in production of *A. bisporus* (Munjal and Seth, 1974) which is in variably been isolated from different compost and casing samples. In present study seven competitor fungi viz. *Chaetomium globosum* *Chromelosporium fulva*, *Coprinus fimetarious* *Diehiliomyces microsporus* *Myceliopthora lutca populospora byssina* and *Sporendonema purpureascens* were recorded from the bed. Though the exact amount of loss of yield by them was not estimated but it was believed that they reduced the yield of mushroom crop at a significant level. (Table-27 Fig-29).
CHAPTER-VI
SUMMARY
1. Button mushroom has tremendous scope for its cultivation in our country on account of its attractivity, palatability and delicacy fetching high market prices. In such situation, constant efforts have been made to increase its yield and quality by selecting high nutritious media for preparation of culture and good quality spawn with high vigour, by making trials in respect of supplementation of substrates with organic materials and inorganic chemicals before and after composting, proper sanitary managements, efficient temperature and humidity control devices, the pathological operations and monitoring of overall procedures. The entire activities and operations were brought together with the routine cultivation of *A. bisporus* from Oct. to March in three cropping seasons (from 1998-2001).

2. Three organic materials viz., cassia foliage, horse manure and mustard oil cake was used for supplementation of normal compost based on CMU formulation. These materials were added with compost on 6th day of composting and after amendment rest operations in respect of composting were done as in long method of compost preparation. These supplemented compost were used for cultivation of *A. bisporus* and impacts of each organic material in terms of yields were noted. Each and every supplement increased the yield of mushroom which was greater on mustard oil cake followed by that on cassia foliage. Compost supplemented with horse manure exhibited the lowest degree of yield increase which was a little higher than that on plane compost which was treated as control.

3. Three inorganic salts viz., Copper sulphate, Ferrous sulphate and Zinc sulphate were used for supplementation of compost at the time of
spawning in three different concentrations i.e. 0.5%, 1.0% and 1.5%. Each supplement resonably increased the yield of mushroom at different concentration gradients, where ferrous sulphate was more effective at low concentration (0.5%), Zinc sulphate at medium range of concentration (1.0%) and Copper sulphate at its highest concentration (1.5%).

4. Composting is a fermentation process during which the physical structure and chemical state of the substrate changes which permits the natural succession of micro organisms on this substrate. In this study, mycoflora of the compost was isolated at four different stages of composting viz., 5th, 12th, 22nd and 28th day. On 5th day, mesophilic mycoflora colonized the substrate but on 12th day, the compost was colonised extremly by thermophilic mycoflora. In third and fourth stages (on 22nd and 28th day) however, with decrease in temperature, again mesophilic fungi came into existence which more are less were similar in their numbers.

5. The physical properties like pH, water holding capacity number of pinheads on differently sterilized casing media and their impact on quality assessment was studied. The maximum water holding capacity (85%) was found in cow dung and garden soil while garden soil and sand mixture was poor in this respect. The initial pH was correct and near the neutral in spent compost and sand mixtures where as lowest pH was found in farmyard manure and tree bark. The change in pH after adjustment during 56 days of cropping was maximum in spent compost and sand mixture which decreased upto 6.5. The farmyard manure and tree bark maintained its pH and it was nearly neutral during the whole cropping period. The number of pinheads were greater in
farmyard manure and tree bark mixtures while minimum pinheads were formed in spent compost and sand mixtures. The average weight of pinheads was greater in spent compost and sand casing media as compared to others.

The yield of *A. bisporus* was greater in all casing mixtures when subjected to steam pasteurization while the steam sterilized casing media showed the lower yield in comparision to other two methods of sterilization. The quality assessment in terms of reflection percentage of fruit body and dry matter content was studied, the fruit body obtained in farm yard manure and tree bark showed greater whiteness as compared to other casing media while spent compost and sand showed minimum whiteness in fruit bodies. The dry matter content of fruit body obtained in cow dung and garden soil casing media was greater in both first and third flushes as compared to other media while it was lower in Farm yard manure and tree bark mixture.

6. The per cent yield of mushroom was found out by correlating the yield of mushroom produced and the weight of compost utilized by *A. bisporus* during cropping. This value was calculated 15.03 per cent. The bioconversion ratio was found out by correlating the per cent production of mushroom with the net value of different compost components used by the mushroom during 75 days of cropping which was 0.31 per cent.

7. Hybrid strains of *Agaricus bisporus* are generally cultivated at commercial scale at 16-18°C using strain U3. The experiments were done to determine whether manipulation of environmental temperature during cropping could effect flush size and timing while maintaining the yield and quality of the mushroom.
At defined stage of sporophore development (cap diameters of 1.2 and 3 Cm. size the air temperature was raised approximately to 26°C until harvesting was completed and then returned to 17°C prior to each successive flushes. The most effective control of flushing was operated at 3 cm stage. This experimental treatment reduced the number of days required to harvest each flush without seriously affecting the yield.

The reports on the effect of temperature manipulation, the flushing pattern, yield, number of picking days and quality of mushroom was also reflected from this study.

8. Humidity is one of the major factor controlling the yield and quality of mushroom during cultivation. The commercially cultivated U3 strain of button mushroom was grown under different levels of humidity and found that 90-95% humidity was most effective which maximised the yield of mushroom crop. Besides the yield, quality of mushroom was also affected at different levels of humidity. At lower levels the fruit body was obtained with light weight and long stipe while at high percent of humidity the weight of fruit body increased with the increase in pileus diameter.

9. The chemical analysis of sporophore of *A. bisporus* was performed in respect of different nutritional constituents which revealed that soluble sugars were present in higher amount in comparison to other constituents of sporophore. It was also noticed that the soluble sugars were present in greater amount in initial stage of sporophore which gradually decreased in later stages till maturity. The decreasing trends in amount of sugar has also noticed in successive flushes of mushroom crop.

10. The average value of protein on fresh weight basis in fruit body was 3.05 per cent. It was maximum at the veil breaking stage of
sporophore in the first flush which declined slightly at the stage of maturation of fruit body. The value of protein also varied from flush to flush and it was maximum in all the stages of first flush which decreased slightly is successive flushes.

12. The average value of fat content in fruit body of *A. bisporus* on fresh weight basis was 0.29 per cent. This was found maximum at the IV stage of frist flush which decreased successively at the later flushes.

13. *Agaricus bisporus* is rich in mineral content as it is evident from their ash content (0.99%) analysed on fresh weight basis. The value of minerals was found maximum at the mature stage of fruit body development which in successive flushes showed decreasing trend.

14. The minerals like Ca, Mn, Cu, Fe and Zn were estimated on fresh weight basis of the sporophore of *A. bisporus*. The results showed that Ca was present in 0.026% of total amount of minerals, its value was nearly the same in all the stages of fruit body development. The concentration of Iron was 19 ppm which was also constant at each stage of fruit body development but the value of Cu, Zn and Mn changed in different stages. The value of Cu was maximum at I and II stages that of zinc at I stage and Mn at IV and V stages.

15. Eighteen amino acids including all the essential amino acids were recorded in *A. bisporus*. Amongst amino acids recorded glutamic acid and arginine exhibited their greater amount while cystein and methionine were present in their lesser amounts. The proline, aspartic acid, alanine and lysine occupied the intermediate position in this respects where as serine, glycine tyrosine, threonine and valine, slightly edged over the above amino acids. Eight amino acids which are not found in plants were also present in *A. bisporus* in good amounts these
were isolucine, leucine, lysine, phenyal alanine, methionine, threonine, valine and trytophan. The amount of essential amino acids in *A. bisporus* was also compared with their corresponding amounts in egg to determine their chemical score. These score was greater in eggs as compared to amino acids of *A. bisporus*.

16. Seven competitor moulds viz., *Chaetomium globosum*, *Chromelosporium fulvum*, *Coprinus fimetarius*, *Diehliomyces microsporus*, *Myceliophthora lutea*, *Populospora hyssnia*, *Sporedonema purpurescens* were isolated and studied which occurred on bed during the cultivation of *A. bisporus*. These weed fungi which appeared on bed after a definite time period in successive manners during cropping of mushroom.

17. The economics of the cultivation of *A. bisporus* was worked out. The total cost of mushroom production in small farms was Rs. 22625. Where fixed cost constituted 14.19 per cent and variable cost 85.81 per cent. The cost and returns study revealed that the average grass return in small farms was Rs. 45500.00 where as the net returns from mushroom production was Rs. 22875.00. This fact justifies the benefits of mushroom production with least capital investments. For the study of the economic feasibility of mushroom production, benefits cost ratio and pay back periods have been analysed where the value of these two factors was 0.51 and 2.01 respectively.

The above results revealed that the mushroom farming in Uttar Pradesh is an economically sound proposition.

18. Mushroom accounts high nutritive food but unfortunately due to high prices and lack of publicity in our country the consumption is confined only to few peoples of cities and the internal production is
insufficient to cope-up with raising demands. Mushrooms are highly perishable commodity therefore, a quick chain of marketing arrangement is needed which totally lacks in our country. The main functionary involved in this occupation are the vendors and provision stores selling the vegetable and fruits which take profit as high as 100 per cent. This is highly unjustified and becoming main obstacle in increasing the consumption of mushroom amongst the middle class people. Besides internal demands of mushroom, internal market is expanding at very fast speed. Thus, keeping above facts in mind there is a great scope of intensive cultivation of button mushroom in our country. The climatic conditions prevailing on hills as well as in plains of Nothern India are ideal for mushroom cultivation, in such situation, in order to enter in export market a strategy is needed to be evolved for commercialization of the production and canning of mushroom in these areas. This can be achieved by the efforts carried out by the growers, reserch workers, cooperatives and governments of our country.