

PHYTOPHAGES ASSOCIATED WITH *ACACIA NILOTICA* IN PAKISTAN AND POSSIBILITIES OF THEIR INTRODUCTION INTO AUSTRALIA

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ABSTRACT

In a survey for phytophagous insects on *Acacia nilotica*, 43 species were recorded in Pakistan. Of these, 16 appear to be stenophagous. The more promising are: *Anarsia* sp. nr. *acaciae* Wals. *Pseudosterrha paulula* Swinh., *Azanus ubaldus* Cr., and *Ceutholopha isidis* Zeller feeding on flowers; *Bruchidius sablbergi* Schilsky and ?*Sulcobruchus* sp. damaging seeds; *Ascalenia callynella* Kasy, *Gisilia stereodoxa* Meyr. and an unidentified gracillariid boring shoots; and ?*Cydia* sp. making stem galls. The distribution of these species is reported and further studies are recommended.

INTRODUCTION

The genus *Acacia* contains about 900 species including trees, shrubs and a few herbs, often with prickles or spines. *Acacia nilotica*, an extremely variable species, comprises a complex of nine subspecies occurring in Africa, the Middle East and the South Asian subcontinent. It is widespread in Pakistan, and Ali (1973) has listed five subspecies (*hemispherica*, *cupressiformis*, *indica*, *astringens* and *subalta*) as native. Almost all the subspecies are of value: their wood is hard and durable; the bark and pods are used for tanning; and young shoots and green pods are used for feeding goats and camels. However, *A. nilotica* has become a serious weed in Queensland because of its high rate of spread and because the young plants grow as weedy thickets that hinder cattle grazing. The subspecies present in Queensland is *A. n. indica* (W.H. Haseler, pers. comm.), which is endemic to the South Asian subcontinent.

A preliminary survey for its natural enemies was carried out in the different ecological zones of Pakistan, viz. (i) tropical summer rains (Rawalpindi and Lahore—Rawalpindi differs from Lahore in having higher rainfall, especially during winter), (ii) tropical summer rains but comparatively hot and arid coastal and subcoastal areas (Karachi and Hyderabad); (iii) subtropical hot arid (Bahawalpur, Khairpur, Multan and Sukkur); and (iv) subtropical hot arid but with winter rains and a relatively dry summer (Peshawar). The results are reported here.

RESULTS AND DISCUSSION

Stenophagous insects

The literature on natural enemies of *A. nilotica* has been reviewed by Girling (1979), who has listed 13 species as apparently confined to *Acacia* spp. During the present survey most localities were visited once when the plants were flowering and a second time when the plants were fruiting. As a result, 43 phytophagous insects were recorded, of which about 16 appear to be stenophagous. These are given in Table 1 which is followed by brief notes on some of them.

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Table 1.— Stenophagous insects attacking *Acacia nilotica* in Pakistan

Order	Family	Species	Stage	Distribution
A. Flower Feeders				
Coleoptera	Languriidae	<i>Cryptophilus integer</i> (Heer)	Larvae & adults	Mandi Bahauddin
Lepidoptera	Gelechiidae	<i>Anarsia</i> sp. nr. <i>acaciae</i> Wals.	Larvae	Widely distributed
	Geometridae	<i>Pseudosterrha paulula</i> Swinh.	Larvae	Lahore, Hyderabad
	Lycaenidae	<i>Azonus ubaldus</i> Cr.	Larvae	Widely distributed
	Pyralidae	<i>Ceutholopha isidis</i> Zeller	Larvae	Widely distributed
B. Seed and Pod Feeders				
Coleoptera	Bruchidae	<i>Bruchidius sablbergi</i> Schilsky ? <i>Sulcobruchus</i> sp.	Larvae & pupae Larvae & pupae	Lahore, Punjnad, Sukkur Lahore
C. Green Shoot Borers				
Lepidoptera	Gracillariidae	Gen. and sp. indet.	Larvae	Widely distributed
	Momphidae	<i>Ascalenia callynella</i> Kasy	Larvae	Lahore, Okara, Punjnad
		<i>Gisilia stereodoxa</i> Meyr.	Larvae	Widely distributed
D. Stem-gall Maker				
Lepidoptera	Tortricidae	? <i>Cydia</i> sp.	Larvae	Hyderabad
E. Defoliators				
Lepidoptera	Geometridae	<i>Chlorissa punctifimbria</i> Warr.	Larvae	Widely distributed
		<i>Tephrina disputaria</i> Gn.	Larvae	Widely distributed
	Glyphipterygidae	<i>Imma</i> sp.	Larvae	Punjmoro
	Noctuidae	<i>Coryta vetusta</i> Walk.	Larvae	Hyderabad
F. Sap Sucker				
Hemiptera	Lecanodiaspididae	<i>Anomalococcus indicus</i> Ayyar	Nymphs & females	Lahore

1. *Anarsia* sp. nr. *acaciae* Wals. (Lepidoptera: Gelechiidae)

This species is fairly widespread (Fig. 1) but was comparatively more abundant in drier areas where winter rains are scarce. It has a number of generations.

2. *Azonus ubaldus* Cr. (Lepidoptera: Lycaenidae)

The species of this genus are known to feed on flowers of *Acacia* spp. (Clark and Dickson 1971). Specimens seen in the collection of the British Museum (Natural History), London, included adults of *A. ubaldus* from South India, Sri Lanka, Arabia, East and West Africa, Ethiopia and Egypt. It is widespread in Pakistan (Fig. 1). It has a number of generations and starts to attack flowers in June to July. Because of its large size compared with other flower feeders, the damage done by each individual is considerable.

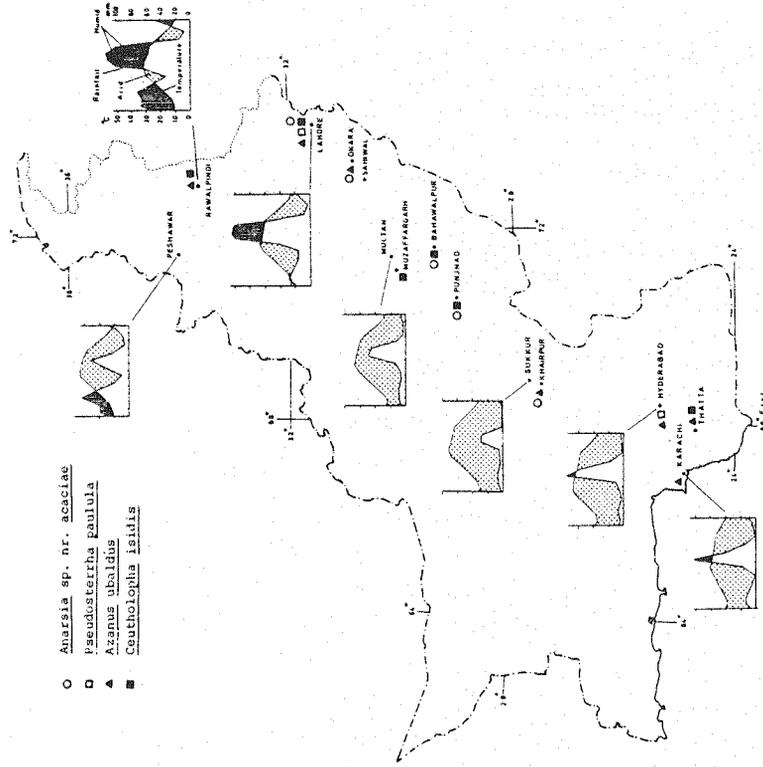


FIG. 1 - DISTRIBUTION OF FLOWER FEEDERS OF *ACACIA NILOTICA* IN PAKISTAN
 (Climatic diagrams after Walter & Lieth (1967))

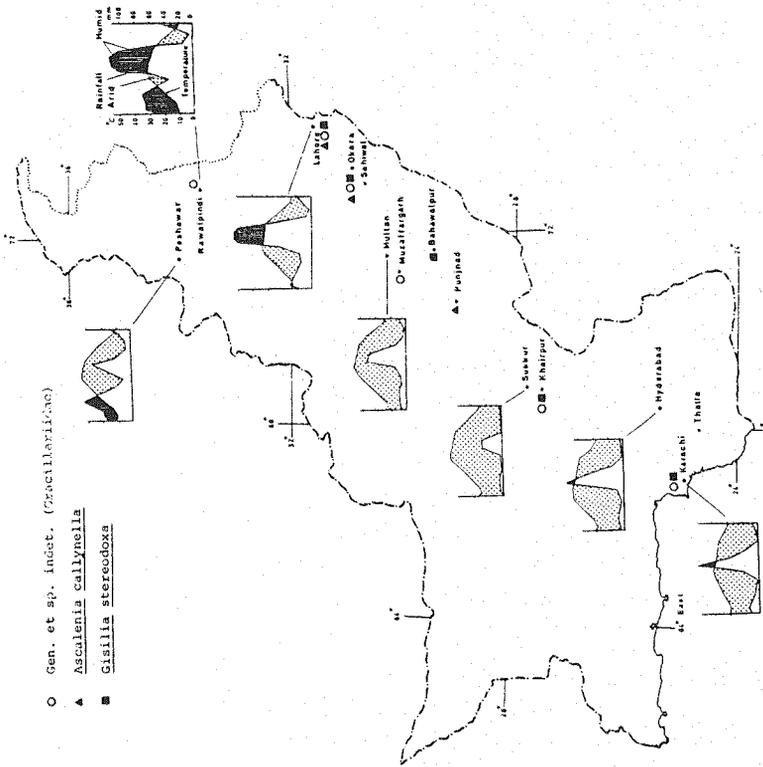


FIG. 2 - DISTRIBUTION OF SHOOT BORERS OF *ACACIA NILOTICA* IN PAKISTAN
 (Climatic diagrams after Walter & Lieth (1967))

3. *Ceutholopha isidis* Zeller (Lepidoptera:Pyralidae)

This species is also widespread but was more abundant in those parts of the tropical area with relatively short dry periods (Rawalpindi) (Fig. 1). It is multi-voltine. The larvae often feed after stitching leaves near the inflorescence and pupate after spinning cocoons among flowers. Damage was considerable.

4. *Pseudosterrha paulula* Swinh. (Lepidoptera:Geometridae)

This geometrid was recorded only from Lahore and Hyderabad (Fig. 1) and is rare. It may have a wider distribution but owing to its rarity was not detected at other places.

5. *Bruchidius sablbergi* Schilsky (Coleoptera:Bruchidae)

B. sablbergi was reared along with *Caryedon serratus* (Oliv.) from almost-mature pods collected in May, whereas it was not found in green pods in March and April. *C. serratus* emerged earlier than *B. sablbergi*. However, *C. serratus* is polyphagous but no other hosts are known for *B. sablbergi*. Infestation rate was high. It is widespread and was collected from all localities from where maturing pods were collected; e.g., Rawalpindi, Lahore, Punjnad and Sukkur.

6. ?*Sulcobruchus* sp. (Coleoptera:Bruchidae)

This bruchid was reared from maturing pods of *A. nilotica* at Lahore. A *Sulcobruchus* sp. was also recorded from pods of *Acacia farnesiana*.

7. Gen. and sp. indet. (Lepidoptera:Gracillariidae)

This gracillariid bores tender shoots of the current year. It has a wide distribution (Fig. 2) but was more abundant in warmer areas with a low rainfall; i.e., Lahore, Okara, Khairpur and Muzaffargarh.

At Lahore it had resumed activity by the middle of March because only first instar larvae were collected in the first week of April. The first generation moths started emerging by the end of April. It has a number of generations and passes winter as full-grown larvae in stems. However, in the laboratory adults emerged in January from larvae collected in November.

Up to five larvae were collected from a single shoot. When two larvae meet in a tunnel, the bigger larva injures the smaller one. The average tunnel length per larva was less when the number of larvae per branch increased: 24.2 cm when one larva was recorded; 20.7 cm with two larvae; 14.5 cm with three larvae; and 9 cm with five larvae. The larvae pupated outside the tunnel after spinning cocoons.

8. *Gisilia stereodoxa* Meyr. (Lepidoptera:Momphidae)

G. stereodoxa is also known from Egypt (J.D. Bradley, pers. comm.). It is widespread in Pakistan and was comparatively more abundant in the subtropical hot arid zone (Fig. 2). At Lahore it had resumed activity by the end of March. It seems to have a number of generations per year.

9. *Ascalenia callynella* Kasy (Lepidoptera:Momphidae)

This species seems to have a restricted distribution as it was recorded in small numbers only from Lahore, Okara and Punjnad. Its low population density may be due to competition with the unidentified gracillariid and *G. stereodoxa*.

10. ?*Cydia* sp. (Lepidoptera:Tortricidae)

This species was reared from Hyderabad (subcoastal area) in October from galls on young plants. It is gregarious, as a large number of galls were collected from a plant which was very severely damaged.

11. *Chlorissa punctifimbria* Warr. (Lepidoptera:Geometridae)

From the specimens examined at the Commonwealth Institute of Entomology, this species appears to be present in South and Southwest Asia, but no host species have been recorded. It was reared from almost all the places surveyed in Pakistan in October.

12. *Tephrina disputaria* Gr. (Lepidoptera:Geometridae)

This is the most abundant and widespread defoliator throughout Pakistan. It is very variable and has a number of generations as it was reared from July to November.

13. *Cortyta vetusta* Walk. (Lepidoptera:Noctuidae)

This noctuid was reared from Hyderabad in small numbers and seems to be rare in Pakistan.

Natural enemies

A tachinid and a braconid were reared from *Tephrina disputaria*, a braconid from *Cydia* sp., and *Apanteles* sp. from mass collections of flower feeders.

Euryphagous/pest insects

In addition to the above-mentioned stenophagous insects, the following euryphagous or pest species were also collected:

Flower feeders: *Comibaena cassidara* Gn. (Lepidoptera:Geometridae); *Autoba* (*Eublemma*) *silicula* Swinh. (Lepidoptera:Noctuidae).

Seed feeder: *Caryedon serratus* (Oliv.) (Coleoptera:Bruchidae).

Bark borers: *Niphona fuscatrix* (F.) (Coleoptera:Cerambycidae); gen. and sp. indet. (Lepidoptera:Gelechiidae).

Defoliators: *Julodis whitbilli* Gray (Coleoptera:Buprestidae); *Amblyrhinus poricollis* Sch., *Hypolixus truncatulus* (F.), *Myllocerus undecimpustulatus* Fst., *Tanymecus* sp. (unnamed in British Museum (Coleoptera:Curculionidae); *Ascotis imparata* Walk. (Lepidoptera:Geometridae); *Euproctis scintillans* Walk., *E. subnotata* Walk. (Lepidoptera:Lymantriidae); *Selepa celtis* Mre. (Lepidoptera:Noctuidae); *Nola* (*Celama*) *analisis* W. & W. (Lepidoptera:Nolidae); *Nephopteryx* sp., *Phycita* sp., *?Phycita* sp. (Lepidoptera:Pyralidae); *Scythris* sp. (Lepidoptera:Scythrididae).

Sap suckers: *Aleurolobus niloticae* P. & H. (Homoptera:Aleyrodidae); *Ledropsis* sp., *Moonia* sp. (Homoptera:Cicadellidae); *Homoecerus prominulus* Dall. (Heteroptera:Coreidae), *Flata* sp. (Homoptera:Flatidae), *Drosicha stebbingi* (Green) (Homoptera:Margarodidae); *Oxyrbachis tarandus* (Fabr.) (Homoptera:Membracidae); *Nipaecoccus vastator* (Mask.) (Homoptera:Pseudococcidae).

CONCLUSIONS

A good complex of insects, including promising candidates for controlling the spread of *Acacia nilotica*, has been recorded. These include flower and seed feeders, green shoot borers and a stem-gall maker. Further surveys may yield additional promising species.

The flower feeders are very abundant and destroy a large number of flowers. They seem to be restricted to the genus *Acacia*, but it remains to be seen if they are confined to *A. nilotica*.

Borer attack was heavy in some areas; for example, at Lahore 18 per cent of

branches were bored in April, when the fresh growth started, and the combined infestation by the three species, *Ascalenia callynella*, *Gisilia stereodoxa* and the unidentified gracillariid, was almost 100 per cent on some trees by the end of the growing season. They seem to prevent flowering as infested branches seldom bore flower heads.

More than one species of stem borer and flower feeder occur together, but the abundance of any of these species in a particular area cannot be taken as an indication of its ecological preference because its scarcity in another area could be due to competition with the other species. Therefore, studies on competition will result in selection of species with potential for successful establishment.

The bruchid, *Bruchidius sablbergi*, if confined to seeds of *A. nilotica*, may prove to be an effective biocontrol agent.

Detailed investigations on the host specificity, ecological preferences and effectiveness of the stenophagous insects are essential to determine their suitability for Queensland.

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REFERENCES

- Ali, S.I. (1973). 'Flora of West Pakistan, No. 36, Mimosaceae.' (Department of Botany, University of Karachi: Karachi.) 41 p.
- Clark, G.C. and Dickson, C.G.C. (1971). 'Life Histories of the South African Lycaenid Butterflies.' (Purnell: London.) 272 p.
- Girling, D.J. (1979). The possibilities for biological control of *Acacia nilotica* in Queensland—a survey of the literature. 8 p. (Mimeo.)
- Walter, H. and Lieth, H. (1967). 'Klimadiagramm-Weltatlas.' (Gustav Fischer Verlag: Jena.)