ISSN 0376-5561
Geophytology 44(1): 49-54
May 2014

Palynological investigation of honey from Khallagaon, Kanchanpur District, western Nepal

Ankit K. Kannaujia[1], Alok[2]* and Mahesh Prasad[3]

[1]Department of Botany, University of Lucknow, Lucknow-226007, India
[2]Department of Botany, University of Allahabad, Allahabad-211002, India
[3]Birbal Sahni Institute of Palaeobotany, 53 University Road, Lucknow-226007, India
E-mail: ankit_kannaujia24@yahoo.com; alok.sharma13@gmail.com;
Mahesh_bsip.@ yahoo.com
*Corresponding author

Manuscript received: 31 January 2013
Accepted for publication: 30 March 2014

ABSTRACT

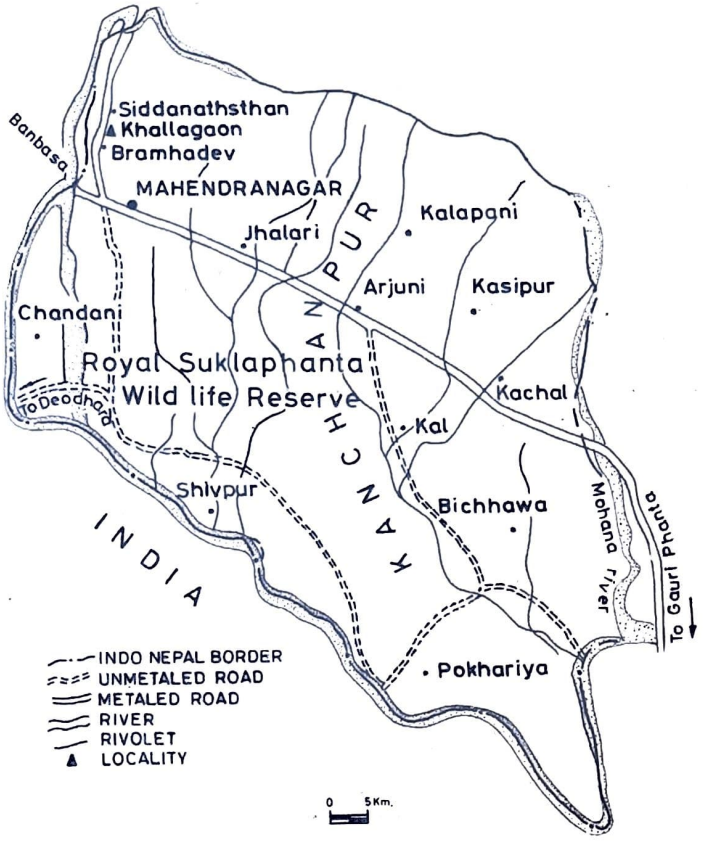
Kannaujia A. K., Alok & Prasad M. 2014. Palynological investigation of honey from Khallagaon, Kanchanpur District, western Nepal. Geophytology 44(1): 49-54.

Pollen analysis of a honey sample collected from Khallagaon, Kanchanpur District, western Nepal, shows a variety of pollen grains which were brought by honey bees during their visit to flowers of these plants for forage and nectar collection. The pollen assemblage is dominated by pollen of trees and shrubs, whereas herbs are meagrely represented by *Brassica campestris*. The commonly found tree and shrub pollen belong to *Schleichera oleosa*, *Shorea robusta*, *Pongamia pinnata*, *Ricinus communis*, *Prosopis juliflora*, *Eucalyptus* sp., Malvaceae, *Grewia oppositifolia*, Rutaceae, *Bombax* sp., *Acacia* sp., *Madhuca indica*, *Saccharum indicum* and *Pinus wallichiana*. However, the rest of the forest elements are not well represented despite their frequent presence in the area. In the pollen spectra, maximum representation is of *Schleichera oleosa* followed by *Shorea robusta* and Brassicaceae. These taxa are the major source of pollen and nectar in the bee hives of area. The honey production may be peaked during late winter to early spring since the major forage plants achieve peak of flowering during this period. The present investigation reveals that this region has great potential for bee keeping and therefore knowledge of flora of this region is important for its optimum exploitation.

Key-words: Melissopalynology, pollen load, floral composition, Kanchanpur District, Himalayan Foothills, Nepal.

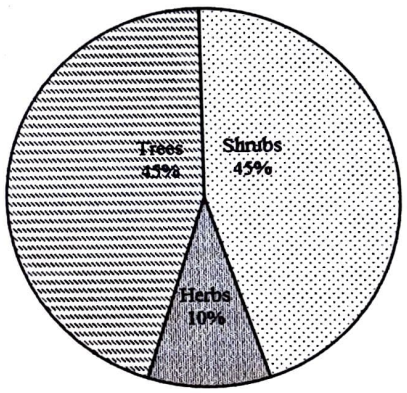
INTRODUCTION

Precise identification and analysis of palynological content of honey facilitate in ascertaining its botanical source as well as the season of nectar flow. However, little work has been done on this aspect from Nepal. Melissopalynological studies of *Apis cerana* honey from Jumla, western Nepal recorded occurrence of 103 plant species constituting the bee forage sources of that region (ICIMOD 1996). Joshi (1999) carried out detailed investigation on the pollen spectrum of Nepali honeys and identified 51 pollen types in *Apis dorsata*, *A. cerana* and *A. mellifera* honeys from Chitwan District, 50 pollen types in *A. cerana* and *A. mellifera* honeys from Kathmandu valley, 16 pollen types in *A. cerana* honeys from Jajarkot district, 49 pollen types in *A. cerana* honeys from Dadeldhura district, 43 pollen types in *A. cerana* honeys from Jumla district and 25 pollen types in *A. cerana* honeys from Langtang. This



Text-figure 1. Location of the site of investigation in Kanchanpur District, western Nepal

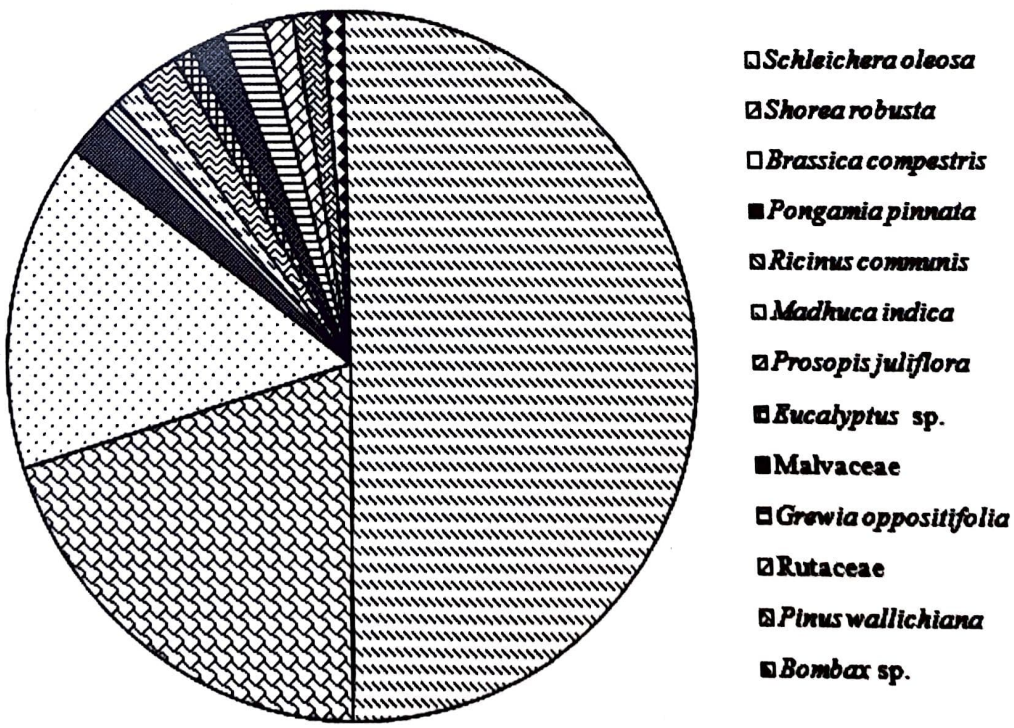
regarding wild and cultivated bee forage. Paudayal and Gautam (2011a) recovered nineteen species of pollen flora belonging to thirteen families from four pollen load samples from honey bee *A. cerana* collected in Jajarkot district, mid-western Nepal. Paudayal and Gautam (2011b) published descriptions of eight pollen types representing seven families of foraging plant sources for the same autochtone species of honey bee in Bajhang district, western Nepal. Paudayal and Gautam (2012) published SEM pollen description of 44



Text-figure 2. Pollen of trees, shrubs and herbs in the honey from Khallagaon, Kanchanpur District, western Nepal.

represents the major melissopalynological study in Nepal indicating the ecological origins of the honeys produced by *Apis dorsata*, *A. cerana* and *A. mellifera* and providing important information

species belonging to 28 families from autochtone honey bee *A. cerana* honeys collected from Godavari area, southern part of the Kathmandu Valley, Nepal.



Text-figure 3. Major pollen constituents of honey from Khallagaon, Kanchanpur District, western Nepal.

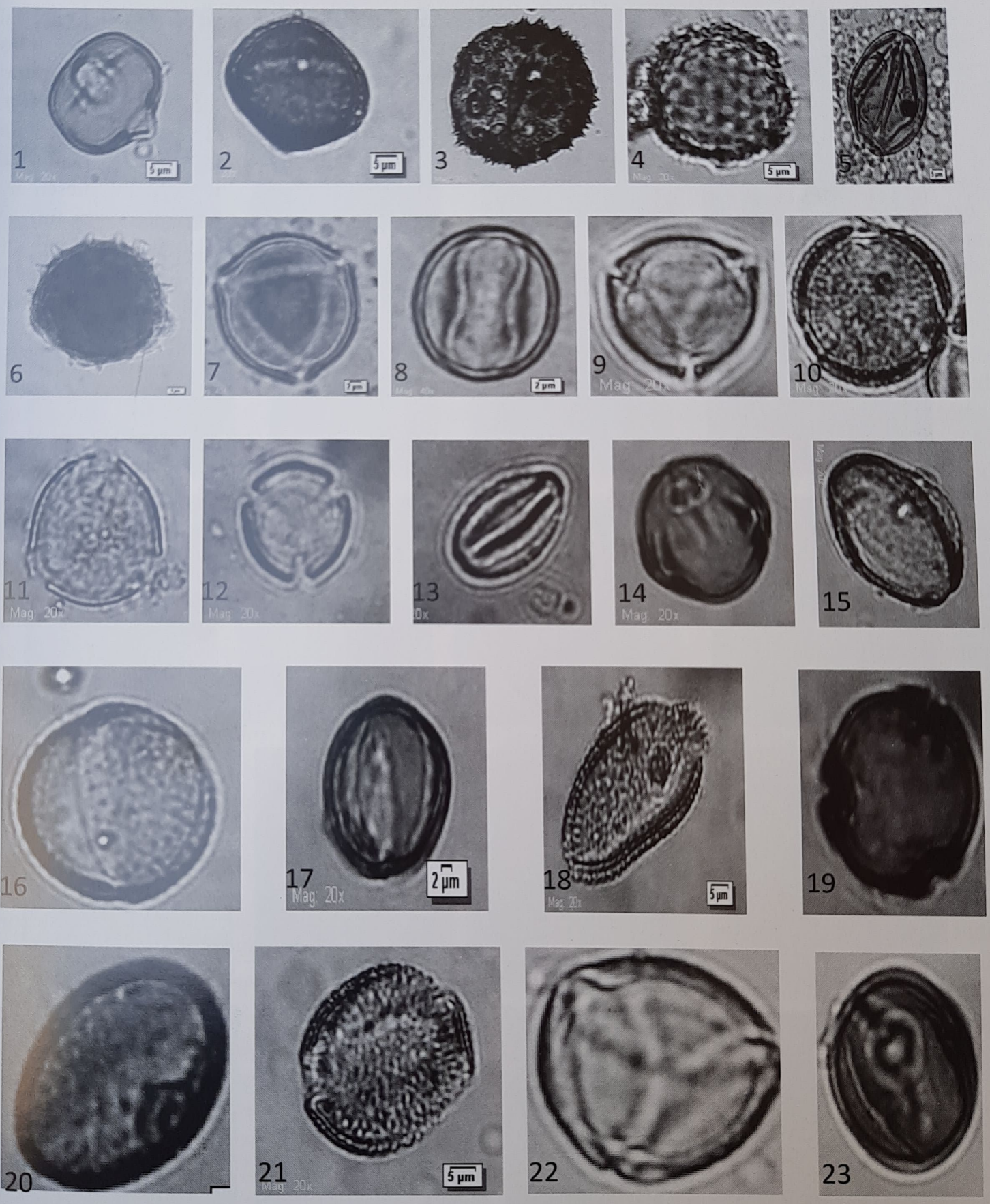


Plate 1

1. *Pongamia pinnata*. 2. *Lagerstoemia parvifolia*. 3. Malvaceae. 4, 6. Tubuliflorae. 5. *Prosopis juliflora*. 7. *Ricinus cummunis*. 8. *Cassia fistula*. 9, 22. *Schleichera oleosa*. 10. *Brassica campestris*. 11-12, 16. *Shorea robusta*. 13. Rannunculaceae. 14, 17. *Madhuca indica*. 15. *Grewia oppositifolia*. 18. Liliaceae. 19. Rutaceae. 20. Poaceae. 21. *Brassica campestris*. 23. *Gardenia* sp.

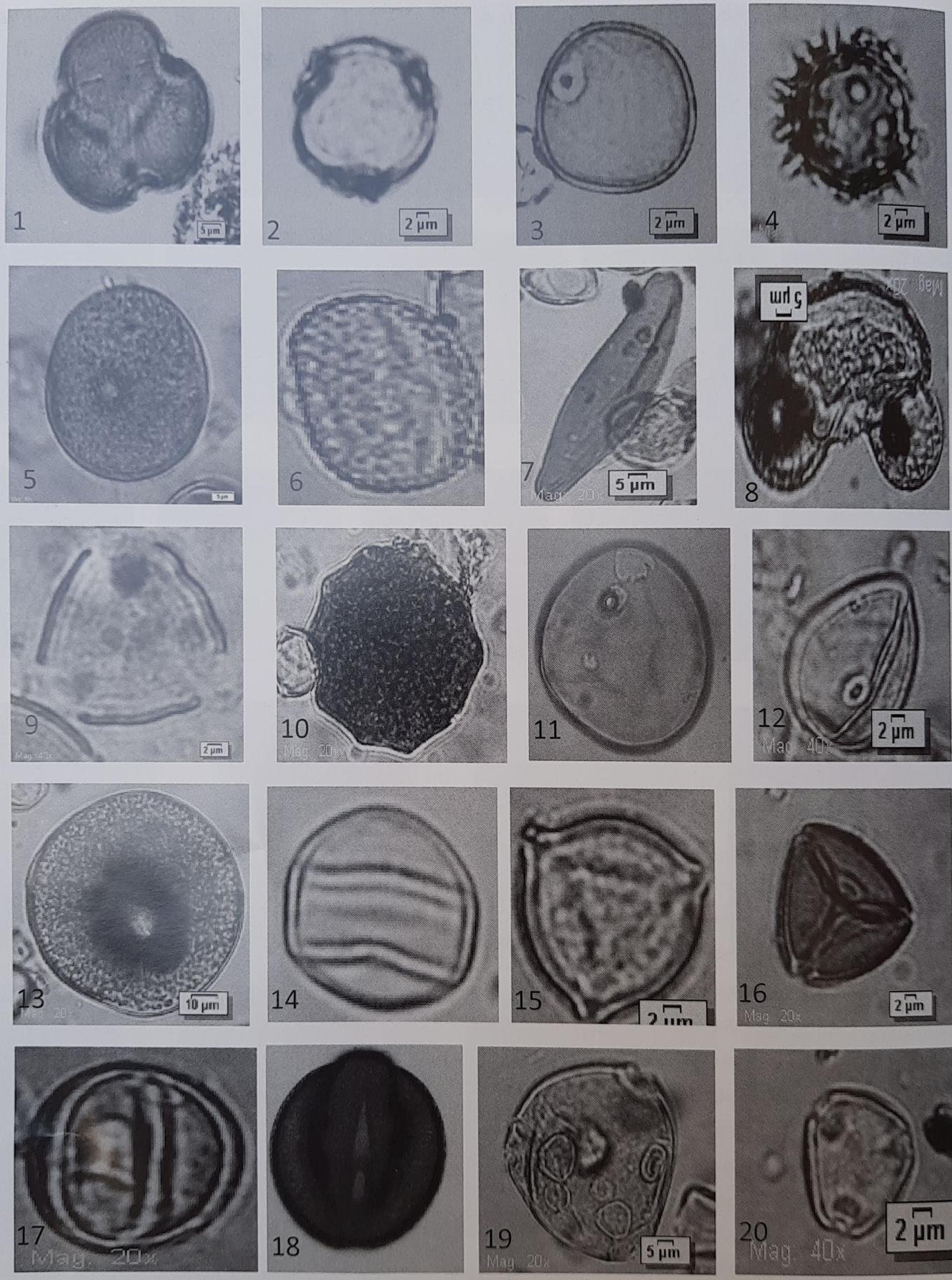


Plate 2

1. *Prosopis juliflora*. 2. *Gardenia* sp. 3, 5, 11-12. Poaceae. 4. *Blumea* sp. 6. *Brosilia* sp. 7. Liliaceae. 8. *Pinus wallichiana*. 9. *Shorea robusta*. 10. *Chrozophora* sp. 13. *Saccharum indicum*. 14, 17. *Cassia* sp. 15. *Euphorbia* sp. 16. *Gardenia* sp. 18. *Symmeria paniculata*. 19-20. *Xeromphis* sp.

The present study is aimed to recognize sources of pollen to the bees in the deciduous forests of Kanchanpur District, western Nepal through the qualitative and quantitative analysis of the pollen content of honey which was picked up directly from the beehive.

MATERIAL AND METHOD

The investigation site, Khallagaon, is about 2.5 km north of Brahmadev in Kanchanpur District, western Nepal (Text-figure 1). Approximately 200 gm of honey was squeezed out from beehive. The procedure employed for the segregation of pollen from honey samples is in accordance to Louveaux et al. (1978). 20 gm honey was taken from the bulk honey and was dissolved in 20 ml of distilled water. This was followed by treatment with glacial acetic acid for dehydration. Thereafter, the samples were acetolysed (Erdtman 1943). The samples were again treated with glacial acetic acid before washing twice with distilled water to neutralize the effect of acetolysis mixture. Finally, the pollen slides were prepared in glycerin jelly for microscopic examination and sealed with wax.

MODERN VEGETATION

In and around Khallagaon, the moist Sal bearing forest, a component of moist deciduous forest is conspicuous. The other common taxa are: *Terminalia tomentosa, T. arjuna, T. chebula, Adina cordifolia, Lagerstroemia parviflora Woodfordia fruticosa, Mallotus philippinensis, Sida veronica, Urena lobata, Ficus cunia, Callicarpa arborea, Bauhinia vahlii, B. variegate, B. purpurea, Dalbergia latifolia, D. sissoo, Terminalia belerica, Buchanania latifolia, Capparis spinosa, Gmelina arborea, Indigofera pulchella, I. hirsute, Anogeissus latifolia, Grewia* spp., *Mitregyna parvifolia, Melia azadiracta, Tridox procerum, Zizyphus jujuba, Fumaria indica, Schleichera oleosa, Brassica campestris, Pongamia pinnata, Ricinus cummunis, Madhuca indica, Prosopis juliflora, Eucalyptus, Bombax* sp., *Xeromphis* sp., *Gardenia* sp., *Pinus wallichiana, Blumea* sp., *Saccharum indica, Brosilia* sp., *Euphorbia* sp., *Buttenaria pilosa, Millettia auriculata, Smilax* spp. *Purarea tuberose, Musa* spp. *Paederia scandens* and *Combretum decandrum.*

POLLEN COMPOSITION OF HONEY

The honey sample yielded a diversified pollen assemblage. Altogether, 29 plant taxa, mostly comprising trees and shrubs, have been recorded (Text-figure 2). The quantitative analysis reveals that *Schleichera oleosa* (50%) and *Shorea robusta* (20%) constitute the major fraction of the pollen assemblage. *Prosopis juliflora, Grewia* and *Pongamia pinnata* are encountered in low frequency (2% each), whereas *Eucalyptus, Bombax* sp. (1% each), *Lagerstroemia, Xeromphis, Gardenia, Pinus wallichiana* (1.4% each) and *Madhuca indica* (1.3%) are poorly represented. The shrubby elements are few and are marked by scanty pollen of *Cassia* sp. (1.8%), Rutaceae (1.4%) and *Ricinus (*1%). Among the herbaceous constituents, Brassicaceae (15%) is recovered in moderate value. The other taxa, viz. *Blumea, Saccharum indica* (1.6% each), *Brosilia* sp., Asteraceae (Liguiliflorae), Liliaceae (1.4% each), Malvaceae (1.5%) Ranunculaceae (1.7%), Asteraceae, Tubuliflorae and *Euphorbia* (1.2% each), have been recovered in low frequencies (Plates 1-2, Text-figure 3).

Efforts were made to compare the pollen assemblage from honey of Khallagaon with those published from various parts of Nepal and India. However, none of them were found to be similar to the present one. The difference between them may be attributed to the disparity of vegetation and climate of these areas.

CONCLUSION

The analysis of honey sample shows good prospects for the development of bee colonies in Kanchanpur District of western Nepal. Abundance of *Schleichera oleosa* pollen (> 50%) points out that the honey at this area is monofloral in nature. It is inferred that the flowers of *Schleichera*

oleosa tree are more preferable by the bees as major source for the nectar. The other important floral constituents are *Shorea robusta*, *Brassica campestris*, *Pongamia pinnata*, *Ricinus cummunis*, *Madhuca indica*, *Bombax* sp., *Prosopis juliflora*, *Eucalyptus* sp., *Grewia oppositifolia*, *Pinus wallichiana*, Malvaceae and Rutaceae. Since many of the local elements are recorded in the honey analyzed here, it becomes evident that the local floristic composition plays a major role in determination of quality and production of honey. This study also indicates that this region has great potential for bee management. Besides, the pollen based assessment of honey, as source of bee forage, may be important to judge the quality of honey.

ACKNOWLEDGMENTS

The authors are thankful to Dr. E. G. Khare and Mr. Keshav Ram, Technical Officers, Birbal Sahni Institute of Palaeobotany, Lucknow for their help in processing the samples. Two of the authors (A.K.K. and Alok) are grateful to the University Grants Commission, New Delhi for providing financial assistance in the form of R.G.N Fellowship and DSK-Post Doctorate Fellowship.

REFERENCES

Erdtman G. 1943. An introduction to pollen analysis. Waltham, Mass. USA.

ICIMOD 1996. Promotion and development of beekeeping through preservation of indigenous *Apis cerana*. Annual Project Progress Report Submitted to the Federal Chancellory of Austria.

Joshi S. R. 1999. Physico-chemical and melissopalynological characteristics of Nepalese honey. Ph.D. Thesis, University of Agricultural Sciences, Vienna, Austria.

Louveaux J., Mourizia A. & Vormohl G. 1978. Method of melissopalynology. Bee World 59: 139-153.

Paudayal K. N. & Gautam I. 2011a. Scanning electron microscopic studies on surface pattern of the pollen loads from *Apis cerana* in Jajarkot district. Nepal J. Sci. Tech. 12: 340-349.

Paudayal K. N. & Gautam I. 2011b. Palynological study of pollen loads of *Apis cerana* in Bajhang district, west Nepal using scanning electron microscope. Perspectives on higher education. J. TUTA University Campus 6: 77-86.

Paudayal K. N. & Gautam I. 2012. SEM investigation of pollen taxa in honeys from autochtone *Apis cerana* in Godavari, Lalitpur District, Nepal. J. Nat. Hist. Mus. 26: 29-67.