➔DOI : 10.15740/HAS/AJBS/9.2/208-212
e ISSN-0976-8343 | ■ Visit us : *www.researchjournal.co.in*

Asian Journal of Bio Science, Volume **9** | Issue 2 | October, 2014 | 208-212
Received : 14.05.2014; **Revised :** 00.00.2014; **Accepted :** 00.00.2014

RESEARCH PAPER

Preliminary results of bowl trapping insects in field bean (*Lablab purpureus*) ecosystem

M.K. PRABHAVATHI AND SYED NAJEER E NOOR KHADRI

Department of Entomology, University of Agricultural Sciences, GKVK, BENGALURU (KARNATAKA) INDIA
Email : prabhavathient@gmail.com

Bowl traps have gained attention as a useful method for sampling many insects and are now commonly used across the world for this purpose. The preliminary results of bowl trapping in a September to November season in field bean ecosystem of University of Agricultural Science, GKVK, Bangalore are presented, including the test of three different color bowls, two different habitats, and the interaction of these variables in insect species number and composition. Blue, white and yellow bowls were used in the random, in seven sampling days between September to November. Bowl traps captured 1390 insect specimens, with calliphoridae, dolichopodidae and Halictidae bees being the richest and most abundant group. Different trails influenced only the composition, while the interaction with different colors did not have a significant effect. These results, as well as the higher taxonomic composition of the inventoried bees, are similar to other studies reported in the literature.

Key words : Insects, Bee bowls, Field bean

How to cite this paper : Prabhavathi, M.K. and Khadri, Syed Najeer E Noor (2014). Preliminary results of bowl trapping insects in field bean (*Lablab purpureus*) ecosystem. *Asian J. Bio. Sci.*, **9** (2) : 208-212.

INTRODUCTION

Lablab purpureus (L.) Sweet, commonly called field bean, hyacinth bean, Indian bean, Egyptian bean, lablab bean or poor man's bean is a dual purpose legume and is one of the most ancient crops among cultivated plants. *Dolichos lablab* L., *Dolichos purpureus* L. *Lablab niger* Medikus, *Lablab lablab* (L.) Lyons, *Lablab vulgaris* (L.) Savi, *Vigna aristata* Piper are the synonyms for the species. Wild forms of lablab are believed to have originated in India or Asia (Purseglove, 1968; Shivashankar *et al*., 1987; Deka and Sarkar, 1990) and were supposed to have been introduced into Africa, Australia and several other countries from Southeast Asia during the eighth and ninth centuries (Kay, 1979; Cameron, 1988). Presently *L. purpureus* is widely distributed in many tropical and subtropical countries where it has almost become naturalised (Purseglove, 1968). In South and Central America, East and West Indies and Asia, lablab is grown as an annual or a short-lived perennial (Whyte *et al*., 1953). It is reported to grow well under warm, humid conditions at temperatures ranging from 18^{o} to 30^{o}C, and is fairly tolerant to high temperatures (Hendricksen and Minson, 1985; Schaaffhausen, 1963a,b; Kay, 1979; Cameron, 1988). Field bean is cultivated either as a pure crop or as a mixed crop with finger millet, groundnut, castor, corn, bajra or sorghum in Asia and Africa. The crop is mainly grown for its green pods, while the dry seeds are also used in various vegetable preparations. In India cultivation of field bean is mostly confined to the peninsular region and to a large extent in Karnataka and adjoining districts of Tamil Nadu, Andhra Pradesh and Maharashtra. Karnataka contributes a major share, accounting for nearly 90 per cent in terms of both area (85,000 ha) and production (18,000 tonnes) in the country. The older varieties used to be of long duration and photosensitive. Whereas, improved varieties are photo insensitive and can be cultivated throughout the year either as pure crop or as mixed crop and they mature in 110–120 days. In pure stands, seed yields are around 12 to 15 q/ha, whereas in intercrop condition, the yields are around 4 to 5 q/ha (Anonymous, 2010). Major pests like the pod borer complex and aphids, diseases like bacterial blight and anthracnose are the major production constraints for field bean. More than anything, production basically depends on pollination and pod set since inadequate pollination can be a cause of reduction in yields of field bean.

It has been demonstrated by Free (1966) that the absence of pollinating insects during flowering of the bean significantly reduced the average number of seeds per plant.

RESEARCH METHODOLOGY

Sampling was conducted in the field bean ecosystem at University of Agricultural Sciences, GKVK, Bangalore. Commercial plastic bowl traps, blue, white and yellow and filled one third of its volume with a water/soap solution were used. Traps were placed (24 bowl traps of each color were placed) randomly in field bean ecosystem. The location of each bowl trap on each trail was randomly selected. A total of seven sampling days were carried in spring 2013 (September to November) the season of the first activities of insects, in the beginning of the wet season and when the plants were full of leaves. Samplings were carried out at intervals of one week. Insects were pinned and identified to family level. The families trapped in bowls are presented in Fig. 1, In Coleoptera the families like, Coccinellidae, Chrysomelidae, Staphylinidae, Anthicidae and Curculionidae, in Lepidoptera, Pieridae, Hespiridse, Lycaenidae, Gelechidae, Nymphalidae, in Hymenoptera, Apidae, Sphecidae, Braconidae, Formicidae, Ichneumonidae, Vespidae, Tiphiidae, Halictidae, Chrysididae, Megachilidae, Mutiliidae, Tenthredinidae, Scolidae in Diptera, Sarcophagidae, Syrphidae, Muscidae, Dolichopodidea, Calliphoridae, Tephritidae, Mycetophilidae, Pipunculidae, Asilidae, Drosophilidae, Lauxanidae, Agromizidae, Stratiomyidae in Hemiptera, Membracidae, Cicadellidae, Lygaeidae, Coreidae, Berytidae, Delphacidae, Miridae, Brenthidae in arthoptera, Tettigonidae, Acrididae and Gryllidae.

RESEARCH FINDINGS AND ANALYSIS

Bowl traps sampled 1390 specimens, representing 47 families. The highest insects were trapped by yellow color bowl (697), 372 insects trapped by blue bowl and 321 by white color (Table 1). Among these, higher taxonomical groups, calliporidae (487), dolichopodidae (189), muscidae (96), apidae (95), and Halictidae (88) were the most common (Fig 1).

Pooling data from all seven sampling days, most individuals were collected in yellow bowls (Table 1). composition varied among sampling days according to the different colors and habitat transects. yellow pan traps produced more similar assemblages in two sampling days, blue pan traps in one sampling day, the trail transect was accounted for one, and in one sampling day both blue and white bowls showed almost similar fauna.

An abundance of species and individuals of sweat bees were found as in other pan trap studies (Campbell and Hanula, 2007; Droege *et al.*, 2010; Gollan *et al.*, 2010, Roulston *et al.*, 2007; Tuell and Isaacs, 2011). Halictinae is one of commonest group of bees, overcoming other bees in many areas (Michener, 2007), and this accumulate knowledge indicates that the group is easily attracted and sampled by pan traps than other groups. Aizen and Feinsinger (1994) showed a greater richness of Apinae for Argentinean Chaco, but *Augochlora* and *Dialictus* morphospecies were not sorted in their study. For Brazil, such abundance of Halictinae has been previously recorded, including the higher richness of *Dialictus* (Krug and Alves-dos-Santos, 2008; Souza and Campos, 2008) confirming the prevalence of the group. Bowl traps can sample different species from those collected by netting. The presence of representatives of Andreninae and Apinae and the absence of Colletinae and Megachilinae (groups previously known for the study site by the authors) were also a pattern recovered in other Brazilian localities using bowl traps (Krug and Alves-dos-Santos, 2008; Souza and Campos, 2008), but see Aizen and Feinsinger (1994) and Droege *et al.* (2010) for studies where these groups were sampled. The introduced honey bee (*Apis mellifera* Linnaeus, 1758), a species attracted to bowls (Krug and Alves-dos-Santos, 2008; Droege *et al.*, 2010), were not sampled in this study, but its presence in the study area was confirmed by personal observation and hand-netting. The blue/yellow capture ratio varies according to different studies, a higher number of captures of blue bowl traps, measured by richness and abundance, has been observed in other studies, such as those of Campbell and Hanula (2007), Grundel *et al.* (2011), while Krug and Alvesdos-Santos (2008) found yellow bowl traps as more efficient, and Wilson *et al.* (2008) found almost the same species numbers from yellow and blue traps. In University of Agricultural Sciences, GKVK, Bangalore yellow bowl traps sampled more bees compare to blue and white color. Colour may have an influence on richness among samples in a period of sampling, but not when grouping the samples, and may have a slight influence on composition; therefore, it seems appropriate to use of both colors to have a

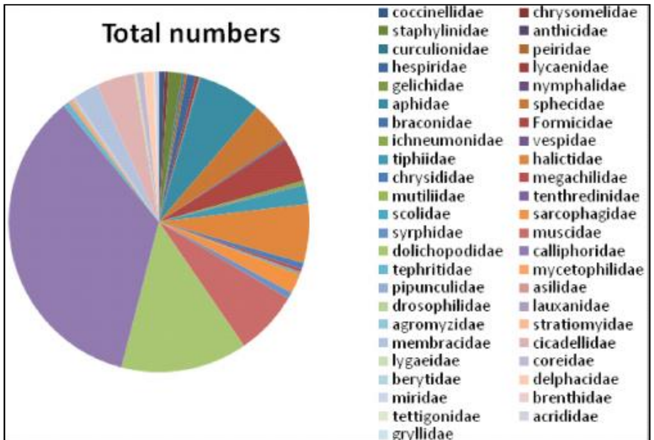

Fig. 1 : Total number of trapped insects to bee bowls

Table 1 : Different family of insects was trapped in bee bowls

Family	Yellow colour bowl	Blue colour bowl	White colour bowl	Total
Coccinellidae	2	5	2	9
Chrysomelidae	3	1	1	5
Staphylinidae	7	10	3	20
Anthicidae	0	0	1	1
Curculionidae	0	2	1	3
Peiridae	4	0	0	4
Hespiridae	9	2	2	13
Lycaenidae	2	2	1	5
Gelichidae	0	0	1	1
Nymphalidae	0	0	1	1
Apidae	24	38	33	95
Sphecidae	48	13	1	62
Braconidae	0	1	2	3
Formicidae	38	20	6	64
Ichneumonidae	3	1	2	6
Vespidae	0	1	0	1
Tiphiidae	20	6	2	28
Halictidae	50	11	27	88
Chrysididae	7	2	0	9
Megachilidae	3	1	1	5
Mutiliidae	0	0	1	1
Tenthredinidae	0	1	0	1
Scolidae	1	1	0	2
Sarcophagidae	16	7	6	29
Syrphidae	6	4	0	10
Muscidae	74	22	0	96
Dolichopodidae	171	18	0	189
Calliphoridae	137	148	202	487
Tephritidae	3	6	0	9
Mycetophilidae	1	2	2	5
Pipunculidae	1	0	0	1
Asilidae	1	0	0	1
Drosophilidae	0	1	0	1
Lauxanidae	0	1	0	1
Agromyzidae	1	0	0	1
Stratiomyidae	1	0	0	1
Membracidae	31	7	0	38
Cicadellidae	29	13	15	57
Lygaeidae	0	4	0	4
Coreidae	0	8	2	10
Berytidae	0	1	0	1
Delphacidae	3	10	0	13
Miridae	0	0	1	1
Brenthidae	0	1	0	1
Tettigonidae	1	0	0	1
Acrididae	0	1	4	5
Oryllidae	0	0	1	1
Total	697	372	321	1390

more complete sampling. Different colors can also be employed to deal with the differential preferences of certain bee groups for a particular color (Campbell and Hanula, 2007). White bowl traps, which usually have the least performance (Krug and Alves-dos-Santos, 2008, see also Gollan *et al.*, 2010), were not evaluated, but should be considered for inventory purposes. Studies about the effect of different transects on bowl trap sampling are scarce. Droege *et al.* (2010), compiling several initiatives in North America, suggested a dispersed distribution of bowl traps throughout a study site to deal with the clumped distribution of bees according to habitat preferences. Abrahamczyk *et al.* (2010), studying Hymenoptera as a whole, suggested that area cover influences the proportion of capture by different bowl trap colors because of the visibility conditions. Our results suggest little influence of habitats on the bee species number and composition, but we consider the importance of different habitats for a complete inventory of species composition. A good dispersion of pan traps throughout the study area will increase the probability that bees restricted to one part of the study area will be sampled, either because more bowl traps would mean more chance for a bee to be caught as well as increase the overall visibility of bowls amid vegetation. On the other hand, when sampling several areas at the same time, restricting the number of habitats to maintain a comparable and cost-effective sampling effort may be a better strategy, as for fragmentation studies (Aizen and Feinsinger, 1994). Present results indicate that bowl traps performances, and the higher taxonomic composition of the captures as influenced by bowl colors and transects on bee richness and composition, are quite similar to other published studies.

Acknowledgement :

We are grateful for the collection permits to Department of Entomology, University of Agricultural Science, GKVK, and Bangalore and grateful to Dr. V.V. Belavadi, Professor of Entomology, for providing bowls for present research purpose.

LITERATURE CITED

Abrahamczyk, S., Steudel, B. and Kessler, M. (2010). Sampling Hymenoptera along a precipitation gradient in tropical forests: the effectiveness of different coloured pan traps. *Entomologia Experimentalis et Applicata,* **137**(3): 262–268.

Aizen, M.A. and Feinsinger, P. (1994). Habitat fragmentation, native insect pollinators and feral honey bees in Argentine 'Chaco Serrano'. *Ecological Application,* **4**(2): 378–392.

Campbell, J.W. and Hanula, J.L. (2007). Efficiency of Malaise traps and colored pan traps for collecting flower visiting insects from three forested ecosystems. *J. Insect Conservation,* **11**: 399–408.

Cameron, D.G. (1988). Tropical and subtropical pasture legumes. *Queensland Agric. J.,* **114**(2): 110-113.

Deka, R.K. and Sarkar, C.R. (1990). Nutrient composition and antinutritional factors of *Dolichos lablab* L seeds. *Food Chem.,* **38**(4): 239-246.

Droege, S., Tepedino, V.J., Lebuhn, G., Link, W., Minckley, R.L., Chen, Q. and Conrad, C. (2010). Spatial patterns of bee captures in North American bowl trapping surveys. *Insect Cons. & Diversity* **3**(1): 15–23.

Free, J.B. (1966a). The pollination requirements of broad beans and field beans (*Vicia faba*). *J. Agric. Sci.,* **66**(3): 395-398.

Gollan, J.R., Ashcroft, M.B. and Batley, M. (2010). Comparison of yellow and white pan traps in surveys of bee fauna in New South Wales, Australia (Hymenoptera: Apoidea: Anthophila). *Australian J. Entomol.,* **50**(2): 174–178.

Grundel, R., Krystalynn, J., Frohnapple, J.R.P. and Pavlovic, N.B. (2011). Effectiveness of bowltrapping and netting for inventory of a bee community. *Environ. Entomol.,* **40**(2): 374–380.

Hendricksen, R.E. and Minson, D.J. (1985). Lablab purpureus – A Review. *Herbage Abs.,* **55**: 215-227.

Kay, D.E. (1979). Hyacinth bean - Food legumes. Crop and product digest, *Tropi. Products Institute,* **3**: 184-196.

Krug, C. and Alves-dos-santos, I. (2008). O uso de diferentes métodos para amostragem da faunade abelhas (Hymenotera: Apoidea), um estudo em floresta ombrófila mista em Santa Catarina. *Neotropic Entomol.,* **37**: 265–278.

Michener, C.D. (2007). *The bees of the world* [2nd Edition]. Johns Hopkins University Press, Baltimore, MD; xvi+[i]+953 pp., +20 pls.

Purseglove, J.W. (1968). *Tropical crops: Dicotyledons 1, Dicotyledons 2*. John Wiley and Sons, New York (U.S.A.). 719pp.

Purseglove, J.W. (1968). *Tropical Crops, Dicotyledons.* Vol L London, UK; Longmans Greens and Company Ltd. pp. 273-276.

Roulston, T.H., Smith, S.A. and Brewster, A.L. (2007). A comparison of pan trap and intensive net sampling techniques for documenting a bee (Hymenoptera: Apiformes) fauna. *J. Kansas Entomological Soc.,* **80**: 179–181.

Schaaffhausen, R.V. (1963a). *Dolichos lablab* or Hyacinth bean; Its uses for feed, food and soil improvement. *Econ. Bot.*, **17**: 146-153.

Schaaffhausen, R.V. (1963b). Economical methods for using the legume *Dolichos lablab* for soil improvement, food and feed. *Turrialba*, **13**: 172-178.

Shivashankar, G., Kulkarni, R.S., Shashidhar, H.E. and Mahishi, D.M. (1987). Field bean *Lablab purpureus* (L.) Sweet. Botany, culture and improvement, Report of University of Agricultural Sciences, Bangalore, KARNATAKA (INDIA).

Souza, l. and Campos, M.J.O. (2008). Composition and diversity of bees (Hymenoptera) attracted by Moericke traps in an agricultural area in Rio Claro, state of São Paulo, Brasil. *Iheringia,* **98** (2) : 236–243.

Tuell, J.K. and Isaacs, R. (2011). Elevated pan traps to monitor bee in flowering crop canopies. *Entomologia Experimentalis et Applicata* **131**(1): 93–98.

Whyte, R.O., Nilsson-leissner, G. and Trumble, H.C. (1953). Legumes in agriculture. FAO, pp. 272-273.

Wilson, J.S., Griswold, T. and Messinge, O.J. (2008). Sampling bee communities (Hymenoptera: Apiformes) in a desert landscapes: are pan traps sufficient? *J. Kansas Entomological Soc.,* **81** (3) : 288–300.

■ WEBLIOGRAPHY

Anonymous (2010). Dolichos bean <*http: // www. Lablab. org/html/general-information. html*> accessed on 18/7/2012.