

Research Article

**A REPORT ON *ALTERNANTHERA TRIANDRA* LAM. UNIFLORAL
ROCK BEE HONEY FROM AHMEDNAGAR (M.S.), INDIA**

Shikhin Kolhe* and M. Arif Shaikh

Department of Zoology, Ahmednagar College,
Ahmednagar-414 001, Maharashtra, India.

Article History: Received 25th December 2013; Accepted 16th July 2014; Published August 17th 2014

ABSTRACT

Studies on pollen analysis of rock bee honey were undertaken during the winter season at Ahmednagar (M.S.), India. Two honey samples were strangely unifloral honeys with *Alternanthera triandra* representing the predominant pollen type. *A. triandra* Lam. (Family: Amaranthaceae) is a dominant weed locally referred as Matsyagandha. It is reported in honeys of *Apis dorsata*, *Apis cerana*, *A. florea* and the stingless bees. However, this is an exclusive finding wherein *A. triandra* Lam. is observed as a 'predominant' pollen type in melittopalynological investigation of *Apis dorsata* honeys.

Keywords: *Alternanthera triandra*, Pollen analysis, Unifloral honey, *Apis dorsata*.

INTRODUCTION

Honey pollen analysis makes possible identification of the main nectar sources used by the bees for the production of honey in a region, classifying the honey botanically and geographically as per its origin (Louveaux *et al.*, 1978). The honey produced in Ahmednagar District (M.S.) is rich in pollen types due to the diverse native flora visited by the bees, rock bees in this particular case. There are many endemic plant species with important forage value and are good geographical markers (Lakshmi *et al.*, 1997; Soman *et al.*, 1995; Arif, 2011).

According to Forcone *et al.* (2003), analysis of the evolution of honey pollen spectrum during the honey flow period is useful to detect the contribution of different bee forage over the season.

Alternanthera triandra Lam. belonging to the family Amaranthaceae is a dominant weed distributed throughout the tropics and sub tropics of America, Africa and Asia. It is a perennial or

sometimes annual herb. The stem stands erect, ascending and sometimes creeping. It is widely branched with taproot system. The leaves are linear, oblong or ovate. *A. triandra* shows cap-like flowering heads that are sessile, shiny white. The fruit is obreniform and corky (www.globinmed.com). Though a nectarless plant, it is frequently visited by the bees for pollen.

The objective of this study was to study the honey samples for evaluating the pollens in them and identifying the main floral source in this region.

MATERIAL AND METHODS

Study area

The city of Ahmednagar (19°5'2.5" N and 74°44'42.9" E) is situated in the South- Eastern region of Western Ghats. The *Alternanthera triandra* (local name: Matsyagandha) is a herb that predominates in the region (Figure 1). It seems to have replaced the *Parthenium hysteroporous* as a weed.

*Corresponding author e-mail: sklifescience@gmail.com, Mobile: +91 9860692377



Figure 1. *Alternanthera triandra*.

Pollen analysis

The pollen content of 10 honey samples of *Apis dorsata* was studied. The honey samples were obtained from the different locations of Ahmednagar (M.S.) during November-December 2010 and January 2011. Such samples are referred as winter honey.

For pollen analysis, we followed the method described by Louveaux *et al.* (1978). A 10gm honey sample was dissolved in 20ml of distilled water and centrifuged for 10 min. at 2500 rpm. The supernatant obtained was discarded while the sediment was acetolysed as per technique of Erdtman (1960), mounted in glycerine jelly and sealed with paraffin.

To determine the frequency classes, 600 pollen grains were counted on three slides from each sample. Pollen types were classified into four categories (Louveaux *et al.*, 1978) as predominant pollen (45%), secondary pollen (16-45%), important minor pollen (3-15%) and minor pollen (3%). The pollens were identified by comparison with the reference slides and pollen identification key (Wodehouse, 1935).

RESULTS

A total of 20 pollen types were identified from the honey samples.

The honey samples were obtained in November 2010, December 2010 and January 2011. These months relate to winter season and have pertinence to the forage resources available to the bees.

The secondary pollen types were represented by *Prunus guajava*, *Cocos nucifera*, *Eucalyptus sp.*, *Mangifera indica*, *Syzygium cumini*, *Moringa oleifera*, *Sorghum vulgare* and *Helianthus annuus*.

Important pollen types and minor pollen types were *Brassica niagra*, *Pongamia pinnata*, *Zizipus jujuba*, *Allium cepa*, *Zea mays*, *Argemone Mexicana*, *Cucurbita sp.*, *Parthenium hysterophorus* and *Justica sp.* However, the most interesting finding is two of the *Apis dorsata* winter honey samples (HS IV and HS IX) being unifloral with *Alternanthera triandra* pollens (Figure 2 and 3) falling in predominant category (45%).

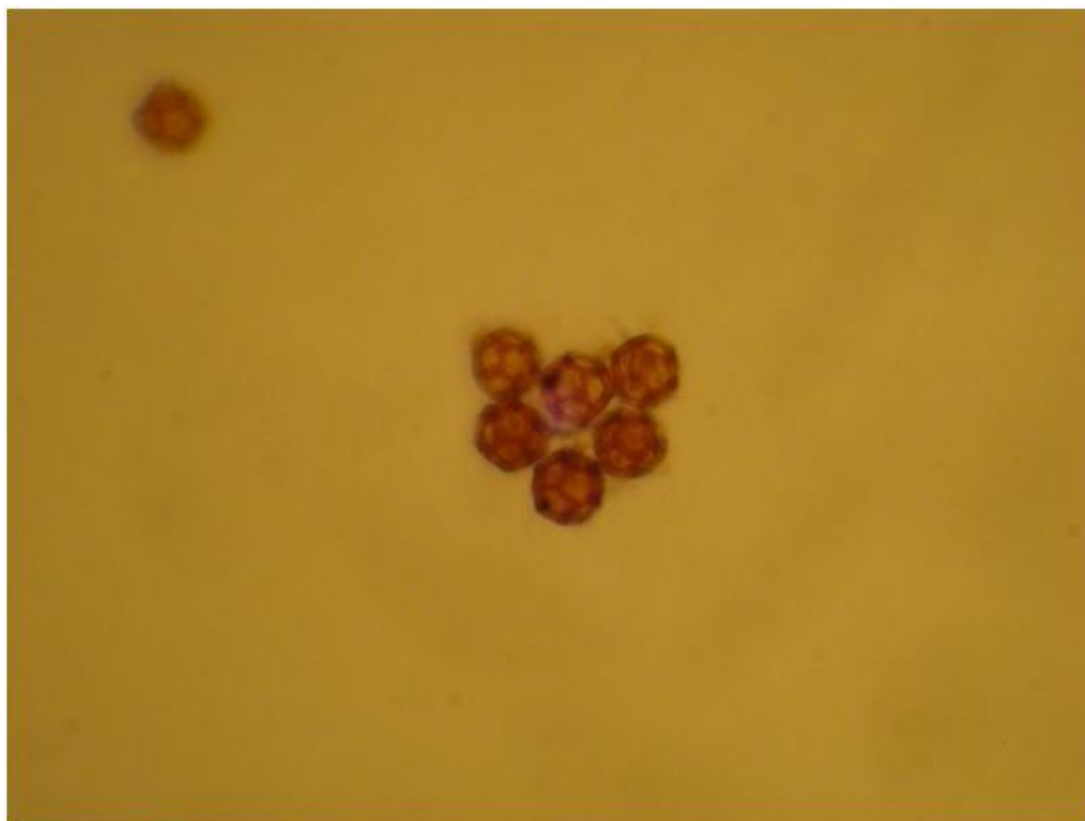


Figure 2. Photograph of *Alternanthera sp.* pollens.



Figure 3. Photomicrograph of individual *Alternanthera sp.* pollen.

Table 1. Pollen types and their frequency class in the honey samples (HS) from Ahmednagar.

Pollen type	HS-I	HS-II	HS-III	HS-IV	HS-V	HS-VI	HS-VII	HS-VIII	HS-IX	HS-X
<i>Alternanthera triandra</i>	M	M	I	D	M	M	M	M	D	M
<i>Prunus guajava</i>	S	S	M	--	I	--	--	--	M	--
<i>Cocos nucifera</i>	--	D	S	S	I	I	--	I	M	--
<i>Eucalyptus sp.</i>	--	M	M	M	D	S	--	--	--	M
<i>Mangifera indica</i>	--	--	--	M	M	M	S	D	D	S
<i>Coriandrum sativum</i>	--	--	M	--	M	M	--	--	--	M
<i>Brassica nigra</i>	--	I	--	--	--	--	I	I	I	--
<i>Syzigium jambos</i>	--	--	I	--	--	I	D	D	--	S
<i>Pongamia pinnata</i>	--	I	--	--	--	I	I	--	--	--
<i>Zyzipus jujuba</i>	--	M	M	M	--	--	I	I	--	--
<i>Calendula officinalis</i>	--	M	--	--	--	--	--	M	--	--
<i>Allium cepa</i>	I	I	--	M	--	--	M	--	--	M
<i>Moringa oleifera</i>	S	S	I	I	I	--	--	I	S	I
<i>Zea mays</i>	M	--	--	--	--	--	--	--	--	--
<i>Sorghum vulgare</i>	D	--	S	D	D	--	--	I	--	--
<i>Helianthus annuus</i>	--	--	--	--	S	S	S	S	I	I
<i>Argemone Mexicana</i>	--	M	--	--	--	--	--	--	--	M
<i>Cucurbita sp.</i>	--	M	--	M	--	--	--	--	--	--
<i>Parthenium sp.</i>	--	--	M	--	--	--	--	--	--	--
<i>Justicia sp.</i>	--	--	--	--	--	--	--	--	--	M

D = predominant pollen (>45%).

S = secondary pollen (16-45%).

I = important minor pollen (3-16%).

M = minor pollen (<3%).

DISCUSSION

Two of the ten honey samples had *Alternanthera triandra* Lam. as predominant pollen type, suggesting it to be of unifloral origin. It is important to emphasize that little is known about the floral biology of the *Alternanthera triandra* Lam. represented in the pollen spectrum, their real nectariferous contribution to honey production or the relationship between pollen and nectar in the pollen spectrum.

The pollens of *Alternanthera triandra* Lam. have been earlier reported in the honeys of *Apis dorsata* (Lakshmi Rao, 1995), *Apis florea* (Bhusari *et al.*, 2005; Jyoti Timande and Tembhare, 2010), *A. cerana* (Vijaya Bhaskar Reddy and Ramchandran Reddy, 2008; Cherian *et al.*, 2011) and in *A. mellifera* (Oliveira *et al.*, 2010). However, none of the reports mention the pollens of *Alternanthera triandra* Lam. as predominant, especially in *A. dorsata* honey.

The probable explanation for this unusual finding could be the mixing of unifloral or multifloral pollen loads in the honey pot.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest associated with this article.

ACKNOWLEDGEMENTS

The authors express their gratitude to Dr. K. Lakshmi Rao, Botany Section, Central Bee Research and Training Institute, Pune for her valuable inputs in pollen identification.

REFERENCES

- Arif, M., 2011. *Peltophorum pterocarpum*- An important forage to *Apis dorsata* Fabr. Indian Stream Res. J., 1(11): 1-4.
- Bhusari, N.V., Mate, D.M. and Makde, K.H., 2005. Pollen of *Apis* honey from

- Maharashtra. *Grana Int. J. Palynol.*, 44(3): 216-224.
- Cherian, K.J., Bhowal, M. and Godghate, S.D., 2011. Pollen and physiochemical analysis of honey produced by *Apis cerana indica* of Nagpur, Maharashtra (India). *J. Environ. Res. Dev.*, 5(3): 542-550.
- Erdtman, G., 1966. Pollen morphology and plant taxonomy. Angiosperms. An introduction to palynology I. Hafner Publishing Co., New York and London, pp. 553.
- Forcone, A., Bravo, O. and Ayesteran, M.C., 2003. Intra-annual variations in the pollinic spectrum of honey from the lower valley of the River Chubut. *Sci. J. Agr. Res.*, 1: 29-36.
- Jyoti Timande and Tembhare, D.B., 2010. Seasonal impact on comb products of little honey bee, *Apis florea* Fabr. (Hymenoptera: Apidae). *Bioscan*, 5(4): 621-625.
- Lakshmi, K., 1995. Mellitopalynological investigations of forest honeys from Andhra Pradesh with special referece to *Apis dorsata* Fabr. M.Sc. Thesis, Pune University.
- Lakshmi, K., Mohana Rao, G., Joshi, M.A. and Suryanarayana, M.C. 1997. Studies on *Pongamia pinnata*- as an important source of forage to *Apis* species. *J. Palynol.*, Vol 33, pp. 137-148.
- Louveaux, J., Maurizo Anna and Vorwohl G. (1978). Methods of melissopalynology. *Bee World*, 59: 139-157.
- Oliveira, A., França, H., Kuster, R., Teixeira, L. and Rocha, L., 2010. Chemical composition and antibacterial activity of Brazilian propolis essential oil. *J. Venom Anim. Toxins Incl. Trop. Dis.*, 16: 121-130.
- Paulino Oliveira, Cassio Van den Berg, Francisco de Assis Ribeiro Dos Santos 2010. Pollen analysis of honeys from Caatinga vegetation of the state of Bahia. *Brazil. Grana*, 49(1): 66-75.
- Soman, A.G., Lakshmi, K. and Mahindre, V.P. 1995. Typha-A pollen source to *Apis dorsata* Fabr. *J. Palynol.*, 31: 203-205.
- Vijaya Bhaskara Reddy, A. and P. Ramchandra Reddy, 2008. Occurrence of medicinal plant pollen in *Apis cerana* honeys of Khammam District, Andhra Pradesh, India. *Ethnobotanical leaflets*, 12: 452-460.
- Wodehouse, R.P., 1935. Pollen grains. McGraw-Hill Book Co. New York.
- www.globinmed.com/index.php?option=com_content&view=article&id=62822:alternanthera-sessilis-l-adc&catid=365. Cited on 12 October, 2011.