SUMMARY AND CONCLUSION

- The present study embodies results of investigations on the antioxidant potential of bee pollen and bee bread collected from different crops (*H. annus*, *B. campestris* and *Z. mays*) against oxidative stress produced by *S. typhimurium* in mice.
- Bee pollen was collected by placing a pollen trap at the entrance of the bee hive.
- Bee bread was collected directly from the comb with the help of spatula.
- The bacterial strain of *Salmonella typhimurium* (MTCC 98) was purchased from Institute of Microbial Technology (IMTECH).
- The bacterial strain was confirmed by suitable biochemical tests.
- Phytochemical analysis was performed for three types of bee pollen and bee bread. It was observed that bee pollen and bee bread collected from *H. annus* possessed higher bioactive constituents so, it was selected to decide the dose of administration and day of sacrifice. After conducting required experiments with *H. annus* with different doses and different days, 250 mg/kg bw/day dose for 21 days was observed to be the most suitable.
- Different doses of bacteria were injected intraperitoneally in mice. Suitable dose and day was $2 \times 10^4$ CFU/ml and on 5th day infection was at peak.
- The whole experiment was divided into different groups as normal, infected with *S. typhimurium* intraperitoneally, orally administrated bee pollen collected from different crops without infection, orally given bee bread collected from different crops without infection, infected with *S. typhimurium* followed by treatment with bee pollen collected from different crops, infected with *S. typhimurium* followed by treatment with bee bread collected from different crops, vitamin C treated group (without infection), infected with *S. typhimurium* intraperitoneally followed by oral administration of vitamin C.
- The tissues taken for the present investigations included liver, spleen and kidney. Blood was also collected for serum parameter studies.
- Parameters of oxidative stress including LPO, GSH, CAT, SOD, GST, GR and GPx were investigated.
Summary and Conclusion

- Serum parameters studied included ALP, bilirubin, uric acid, creatinine, urea and LDH.
- It was observed that in liver, the level of LPO was increased and GSH, CAT, SOD, GST, GR and GPx were decreased in *Salmonella* infected groups. Treatment with bee pollen, bee bread of different crops and vitamin C restored the values to near normal.
- In spleen, *S. typhimurium* infection resulted in rise in the level of LPO. Activities of antioxidant enzymes GST, CAT, SOD, GR and GPx were reduced. Level of GSH fell to below normal. Administration of bee pollen and bee bread at a dose of 250 mg/kg bw/day for 21 days showed ameliorative effect.
- The kidney of the infected mice showed rise in the level of LPO. Reduced activity of GST, CAT, SOD, GR and GPx was recorded. In kidney of the treated groups (bee pollen and bee bread) the levels were restored to near normal values.
- Serum parameters such as ALP, bilirubin, creatinine, urea, uric acid and LDH were analysed by using different kits. It was observed that these serum parameters were increased after infection with *S. typhimurium* but after treatment with bee pollen, bee bread, vitamin C, their values approached near normal which confirmed the protective effects of used natural products.
- Further, it was observed that bee pollen and bee bread when administrated alone (*i.e.* without *S. typhimurium* infection), there was no negative effect on the tested parameters.
- On comparing the activity of pollen and bee bread, it was observed that bee bread in all crops showed higher antioxidant activity as compared to bee pollen.
- While comparing the free radical scavenging activities of bee pollen collected from *H. annus, B. campestris* and *Z. mays*, the results showed that bee pollen of *H. annus* showed higher activity followed by *B. campestris* and *Z. mays*.
- Similarly, in case of bee bread, *H. annus* was found to be good performer as compared to *B. campestris* and *Z. mays*. 