | 8.30 | 4.70 | 351 |

Courtesy: Stamets, 2005 (*A.bisporous*, *P. sajor-caju*, *Lentinula edodes*), FAO, 1972 (*Pleurotus ostreatus, V. volvaceae*), Doshi and Sharma, 1995 (*Calocybe indica*), Crison and Sand, 1978 (*Flammulina velutipes and Auricularia spp*)

Mushrooms also contain a high amount of calcium, phosphorus, sodium, and potassium and low but available form of iron and magnesium which shows good health effects (Table 3). Mushroom with its regards to nutritional value and digestibility is gaining importance in today's human diet. It has also been examined that mushroom contains vitamins like thiamine, riboflavin, niacin, biotin, and vitamin-C (Chandra 2006). Mushrooms have been utilized for food and medicine, mushrooms contain different primary and secondary metabolites, showing beneficial health effects, there have been numbers of research findings on the therapeutic application of mushrooms, metabolites like indole, and phenolic compounds, carbohydrates, fatty acids, proteins, free amino acids, sterols, carotenoids, enzymes, vitamins and elements with biological activity the presence of these compounds and elements conditions the nutrient and therapeutic activity of Mushrooms e.g. immunomodulatory, anti-inflammatory, antioxidant, antiviral, antimicrobial and antigenotoxic properties, antiasthmatic, anti-diabatic activity, anti-obesity activity, prevent cardiovascular activity, anti-cancer activity, antiaging, enhance bone health, Aphrodaic activity, ant-arthritis, etc. (Barbieri *et al*. 2017, Breene 1990, Khan *et al*. 2013, Nahata 2013, Sheikh *et al*. 2015, Vyas *et al*., 2016, Radwan 2012). The importance of the mushroom could be mentioned in adding supplementation of income through mushroom cultivation as the demands mushroom in pharmaceutical industry increase due to its neutraceutical application, moreover, mushrooms are being used for the production of mushroom products like mushroom pappad, mushroom pickle, mushroom biscuits, mushroom beverage, mushroom in various value-added production as food health

supplements (Wakchaure 2017, Wakchaure *et al*. 2010), mushroom marketing in India growing day by day with the awareness of the mushroom potentials in food and medicine, the facts of mushroom cultivation technologies have been developed as such that a layman could easily start mushroom farm using their unwanted agricultural stuff and gain extra money, there are numbers of the farm established in India and Government also providing loans to promotes its cultivation so as marginal farmers could earn their livelihoods and get the opportunity to develop enterprise of mushrooms production.

Table 3 Mineral composition of some the edible mushroom (mg/100g dry wt) adapted from

| Mushroom | Ca | P | Fe | Na | K |
|---|---|---|---|---|---|
| *Agaricus bisporous* | 23 | 1429 | 0.2 | - | 4762 |
| *Lentinus edodes* | 33 | 1348 | 15.2 | 837 | 3793 |
| *Pleurotus ostreatus* | 98 | 476 | 8.5 | 61 | - |
| *Volvariella volvacea* | 71 | 677 | 17.1 | 374 | 3455 |

Courtesy: Chandra (2006)

*Management of Agric waste through mushroom cultivation*

The 70% of Indian depends directly on agriculture and 30% of the country's GDP contributed by the agricultural products. The cultivation of crops is the primary base of survival, therefore it is obvious that a huge amount of agric residue generated, which is either dumped or burnt causing environmental pollutions, this generated issue to manage the stubbles of the crops to prevents its burning, there are numbers of strategies have been put forward through various organizations, it has been seen that the cultivation of mushroom using this stubble could be converted into an income source. Apart from mushroom cultivation, crop residues are commonly used as bedding material for animals, livestock feed, soil mulching, bio-gas generation, bio-manure/compost, thatching for rural homes, biomass energy production, fuel for domestic and industrial use, etc. for the management of the crop residue (MoAFW 2014). However, a large portion of crop residue is burnt 'on-farm' primarily to clean the field for sowing the next crop, the problem of 'on-farm' burning of crop residues is intensifying in recent years due to a shortage of human labor, high cost of removing the crop residue from the field and mechanized harvesting of crops (IARI 2012). As per available estimates, burning of crop residues is predominant in four states, namely, Haryana, Punjab, Uttar Pradesh and West Bengal (Bhuvaneshwari *et al*. 2019). Since Mushrooms are heterotrophic, they need substrate rich in carbon, nitrogen, minerals, and vitamins to grow and the crop resides are found to be the best substrate, which is converted into edible mass out of waste, moreover, the substrate left after mushroom harvesting are a good source of soil conditioner and used as a source of biofertilizer. Crop residues management is vital for the long-term sustainability of Indian agriculture. Hence burning of residues must be avoided and should be used positively to improve the economic returns of farmers and reduce the environmental impacts. A potential and promising agro-residue management that can attract the farmer would be mushroom cultivation. This technique has various benefits such as the reduction in environmental pollution; generation of employment, particularly for rural women and youth; mode of short return agricultural business offering an immediate benefit to the community; enrichment in human diet and fitness with high nutrition and nutraceutical compounds; improvement of economic standards of the family (Gowda and Manvi 2019) (Fig 2) shows the utilization of agric residue and its management.

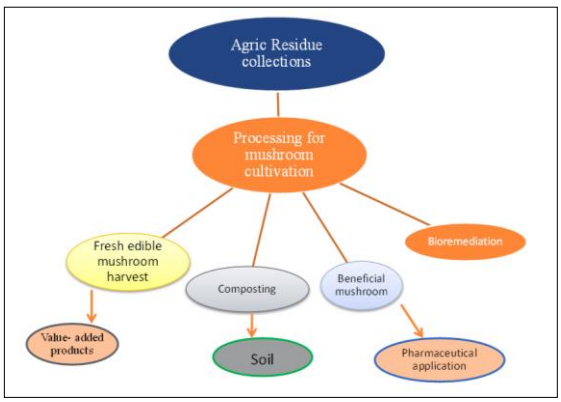


Fig 2 Utilization of agric residue and its management by mushroom cultivation and its outcomes

*Mushroom in animal husbandry*

Over the year persisting research on mushrooms potential in numerous health benefits, found to have a broad spectrum of action, and based on recent literature data the use of mushrooms is found to be justified in the feeding of farm animals, in poultry farm, and fisheries. Bederska *et al*. (2017) have reviewed the current status of knowledge concerning the use of edible mushroom as a feed additive with the dietary and health-promoting activities in the nutrition of broiler chickens and laying hens. In poultry farm, antibiotic is common to check the health and increase the production performance has led to human health hazards, therefore a natural source of the antibiotic substitute is being investigated, medicinal mushrooms are found to shows positive effects on immunity on the broiler and laying hens (Mahfuz and Piao 2019). The waste of oyster mushroom left from the mushroom industry used as supplements and 1% supplementation showed a positive response on the broiler chicken health (Fard *et al*. 2014). In fisheries mushroom, supplemented food is currently culminating in recent literature and several research findings reported a positive impact of mushroom supplemented food in fish culture, Mohd-Din *et al*. (2012) have used mushroom supplementation as a prebiotic compound on red Tilapia fingerlings, they found weight gain in the fingerlings significant compare to control, replacing a 64-80% proportion of dietary fish meal with fermented mushroom bran hydrolysate improve the growth, digestive enzyme activity, and antioxidant capacity of allogynogenetic crucian carp (fish) (Zhang *et al*. 2017). Moreover, Dube and Dwivedi (1996) found that the oyster-mushroom waste supplemented water tank of fish *Cirrhinus mrigala* not only highly nutritive colonized detritus to the fish as direct feed,

but also produced rich plankton in the treated water tank compare to the control. In Korea dietary supplementation of microbially-fermented spent mushroom substrates evaluated for the weight gain, carcass characteristics, and economic efficiency of Hanwoo steers and have found to be positive effects that could replace a part of conventional roughage (Kim *et al*. 2012). Inclusion of 5% spent mushroom compost (SMC) in the diet of grower geese can be supplemented in the feed without adversely influencing growth performance or meat characteristics, the level of 5% spent mushroom compost provides better meat sensory attributes for grower geese and promote good health performance (Chang *et al*. 2016).

*Mushroom compost in horticulture*

SMC (spent mushroom compost) is the residual compost waste generated or left out after mushroom productions, this compost is readily available and its formulation generally consists of a combination of wheat straw, horse manure, ground chalk, etc. composted all together. SMC contains lots of salt and organic material along with enzymes and other nutrients that make the SMC suitable habitats for different microbes including bacteria and fungi, synergistically they are found to be beneficial in disease suppression and plant growth promotion, therefore, an integrated management approach could be adopted to check the severity of the pathogens. Disease suppressive properties of composts rely on several factors including microbial activity, microbial population dynamics, nutrient concentrations, and other associated chemical and physical factors (Patil *et al*. 2018) it is seen that using compost as a soil amendment shows positive and significant effects on growth parameter of the crop production and plant promotion and induces microbiostasis, different study suggests that SMC could be used a source of biocontrol agents against different plant diseases due to its abilities to produce organic salts and enzymes and have been reported that SMC has antagonistic fungi (*Trichoderma sp.*), and bacteria, SMC not only controls the disease but also reduces the use of fungicides and inorganic fertilizer, moreover it saves the money cost required for fertilization and conserve the soil, as SMC has great potential to remediate soil contamination. Spent mushroom substrate (SMS) and spent mushroom compost are two-term people often confused, SMS are those residues which are left after the mushroom harvest from the non-composted substrate and the SMS are those residues which left after the mushroom harvest from the composted substrate, therefore, both the residue found to have vast different on their nutrients contains available for the use as biofertilizer. Spent mushroom substrate (SMS) normally contains 1.9:0.4:2.4%, N-P-K before weathering and 1.9:0.6:1.0, N-P-K after weathering for 8-16 months (Ahlawat and Sagar 2007). Fresh spent mushroom contains Carbon: Nitrogen ratio of 13:1 on average (Fidanza *et al*. 2010), the nutrients in the SMS and SMC depends on the mushroom species from which the spent material was derived, and material where mushrooms are grown, the characteristics of SMC and SMS highly effected by horticultural conditions, post-crop management, age of spent material, its storage time or post-crop composting. SMS and SMC have shared a common role in the soil as a soil conditioner like, improves soil structure, provides plant nutrients, increases plant nutrient availability, increases soil microbial populations, increases soil cation exchange capacity, increases plant root structure, increases soil aeration, improves soil water status, and reduces soil compaction, regulates pH of the soil. Therefore, SMC and SMS are suitable to use in horticulture, in (Table 4) the application of SMS and SMC in different cultivar has been tabulated. Mushroom spent substrate and Mushroom spent compost could be good as amendments in soil because of the following reasons:

- Low cost, consistently high-quality organic fertilizer
- Reduce or eliminate the liming cost
- Improves soil health
- Improves crops health
- Reduce the use of inorganic fertilizer
- It is an organic approach
- Reduce soil toxicity due to persisted pesticides and weedicides
- Increases the soil microflora
- Good bioremidiator
- Best in IFM
- Good in biocontrol agent in plants disease management

Table 4 Showing application of SMS and SMC in the different horticultural cultivars

| Cultivars | Spent substrate | | Source of information |
|---|---|---|---|
| | SMC | SMS | |
| *Amaranthus hybridus* | + | - | Jonathan *et al*. (2012) |
| Bush Beans, collards, squash, tomato | + | - | Stephens and Bennett (1989) |
| *Salvia officinalis* | + | - | Castro (2008) |
| Capsicum, Tomato, Cauliflower, Pea, Potato, Ginger, Garlic, Wheat, Paddy, Maize, and Apple | + | + | Sagar *et al*. (2009) |
| Tomato, Garlic, Onion, Brinjal, Cauliflower, Wheat, Capsicum, maize, Pea, Spinach, Broccoli, Lettuce | + | - | Ahlawat and Sagar (2007) |
| Beetroot, Cucumber, vineyards, barley, marigold, green gram, sweet potato | + | + | Rinker (2017) |

# CONCLUSION

Since the agriculture sector has been going through many challenges due to environmental threats and the increasing population. The increasing population and the challenges for food security have made concerns for a systematic approach to counteract food insecurity and

increased the farmer's income. Though the application of the inorganic fertilizer and pesticides increase agriculture production but has worst effects on soils and human health, therefore the integrated farming system and the integrated farm management is promising methods to overcome the future threats in food security and agricultural land degradations. In this review, it has been reflected that how Mushroom and mushroom compost in IFM and IFS could provide progressive economic growth, employment opportunities, family nutritional requirements, livestock management, agricultural nutrients and optimal utilization of resources of the farming enterprises, etc. Furthermore, in this article, we have discussed the integrated farming system models existing in the country where mushrooms could be added as a component in any model that exists today. But there is very little documentation that has been made to reach the farmers. Hence step to be taken for the documentation of such kinds of farming models and to disseminate it to the needy farmers. The scientific community and research station has to initiate steps to evaluate and standardize the model so that the farmers can improve their standard of living and income. From this review, it is concluded that the integration of Mushroom and Mushroom compost could be a promising enterprise for the marginal and small farmers, particularly those who have fewer farm holdings.

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