

then that of pupal stage (7.92%). However, overall hibernation of stem borer (larva + pupa) through stubble was least in variety GJ 41 (20.0%) and higher in GJ 38 (33.75%). It was further evident that the hibernation of stem borer through stubble was more (26.88%) than that of stalk (20.21%) in *kharif* season.

### Use of division board to reduce wax moth attack in *Apis cerana indica* hives

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*Apis cerana indica* is the most common and popular bee species reared by the apiculture entrepreneurs of Alappuzha district. In a participatory rural appraisal (PRA) conducted in the bee keeping areas of Alleppey district it was revealed that 80 per cent of the bee keepers discontinued the enterprise due to several reasons, major one being wax moth attack, coupled with the lack of continued technical support. *Galleria mellonella* L., the greater wax moth is the major enemy of Indian bees; *A. cerana indica* is more susceptible when compared to Italian bees and *A. mellifera* due to the presence of propolis in the later (Adalaka and Sharma, 1975). Wax moth infestation was observed from June to August/September coinciding with the dearth period as reported earlier by Viraktamath (1989). The female moths lay eggs on the cracks and crevices on the hive box. The emerging larvae feed on the wax debris on the sides and edges of the hive and later enter into the comb, making the combs unfit for brooding by feeding and webbing the comb wax.

Bees leave the affected hives causing heavy loss to apiculturists. Farmers found it very difficult to identify the infestation in the initial stages and noticed only when the bees left the hive. Proper inspection, periodical cleaning and removal of wax debris of the bee hives are the practices recommended as preventive measures against the pest (Kerala Agricultural University, 2007). Bee keepers revealed that the current recommendations were not sufficient to manage the pest. Against this background, on farm testing on the use of division board to manage the wax moth attack was conducted in Alappuzha district by Krishi Vigyan Kendra with the participation of bee keepers.

Division board is a wooden piece of size 14.5x20.5 cm and 1.0 cm thickness attached to the top portion of an empty bee hive frame, at the same size of full comb. The cost of division board ranges from Rs. 25 to Rs. 30 per board. Two technologies *viz.*, colony cleaning and inspection and use of division board were tested against the control (no measures). In the hives where the use of division board was tested, spare combs

were removed from the hive during lean season and active combs were placed on one side of the hive. One division board was placed in the open end, restricting the bees towards one side of the hive. Thus colony hive space was optimised and the colony temperature regulated so that bees could manage the colony effectively. Active combs will not be attacked by the wax moth as bees can easily detect early larvae (Garg and Kashyap, 2002). At the end of the lean season, the division board was removed and empty frames were provided for colony build up. The hives where division board was used retained 96 per cent colonies and escaped the pest attack regular inspection and cleaning alone were practised, only 64 per cent of the colonies escaped the pest attack. In cases, regular infestation. The participating farmers accepted the technique as it was effective, simple and economical. So use of division board can be recommended for Indian bee hives during lean season for better colony retention and to reduce wax moth attack.

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### Species composition of fruit flies from two cucurbit fields of mid-hill Himalayas

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Fruit flies are identified as one of the ten most serious pests in India. Their polyphagous nature, causes high economic losses in fruits and vegetables. Of 207 species, nine are identified to be major and economically important (Sardana *et al.* 2005). About 50 per cent of cucurbits are partially or completely damaged by fruit flies in India (Gupta and Verma 1992). A study was carried out in 2009-2010 to assess the range of fruit fly species from cucurbit fields in two agro-ecological zones at Entomological Experimental Farm, CSKHPAU, Palampur and farmer's field Bara (Hamirpur) in mid-hill Himalayas of Himachal Pradesh. The population of male adult fruit flies was monitored with the help of pheromone traps *viz.*, cuelure and methyl eugenol. The traps were recharged at weekly intervals with malathion and after every fortnight with cuelure and methyl eugenol. Adult males were collected at weekly intervals, separated, identified up to species level, counted and recorded throughout the crop growing seasons. The results of the present