

Greater wax moth: A major threat to beekeeping in Karnataka

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Honeybees are attacked by many diseases and pests which can greatly hinder the advancement and reduce the economic benefits of beekeeping worldwide. Among pests, the wax moth is considered as a notorious pest of honeybee colonies which is well distributed throughout the world. There are two species of wax moth, the greater wax moth (*Galleria mellonella* L.) (Plate 1) and lesser wax moth (*Achoria grisella*). *Galleria mellonella* L. (Lepidoptera: Pyralidae) causes heavy economic losses, sometimes reaching to up 60-70 percent of the beekeeper's income in the developing countries like India (Hanumanthaswamy, *et al.*, 2009). Larvae feeds on honey wax, cast-off honeybee pupal skins and brood, creates tunnels in the comb and leaves masses of webs in the comb and on the frame. Damage occurs as the larvae create silk-lined tunnels through the hexagonal cell walls and over the comb surface. The tunnels and borings made by the larvae on the cell caps makes holes through which honey leaks out. The silken threads entangle emergent bees, which as a result, die of starvation, a phenomenon described as galleriasis (Plate 2). Moreover, large scale infestation of colonies by larvae of the greater wax moth often leads to colony loss and absconding.

Management of the wax moth comprises of cultural practices like maintaining good sanitation which includes, keeping the colony strong with adequate food sources, sealing cracks and crevices, replacing and destroying infested combs (Charriere and Imdorf, 1999). Chemical control consisting of fumigants such as sulphur, acetic acid, ethylene bromide, calcium cyanide, methyl bromide, phosphine, paradichlorobenzene (PDB) naphthalene, and carbon dioxide (Gulati and Kaushik, 2004). However, the above listed fumigants (except carbon dioxide) pose health risks to the handler and lead to residues in hive products such as honey, rendering the product inconsumable. In this context, greater emphasis is being laid on safer methods such as biological agents and bio-products including *Bacillus thuringiensis* Berliner (H-serotype V) (Bt), *Bracon hebetor* (Say), *Trichogramma* species, the redimported fire ant (RIFA) (*Solenopsis invicta* Buren and *Solenopsis germinita* Fabricius), and the use of the male sterile technique (MST) which have

been found to be effective and safe control methods for management of greater wax moth (Kwadha *et al.*, 2017). In addition to this, yellow sticky traps with older honeybee combs are being used for the management of the wax moth at present (Vijayakumar *et al.*, 2019; Plate 3).

In order to record the incidence of this pest, surveys were taken by All India Coordinated Research Project on Honey Bees and Pollinators on honeybees and pollinators in potential beekeeping areas of Karnataka during 2015 to 2019 (Figure 1). Apiaries in the plain and hilly regions of Karnataka were visited every year and recorded the percent infestation in each year. Among thirteen selected beekeeping areas, the maximum infestation was recorded in Udupi and Chitradurga with more than 50% infestation followed by other 12 locations with less than 50% infestation. The least infestation was recorded in Chamarajnar (6.2%) followed by Mysore (10%) and Mandya (12.5%) as indicated in the figure 2. The infestation of wax moth occurs during most of the seasons due to its overlapping generations in a year. Abandoned combs and weak colonies constantly occur at different beekeeping regions in Karnataka, and they become important reservoir for the multiplication of *G. mellonella* population. It is active from March to October (Garg and Kashyap, 1998) and continued up to November (Ramachandaran and Mahadevan, 1951; Gupta, 1987).

In south India, maximum infestation was recorded during the dearth period (Viraktamath *et al.*, 2005) that coincided with the weak population in the colony. Wax moth damage is the major biological constraint in the beekeeping industry. Therefore, controlling wax moth with safe management practices has great economic importance (Turker *et al.*, 1993). More research on safe control methods like use of biological agents and bio-products are the need of the hour.

References

- Charriere, J.D and Imdorf, A. 1999. Protection of honey combs from wax moth damage. *Am. Bee J.* 139: 627–630.
- Gulati, R. and Kaushik, H. 2004. Enemies of honeybees and their management—A review. *Agric. Rev.* 25: 189–200.
- Gupta M. 1987. Wax moth in *Apis mellifera* L. in Haryana, India. *Indian Bee Journal.* 49:26-27.

- Hanumanthaswamy, B.C., Venkatesh H and Nagaraja M. V. 2009. Influence of different species of honey bee combs on the life stages and biological parameters of greater wax moth, *Galleria mellonella* L., *Karnataka Journal of Agricultural Sciences*. 22:670-671.
- Kwadha, C. A., Ongamo G. O., Ndegwa P.N., Raina S. K. and Fombong A. T., 2017. The Biology and Control of the Greater Wax Moth, *Galleria mellonella*. *Insects*, 8: 61. doi:10.3390/insects8020061
- Ramachandaran S and Mahadevan V.1951. The wax moths and their control. *Indian Bee. J.*14:758–785.
- Turker L., Togan I., Ergezen S., Ozer M. 1993. Novel attractants of *Galleria mellonella* L (Lepidoptera: Pyralidae: Galleriinae). *Apidologie*. 24:425-430.
- Vijayakumar, K.T., Neethu, T., Shabarishkumar, S., Nayimabanu T., Madhu, K.V., Bhat, N. S and Kuberappa, G. C. 2019. Survey, biology and management of greater wax moth, *Galleria mellonella* L. in southern Karnataka, Indian. *J. Entomology and Zoology Studies.*, 7(4): 585-592.
- Viraktamath, S., Basalingappa, S. and Lingappa, S. 2005. Biology and seasonal incidence of the braconid wasp, *Apanteles Galleriaiae* and its parasitization of greater wax moth, *Galleria mellonella*. *Ind. Bee J.* 67:182-187.

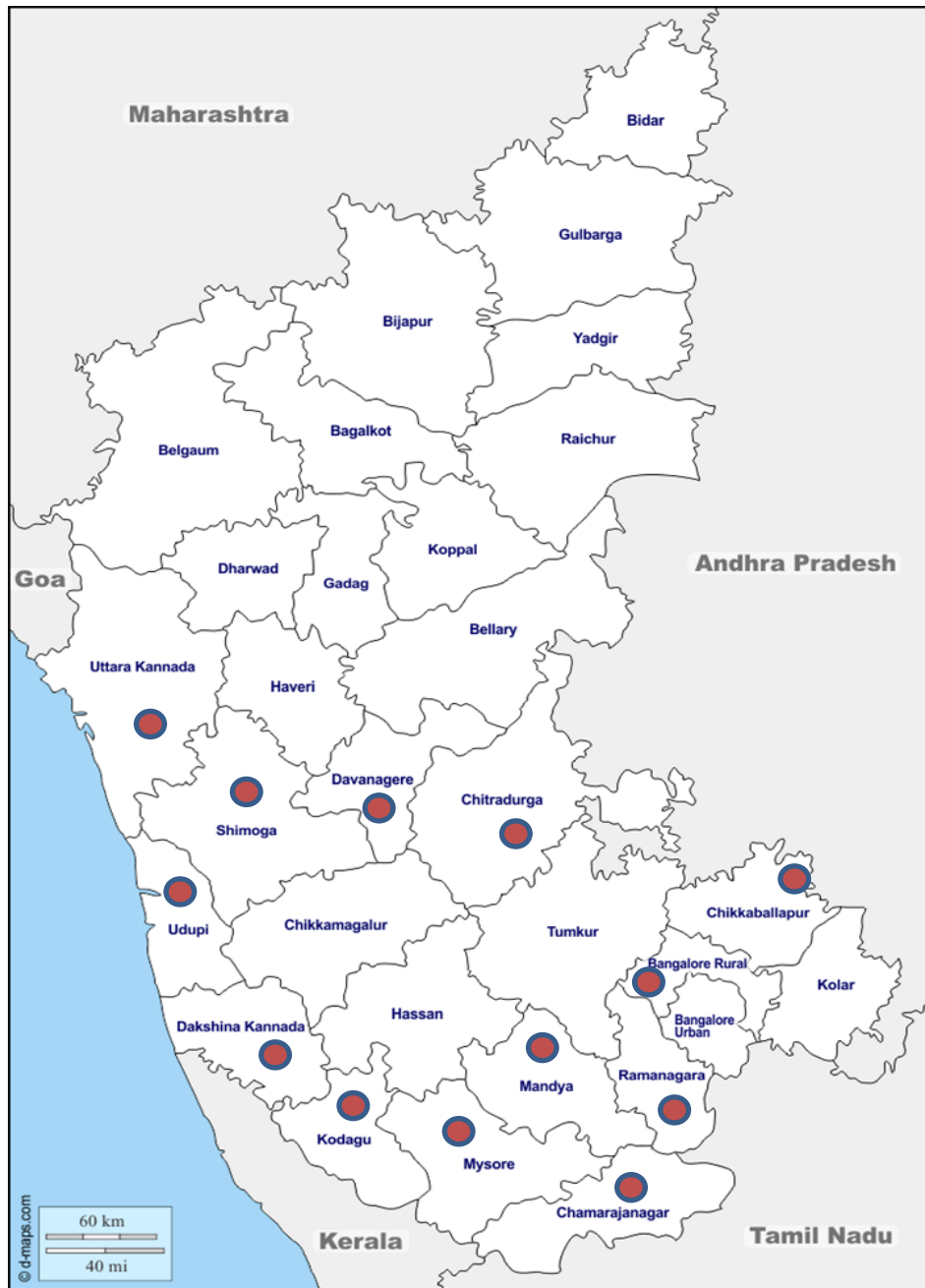


Fig. 1. Selected districts for survey on pest and diseases of honey bees in beekeeping areas of Karnataka

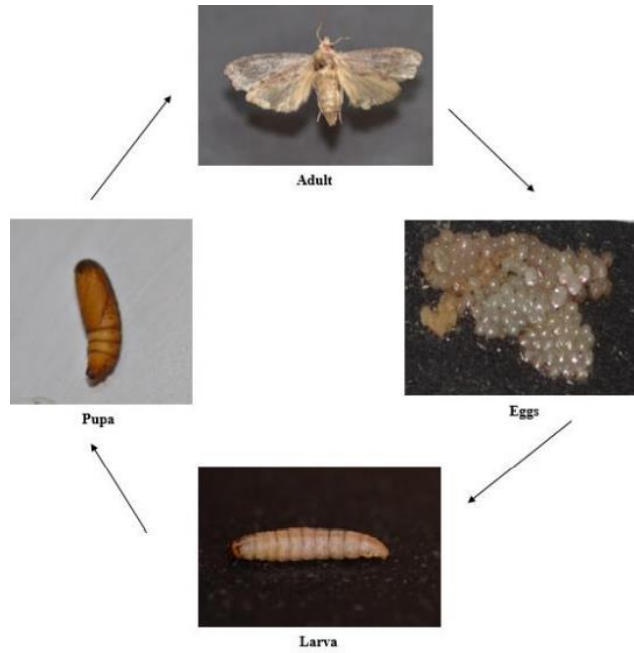


Plate 1. Life cycle of *Galleria mellonella*



Plate 2. Damage caused by *Galleria mellonella* in *Apis cerana* combs



Plate 3. Yellow sticky trap installed at Apiary to trap *Galleria mellonella*

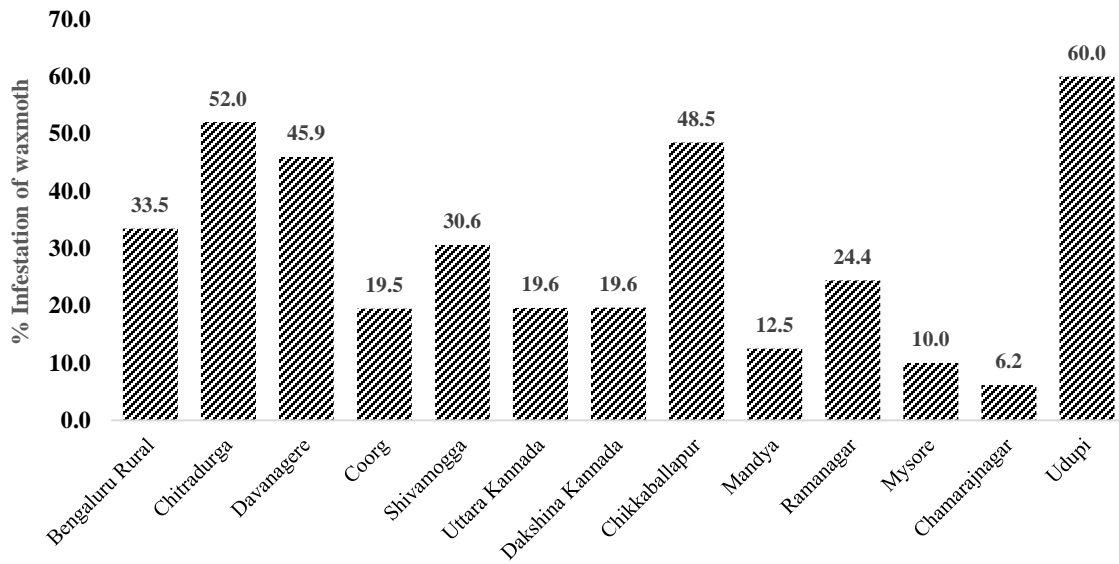


Fig. 2: Average percentage of greater wax moth infestation in different parts of Karnataka from 2015-2019