



Relating shade level and altitude with occurrence of *Hypothenemus hampei* and parasitoids on coffee

Anthony R. Ijala¹, Jeninah Karungi¹, Mattias Jonsson², Samuel Kyamanywa¹ and Barbara Ekbohm²



¹School of Agricultural Sciences, Makerere University, P.O. 7062, Kampala, Uganda; ²Department of Ecology, Swedish University of Agricultural Sciences, P.O. Box 7044, S-750 07 Uppsala, Sweden

Background: Coffee plays a leading role in the economy of Uganda, employing over 3.5 million families. Despite the importance, productivity of coffee in Uganda is still generally at sub-optimal levels. Insect pests, notably, the coffee berry borer (*Hypothenemus hampei*, Curculionidae) are among the major causes of loss in yield. Existing natural enemies offers a degree of protection against the pest for the resource constrained farmers. Diversity and abundance of natural enemies has been found to be higher in agroforestry plantations than in sun-exposed monocultures, and it is often assumed that this will lead to improved pest suppression. The effect that incorporating trees in cropping systems will have on pest populations in individual fields, however, also depends on the habitat requirements of the pests themselves and the biophysical parameters of the landscape. As such, the study assessed the effect of level of shade and altitude on occurrence of *H. hampei* and its parasitoids.

Methodology: In 2012 in Eastern Uganda, we studied how three levels of shade (full >50 trees per acre, moderate 21–50 trees per acre, and low 0–20 trees per acre), and altitude (high, ranging from 1,717–1,840 m.a.s.l., and low: 1,511–1,605 m.a.s.l.) influenced the occurrence of *H. hampei*. The study covered 30 individual coffee plantations. Fifteen plantations were studied for each altitude level; with five in each shading level. Ten coffee trees were randomly selected from each field for berry collection.

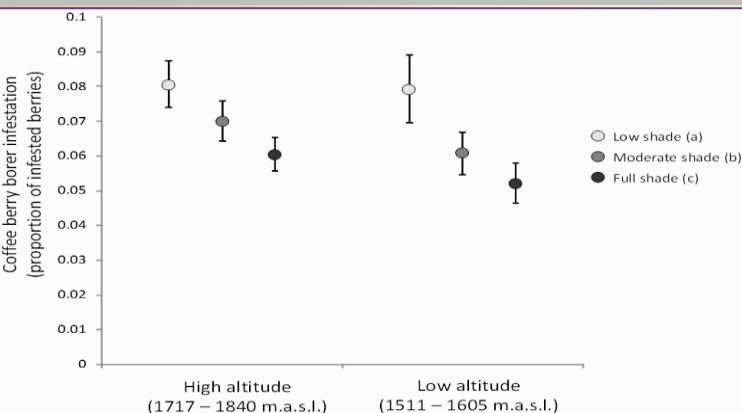


Fig 1. Shade level and altitude on *H. hampei* occurrence (Jonsson et al., 2014)

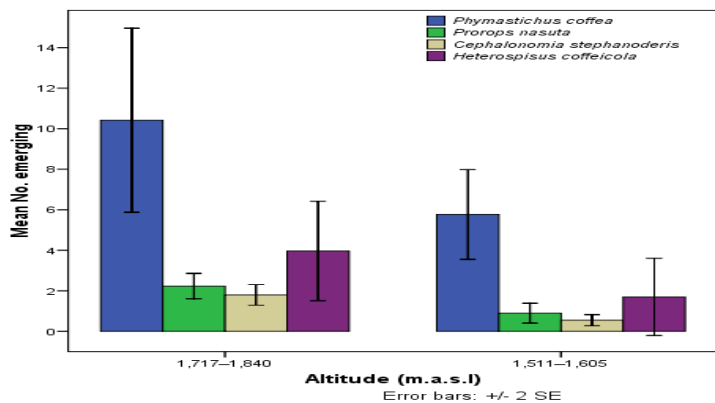


Fig 2. Effect of altitude on natural enemy occurrence

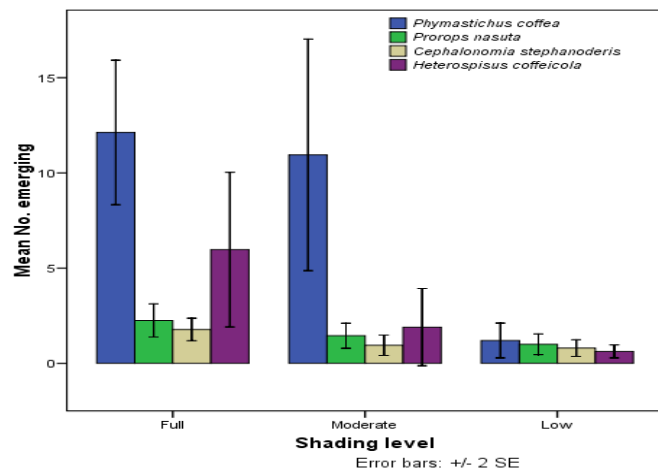


Fig 3. Effect of Shading level on natural enemy occurrence

Results highlights and way forward:

- *Hypothenemus hampei* occurred more in berries from coffee plants under low shade conditions regardless of altitude (Fig.1).
- Four parasitoid species emerged from berries infested with *H. hampei*: *Prorops nasuta* (Bethyidae), *Cephalonomia stephanoderis* (Bethyidae), *Phymastichus coffea* (Eulophidae) and *Heterospilus coffeicola* (Braconidae). There was higher occurrence of parasitoids at higher levels of shade, and at high altitude (Fig. 2, 3). There was an interaction of shading level and altitude for *P. coffea* and *H. coffeicola* occurrence.
- High shade levels are recommended for areas with high *H. hampei* infestations and for conservation of parasitoids.

References: Jonsson M., Ijala, A.R., Ekbohm, B., Kyamanywa, S. and Karungi, J. 2014. Contrasting effect of shade levels and altitude on two important coffee pests. Journal of Pest Science. DOI: 10.1007/s10340-014-0615-1

Acknowledgements: The Swedish Foreign Ministry for funding the research, and the Swedish bilateral research cooperation to Uganda (Makerere University) Project for facilitating attendance at the symposium.