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## Contribution to the Knowledge of the Crop Pest Fauna in Ethiopia

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### Abstract

The crops grown in the Bako area (central Ethiopia) and in the Awash Valley (eastern Ethiopia) are attacked by a considerable number of pests, some of them being of major importance. Cereals are often infested by stemborers e. g. the maize stalk borer (*Busseola fusca*). Birds may do considerable harm to crops in the milky-stage. In stores, primary and secondary pests are responsible for heavy losses. The most important ones are the maize weevil (*Sitophilus zeamais*), *Tribolium confusum*, and the tropical warehouse moth (*Cadra cautella*).

Oil crops are attacked by various caterpillars, e. g. the American bollworm (*Heliothis armigera*). Rape and oil radish are commonly infested by flea beetles (*Phyllotreta mashonana*), diamondback moth (*Plutella xylostella*), and aphids (*Brevicoryne brassicae*). The fly *Dioxyna sororcula* is an important pest of niger oil, the termite *Odontotermes anceps* of groundnut.

Among the fibre crops, cotton is, as elsewhere in Africa, in special danger of pest attack. Stainer bugs (*Dysdercus* spp.), bollworms and jassids have to be considered as major enemies of this crop. Major pests of citrus are scale insects (e. g. *Icerya purchasi*), whereas the only noteworthy insect of coffee for the time being is the antestia bug (*Antestiopsis intricata*).

### 1. Introduction

During November and December, 1968 a pest survey was carried out by the author in Ethiopia. The investigations took place in the areas of the Ethio-German Experimental Station near Bako and in the Awash Valley (with particular reference to Melka Werer Research Station). Some additional studies have been made in the region west of Bako between Nekempt and Gimbi and in the mountains north of Gedo.

### Acknowledgement

Due to excellent support of the survey by the heads of the two above mentioned research stations, Drs. K. H. PETERS and N. FADDA, a considerable number of harmful species could be collected or observed within a relatively short period; some of them have not been recorded from Ethiopia before or have not been observed as crop pests.

The author is also very grateful to a number of insect specialists in the British Museum (London) for the identification of many insects mentioned in this paper.

## 2. Results of the Survey

### 2.1. Pests of Cereals

#### 2.1.1. Maize (*Zea mays*)

*Peregrinus maidis* Ashm. (Homopt.)

Slight infestation under leafsheaths (Melka Werer), no obvious damage.

*Rhopalosiphum maidis* Fitch, maize aphid (Homopt.)

In colonies of varying size on inflorescences and distal parts of leaves, often attended by ants (Bako, Melka Werer).

*Macrosiphum (Sitobion)* sp. (Homopt.)

In small, dispersed colonies on lower surface of older leaves.

- + + *Sitophilus zeamais* Mots., maize weevil (Coleopt.)  
Slight infestation of cobs in fields but heavy damage in silos (no control measures undertaken) – up to 80 % loss. Bako.
- + *Tribolium confusum* Duv. (Coleopt.)  
Very numerous in silos in association with maize weevil (Bako).
- + *Busseola fusca* Full., maize stalk borer (Lepid.)  
Important stemborer in Bako area. Considerable local damage and consequently loss in yield, mainly in late sown plots.  
*Heliothis armigera* Hb., American bollworm (Lepid.)  
Slight damage on cobs by caterpillars. Damaged cobs very attractive for other pests, such as *Sitophilus zeamais*. Bako.  
*Spodoptera exempta* Wlk., armyworm (Lepid.)  
Little damage on young leaves by single caterpillars (last instar larvae). Bako.  
*Eublemma gayneri* Roths. (Lepid.)  
A few caterpillars observed on cobs, already damaged by other pests, for instance *Chilo partellus*. Melka Werer.
- + + *Chilo partellus* Swinh., spotted stalk borer (Lepid.)  
Major pest in Melka Werer. Damaging leaves (young caterpillars), stems, and cobs. Considerable loss in yield, many plants stunted in growth.
- + *Cadra cautella* Wlk., tropical warehouse moth (Lepid.)  
Very common store pest in silos in association with *Sitophilus zeamais* Mots. (Bako).
- + + *Papio cynocephalus* L., baboon (Mamm.)  
Very important pest of ripening and ripe maize at Bako. Crop loss in some plots exceeding 80 %. Main damage on edges of fields near gallery forests (roosting sites of baboons).
- + + *Potamochoerus porcus* L., bush pig (Mamm.)  
Serious pest in Bako by destruction of plants and cobs.

2.1.2. Sorghum (*Sorghum vulgare*)

*Taylorilygus vosseleri* Popp., *T. ? virens* Tayl., *T. ? ricini* Tayl. and *Erystylus ? kivuensis* Schout. (Heteropt.)

Nymphs and adults very numerous in sorghum heads (Bako) but no obvious damage observed. Further investigations required.

*Melanaphis sacchari* Zhnt., sorghum aphid (Homopt.)

Forming medium-sized to large colonies on lower surface of older leaves. Production of large quantities of honeydew, found as shining, sticky layer on upper surface of leaves. Bako, Melka Werer, Ambo.

*Rhopalosiphum maidis* Fitch, maize aphid (Homopt.)

In Bako and Melka Werer less common than *M. sacchari*, attacking young leaves and heads. Heavily infested leaves with symptoms of yellowing.

*Macrosiphum (Sitobion) ? avenae* F. und *M. (S.) africanum* H.R.L. (Homopt.)

In small, dispersed colonies on lower surface of older leaves (Bako).

*Sitophilus zeamais* Mots., maize weevil (Coleopt.)

In Bako commonly found in sorghum heads, associated with various caterpillars (see below).

++ *Busseola fusca* Full., maize stalk borer (Lepid.)

Most important stemborer of sorghum at Bako. Main damage caused to late sown dwarf- and medium-sized varieties; one of the former with 95 % empty heads (stems partly destroyed). Caterpillars end of November either last instar- or already diapause-larvae.

*Heliothis armigera* Hb., American bollworm (Lepid.)

Harmful by feeding on grain in heads of certain varieties, often in association with other pests, such as weevils and caterpillars. Bako.

*Spodoptera exempta* Wlk., armyworm (Lepid.)

Single caterpillars causing slight damage to young leaves (Bako).

*Eublemma gayneri* Roths. (Lepid.)

Minor pest by feeding on grain, often in association with *H. armigera*, *Salebria mesozonella* Bradl. and other caterpillars. Pupation in sorghum heads. Bako, Melka Werer.

*Salebria mesozonella* Bradl. (Lepid.)

Caterpillars very active, feeding on grain in sorghum heads. Fairly common at Bako.

*Atherigona* sp., central shoot fly (Dipt.)

Larvae harmful by destroying growing points. Occasionally, egg-laying adults observed (Bako).

+ *Quelea quelea aethiopica* Sund., Sudan dioc (Aves)

Some harm caused by feeding on grain in milky-stage by flock consisting of 600–800 birds (Bako).

*Plocens* sp. (Aves)

Slight damage caused by feeding on grain in milky-stage (Bako).

- Passer swainsonii* Rüpp. (Aves)  
Harmful by feeding on sorghum heads at Bako and Melka Werer.  
Seems to prefer teff grass to sorghum if available.
- + *Lamprocolius chalybaeus* Hemp. & Ehr., greentailed starling (Aves)  
Rather harmful by feeding on grain in the milky-stage (Ambo).

### 2.1.3. Wheat (*Triticum vulgare*)

*Anaphothrips sudanensis* Tryb. (Thysan.)  
A few specimens found on the ears (Bako).

*Acoloba lanceolata* F. (Heteropt.)  
Observed as nymphs (last instar) and adults on ears in the milky-stage (Bako).

*Rhopalosiphum maidis* Fitch, maize aphid (Homopt.)  
In small colonies on young leaves in fields north of Gedo.

*Macrosiphum (Sitobion) ? avenae* F., *M. (S.)* sp. and *Schizaphis graminum* Rond. (Homopt.)  
Found in dispersed colonies on the lower surface of leaves and ears (Bako, Gedo).

*Heliothis armigera* Hb., American bollworm (Lepid.)  
Caterpillars causing slight damage by feeding on milky-ripe grain in fields north of Gedo.

*Chilo partellus* Swinh., spotted stemborer (Lepid.)  
Little damage by destruction of some shoots in Melka Werer.

### 2.1.4. Barley (*Hordeum vulgare*)

*Rhopalosiphum maidis* Fitch, maize aphid (Homopt.)  
Forming small colonies on young leaves (Gedo).

*Metopolophium dirhodum* Wlk. (Homopt.)  
A few specimens collected on the lower surface of leaves (Gedo).

*Chnootriba similis tellini* Weise, maize ladybird beetle (Coleopt.)  
Feeding on leaves of young plants north of Gedo.

### 2.1.5. Bullrush millet (*Pennisetum typhoides*)

*Lygus amoenus* Boliv. (Heteropt.)  
Single specimens were observed on ears. They fed on milky-ripe grain.  
Bako.

*Busseola fusca* Full., maize stalk borer (Lepid.)  
Rarely found, boring in stems (Bako).

*Heliothis armigera* Hb., American bollworm (Lepid.)  
A few caterpillars fed on ears (Bako).

*Quelea quelea aethiopica* Sund. and *Passer swainsonii* Rüpp. (Aves)  
Causing slight harm by feeding on grain (Bako).

#### 2.1.6. Finger millet (*Eleusine coracana*)

*Rhopalosiphum maidis* Fitch, maize aphid (Homopt.)  
Found on a few plants under leafsheaths (Bako).

*Heliothis armigera* Hb., American bollworm (Lepid.)  
Harmful by feeding on ears (grain) of certain varieties at Bako.

#### 2.1.7. Teff grass (*Eragrostis tef*)

*Opistholeptus elegans* Hesse (Heteropt.)  
Fairly common in fields around Bako station. Feeding on grain; economic status unknown.

Various unidentified leafhoppers (Homopt.)  
Very numerous but apparently of no economic importance (Bako).

Maggots of an unidentified species (Dipt.) often found in shoots, causing white ears. Common in plants growing in shade of trees. Many pupae attacked by parasites. Bako.

- + *Passer swainsonii* Rüpp. (Aves)  
Feeding on grain near houses of Bako station, especially in the morning.

#### 2.1.8. Rice (*Oryza sativa*)

*Diopsis thoracica* Westw., stalk-eyed shootfly (Dipt.)  
Abundant in rice plots at Bako and Melka Werer.

### 2.2. Pests of Oil Crops

#### 2.2.1. Sunflower (*Helianthus annuus*)

- + *Tenebroides mauritanicus* L. (Coleopt.)  
Common in silos of Bako station.
- ++ *Heliothis armigera* Hb., American bollworm (Lepid.)  
Very harmful in Bako area by destruction of seeds. 92 % of heads infested by one or a number of caterpillars.

A few doves (Aves) were observed on the edges of fields at Bako. They did some harm by feeding on seeds.

#### 2.2.2. Rape (*Brassica napus*)

*Brevicoryne brassicae* L., cabbage aphid (Homopt.)  
Commonly found at Bako and north of Gedo. Infesting leaves and

shoots, often forming large, dense colonies. Natural enemy: *Coccinella undecimpunctata* L.

*Lipaphis erysimi* Kalt., false cabbage aphid (Homopt.)

Found at Bako in association with *B. brassicae* but less common than the latter.

*Myzus persicae* Sulz., green peach aphid (Homopt.)

Observed at Bako mainly on lower surface of older leaves. Scattered colonies.

+ *Lixus latro* Mshl. (Coleopt.)

An important pest at Bako and north of Gedo. Larvae developing in stems, causing retardation of growth and loss in yield.

+ *Phyllotreta mashonana* Jac. (Coleopt.)

Very common at Bako and harmful by riddling of leaves.

*Phyllotreta weisei* Jac. (Coleopt.)

Found in low numbers in association with *P. mashonana*.

#### 2.2.3. Oil radish (*Raphanus sativus* var. *oleifera*)

*Brevicoryne brassicae* L., *Lipaphis erysimi* Kalt. and *Myzus persicae* Sulz. (Homopt.)

Regularly observed at Bako. Cabbage aphid being most frequent species.

+ + *Phyllotreta mashonana* Jac. (Coleopt.)

Most important pest of oil radish at Bako. Riddling many leaves, especially on edges of fields.

*Phyllotreta weisei* Jac. (Coleopt.)

Associated with *P. mashonana* but far less common.

*Heliothis armigera* Hb., American bollworm (Lepid.)

Single caterpillars fed on green capsules (Bako).

*Plutella xylostella* L., diamondback moth (Lepid.)

Slight infestation observed on leaves (Bako).

#### 2.2.4. Safflor (*Carthamus tinctorius*)

*Dactynotus? compositae* Theob. (Homopt.)

Collected at Bako and between Addis Ababa and Nazareth. Leaves sometimes destroyed after heavy infestation.

*Heliothis peltigera* Schiff. (Lepid.)

Seen at Bako in limited numbers. Feeding on leaves and flowers (heads).

*Acanthophilus helianthi* Rossi, safflower fly (Dipt.)

Larvae and pupae found in flower heads at Bako and between Addis

Ababa and Nazareth. Most pupae attacked by parasitic Hymenoptera.

#### 2.2.5. Niger oil (*Guizotia abyssinica*)

*Haplothrips articulatus* Bagn. and *Synaptothrips* sp. (Thysan.)  
Common in flower heads, apparently not very harmful (Bako).

*Trichothyrea mulsanti* Guér. (Coleopt.)  
Occasionally observed on flower heads, causing slight damage by feeding on them. Bako.

*Curculionidae* (unidentified) (Coleopt.)  
A grey and black species slightly harmful by feeding on leaves (Bako).

- ++ *Dioxyna sororcula* Wied. (Dipt.)  
Most harmful pest of niger oil in Bako area. Maggots found in flower heads, destroying seeds. Many pupae attacked by parasitic Hymenoptera.

#### 2.2.6. Groundnut (*Arachis hypogaea*)

- + *Odontotermes anceps* Sjöst. (Isopt.)  
Most important pest of groundnuts at Bako. Decorticating main root and distal parts of shoots, leading to death of many plants. Active in the evenings and nights.

*Microtermes* sp. (Isopt.)  
Causing some harm by destruction of single plants by feeding in main root (Bako).

*Aphis craccivora* Koch, groundnut aphid (Homopt.)  
Observed on shoots and leaves of single plants in large or medium-sized colonies (Bako, Melka Werer).

*Aphis?* *gossypii* Glov., cotton aphid (Homopt.)  
Found at Bako on leaves and shoots in one plot only.

*Spodoptera littoralis* Boisd., cotton leafworm (Lepid.)  
A few caterpillars caused slight harm to young leaves (Bako, Melka Werer).

*Heliothis armigera* Hb., American bollworm (Lepid.)  
Harmful at Bako and Melka Werer by feeding on leaves.

#### 2.2.7. Sesame (*Sesamum orientale*)

*Myzus persicae* Sulz., green peach aphid (Homopt.)  
Very numerous on young leaves of young sesame plants (Melka Werer).

*Antigastra catalaunalis* Dup., simsim webworm (Lepid.)  
Found at Bako and Melka Werer. Caterpillars destroy young leaves and seeds in capsules.

## 2.3. Pests of Fibre Crops

2.3.1. Cotton (*Gossypium* sp.)

*Amitermes sciangallorum* Ghid. (Isopt.)

Feeding on main root of young cotton plant in association with larvae of *Schizonycha* sp. (chafer grub). Melka Werer.

- ++ *Dysdercus cardinalis* Gerst. and *D. nigrofasciatus* Stål, cotton stainers (Heteropt.)

Nymphs and adults very common in fields in Awash Valley. The former species usually somewhat more frequent than the latter.

*Taylorilygus vosseleri* Popp., lygus bug (Heteropt.)

Causing obvious damage to young leaves in cotton plot at Bako.

*Nezara viridula* L., green stink bug (Heteropt.)

Observed at Bako and Melka Werer in limited numbers.

*Helopeltis schoutedeni* Reut., cotton helopeltis (Heteropt.)

Collected in adult stage on a few severely stunted plants at Bako.

*Oxycarenus* spp., cotton seedbug (Heteropt.)

Fairly common in open capsules in Awash valley.

- + *Empoasca lybica* de Berg., cotton jassid (Homopt.)

Widely distributed (Bako, Awash Valley, Nekempt). Heavy damage ('hopperburn') observed in small plots between Nekempt and Gimbi.

- ++ *Aphis gossypii* Glov., cotton aphid (Homopt.)

Found in Bako and Melka Werer. Very numerous on young leaves of young irrigated cotton at Melka Werer.

*Coccus hesperidum* L. and *Ferrisia virgata* Ckll. (Homopt.)

Collected on single plants on edges of fields in Awash Valley. The former feeding on stems and branches, the latter on leaves and bolls.

- ++ *Heliothis armigera* Hb., American bollworm (Lepid.)

Serious pest at Bako and Melka Werer by destruction of green bolls.

- + *Diparopsis watersi* Roths., Sudan bollworm (Lepid.)

Fairly common in Awash Valley. Harmful by destruction of flower buds, flowers, and capsules.

- + *Earias insulana* Boisd. and *E. biplaga* Wlk., spiny bollworms (Lepid.)

Occuring at Bako and Melka Werer. Harmful by boring in tips of young shoots and destruction of flower buds and capsules.

*Acrocercops bifasciata* Wlsm., cotton leafminer (Lepid.)

Minor pest by attacking leaves at Bako and Melka Werer.

- + *Papio cynocephalus* L., baboon (Mamm.)

Very harmful at Bako by destruction of all green bolls in a large plot within a few days.

2.3.2. Flax (*Linum usitatissimum*)

*Aphis craccivora* Koch, groundnut aphid (Homopt.)

Some small colonies observed in fields north of Gedo.

*Heliothis armigera* Hb., American bollworm (Lepid.)  
Feeding on capsules north of Gedo.

#### 2.4. Pests of Leguminous Crops

##### 2.4.1. Broadbean (*Vicia faba*)

*Thrips tabaci* Lind. and *Taeniothrips* sp. near *nigricornis* (Thysan.)  
Causing slight damage to upper surface of young leaves north of Gedo.

*Acyrtosiphon pisum* Harr. and *Aphis craccivora* Koch (Homopt.)  
Slight infestation observed in fields north of Gedo.

##### 2.4.2. French bean (*Phaseolus vulgaris*)

*Sericothrips occipitalis* Hood and + *Frankliniella schultzei* Tryb. (Thysan.)  
Very numerous at Melka Werer. The former found on flowers, the latter on leaves.

*Taylorilygus vosseleri* Popp., lygus bug (Heteropt.)  
Frequently seen in bean plots but apparently not harmful (Bako).

*Bemisia tabaci* Genn., tobacco whitefly (Homopt.)  
Common on leaves in vegetable garden of Bako Research Station.

*Empoasca* sp. (Homopt.)  
In limited numbers as nymphs and adults on lower surface of leaves (Bako).

*Acyrtosiphon pisum* Harr. and *Myzus persicae* Sulz. (Homopt.)  
Slight infestation of leaves observed in garden of Bako Res. Sta.

Various species of black and yellow coloured blister beetles (Col., Meloidae) caused some harm by feeding on flowers (Bako).

*Heliothis armigera* Hb., American bollworm (Lepid.)  
Attacking flowers and developing beans in low numbers (Bako).

##### 2.4.3. Soybean (*Glycine max*)

*Microtermes* sp. (Isopt.)  
Destroying a number of plants by feeding in main root (Bako).

*Piezodorus pallescens* Germ. (Heteropt.)  
Fairly common at Bako. No damage observed on infested plants.

*Acyrtosiphon pisum* Harr., *Aphis craccivora* Koch and *A. gossypii* Glov. (Homopt.)  
Observed in small colonies on lower surface of leaves (Bako).

*Heliothis armigera* Hb., American bollworm (Lepid.)  
Causing slight damage by feeding on beans (Bako).

#### 2.4.4. Pea (*Pisum sativum*)

*Thrips tabaci* Lind., onion thrips (Thysan.)  
Harmful by feeding in large numbers on leaves of young plants (Bako).  
Also found on capsules of older plants.

*Acyrtosiphon pisum* Harr. and *Myzus persicae* Sulz. (Homopt.)  
Observed in limited numbers on flowers and leaves (Bako).

*Trichothyrea mulsanti* Guér. (Coleopt.)  
Often seen in fields north of Gedo while feeding on flowers.

+ + *Heliothis armigera* Hb., American bollworm (Lepid.)  
Serious pest north of Gedo by feeding in large numbers on leaves,  
flowers, and capsules (seeds).

#### 2.4.5. Pigeon pea (*Cajanus indicus*)

*Haplothrips articulatus* Bagn. and *Craspedothrips hargreavesi* Karny  
(Thysan.)  
Causing little damage to leaves (Bako).

*Icerya purchasi* Mask., cottony cushion scale (Homopt.)  
Slight infestation observed on branches (Bako).

*Oxyrhachis* sp. (Homopt.)  
In small colonies on tips of shoots, attended by ants (Bako).

*Macrosiphum (Sitobion) nigrinectaria* Theo. (Homopt.)  
Forming small colonies on pods (Bako).

*Mylabris designata* Reiche var. (Coleopt.)  
Fairly common at Bako. Feeding on flowers and destroying them  
partly or completely.

### 2.5. Pests of Vegetables

#### 2.5.1. Red pepper (*Capsicum annum*) and Tomato (*Lyc. esculentum*)

*Macrosiphum euphorbiae* Thos. and *Myzus persicae* Sulz. (Homopt.)  
Found at Bako and Addis Ababa on lower surface of leaves in scattered colonies. Probably important as vectors of viruses.

*Heliothis armigera* Hb., American bollworm (Lepid.)  
Most important pest of red pepper in Bako area. Caterpillars damage green capsules which dry up. Each larva destroys several capsules. In one field of Bako Res. Stat. 2.4 % of capsules per plant destroyed (34 % of the plants attacked).

*Ceratitis rosa* Karsch, Natal fruit fly (Dipt.)  
Attacking ripening capsules in garden at Bako.

*Colius macrourus* L., blue-naped mousebird (Aves)  
Harmful by destruction of numerous ripening capsules in garden (Bako).  
The pests on tomato are the same as on red pepper, except *C. rosa* and mousebirds. In addition slight infestations by *Bemisia tabaci* observed.

#### 2.5.2. Cabbage (*Brassica* spp.)

*Thrips tabaci* Lind., onion thrips (Thysan.)  
Heavily infesting young cabbage plants at Bako.

- + *Brevicoryne brassicae* L., *Lipaphis erysimi* Kalt. and *Myzus persicae* Sulz. (Homopt.)  
Commonly found at Bako on different varieties of cabbage, *B. brassicae* being the most common and harmful species. *M. persicae* usually in dispersed colonies on lower surfaces of older leaves.
- ++ *Lixus latro* Mshl. (Coleopt.)  
Very serious pest at Bako and between Nekempt and Gimbi. Larvae bore inside stems, causing stunted growth and eventually death of attacked plants.
- ++ *Phyllotreta mashonana* Jac. and *P. Weisei* Jac. (Coleopt.)  
Harmful by riddling, of leaves, *P. mashonana* being much more frequent than *P. Weisei*. Bako.  
*Gonocephalum simplex* F., dusty brown beetle (Coleopt.)  
Feeding on stems of young plants near ground level (Bako).
- ++ *Plutella xylostella* L., diamondback moth (Lepid.)  
Important pest at Bako by feeding on leaves.  
*Hellula undalis* F., oriental cabbage webworm (Lepid.)  
Found at Bako in stems of some plants.  
*Agrotis* sp. (Lepid.)  
A few caterpillars observed near damaged stems of young cabbage plants (Bako).

#### 2.5.3. Sweet potato (*Ipomoea batatas*)

Various unidentified weevils (Coleopt.) caused slight damage by feeding on leaves (Bako). The same applied to grasshoppers.

*Bedellia somnulentella* Zell. (Lepid.)  
Fairly common leafminer in a number of small plots in Bako area.

#### 2.5.4. Potato (*Solanum tuberosum*)

*Macrosiphum euphorbiae* Thos., *Aphis gossypii* Glov., and *Myzus persicae* Sulz. (Homopt.)

Feeding on lower surface of leaves, often associated (Bako).

*Henosepilachna fulvosignata* Reiche (Coleopt.)

Single specimens observed on potato leaves, causing little damage.  
Bako.

2.5.5. Cucumber, melon, squash (*Cucumis* sp., *Citrullus* sp., *Cucurbita* sp.)

*Chirothrips atricarpus* Gir. and *Thrips* sp. (*flavus* group) (Thysan.)  
Numerous on young leaves on tips of shoots (Bako, vegetable garden).

*Aphis gossypii* Glov., cotton aphid (Homopt.)

Numerous on lower surface of leaves (Bako).

2.5.6. Eggplant (*Solanum melongena*)

+ *Henosepilachna fulvosignata* Reiche (Coleopt.)

Rather harmful at Bako by feeding on leaves in larval and adult stages (Bako).

*Heliothis armigera* Hb., American bollworm (Lepid.)

Damaging a number of fruits in garden at Bako.

2.5.7. Ladiesfingers (*Hibiscus esculentus*)

*Aphis gossypii* Glov., cotton aphid (Homopt.)

Heavy infestation observed on leaves (Bako).

*Podagrica puncticollis* Weise, cotton flea beetle (Coleopt.)

Harmful by riddling of leaves and feeding on capsules (Bako).

2.5.8. Onion (*Allium cepa*), Leek (*Allium porrum*) and  
Celery (*Apium graveolens*)

++ *Thrips tabaci* Lind., onion thrips (Thysan.)

Major pest of onion, to a lesser degree to leek at Bako. Nymphs and adults very numerous on leaves, causing silverish appearance.

*Aphis fabae? solanella* Theo. (Homopt.)

Found in small colonies on shoots of celery in garden at Addis Ababa.

2.5.9. Radish (*Raphanus sativus*)

*Eurydema ornatum* L. f. *pictum* H. S. (Heteropt.)

Single specimens collected on leaves (Bako).

*Phyllotreta mashonana* Jac. and *P. Weisei* Jac. (Coleopt.)

Numerous on leaves and flowers (Bako).

*Plutella xylostella* L., diamondback moth (Lepid.)

Caterpillars causing little damage to leaves (Bako).

## 2.6. Pests of Forage Crops

2.6.1. Lucerne (*Medicago sativa*)

*Aphis craccivora* Koch, groundnut aphid (Homopt.)  
Small colonies found on shoots at Melka Werer.

*Spodoptera exigua* Hb., lesser armyworm (Lepid.)  
Slightly harmful by feeding on leaves (Melka Werer).

## 2.7. Pests of Fruit Trees

2.7.1. Citrus (*Citrus* spp.)

- + + *Icerya purchasi* Mask., cottony cushion scale (Homopt.)  
Major pest of citrus orchards in Ethiopia. Seen in large colonies at Bako and in Awash Valley. Attended by numerous ants. Natural enemy: *Rodolia ferruginea* Weise (Col., Coccinellidae).
- + *Coccus hesperidum* L., brown soft scale (Homopt.)  
Widely distributed (Bako, Awash Valley). On leaves and branches, producing large quantities of honeydew. Sooty mould develops on leaves of infested trees. Often attended by ants.
- + + *Aonidiella aurantii* Mask., red scale (Homopt.)  
Important pest of orchards in Awash Valley. Infesting in large numbers branches, leaves, and fruits.
- + *Aspidiotus hederae* Vall. (Homopt.)  
Rather harmful on Lemon at Bako. Attacking branches, leaves, and fruits in very large numbers. Sucking activity resulting in spotting of leaves and irregular development of fruits. Natural enemy: *Chilocorus* sp. (Col., Coccinellidae).
- Selenaspidus articulatus* Morg. (Homopt.)  
Found in small numbers on leaves at Ambo.
- Aphis gossypii* Glov., cotton aphid (Homopt.)  
Observed at Bako and Melka Werer in small colonies on tips of shoots of some trees.
- + *Toxoptera aurantii* Mask., black citrus aphid (Homopt.)  
Locally at Bako and in Awash Valley very numerous on young shoots and leaves, regularly attended by ants. Heavily infested shoots stunted in growth, leaves malformed.
- Hilda patruelis* Stål, groundnut hopper (Homopt.)  
Some colonies observed on young shoots in Awash Valley, attended by black ants.
- + *Trioza erytrae* Del Guer., citrus psyllid (Homopt.)  
Very common on young leaves of tangerine in shady gardens at Bako. Harmful by causing galls. Locally heavily parasitized by *Alloxysta* sp.
- + *Phyllocnistis citrella* Stnt., citrus leaf miner (Lepid.)  
Found in Awash Valley (Tibila Farm). Attacking young leaves of grapefruit, orange and lemon, causing malformation.

*Papilio demodocus* Esp., lemon butterfly (Lepid.)

Widespread and common in Bako area and Awash Valley, wherever citrus is grown. Slight damage caused by caterpillars by devouring of leaves.

#### 2.7.2. Pawpaw (*Carica papaya*)

*Eutetranychus pantopus* Berl., Sudan citrus mite (Acar.)

Heavy infestation of lower surfaces of older leaves in garden of hotel at Awash Station.

*Coccus hesperidum* L., soft brown scale (Homopt.)

A few specimens observed in cracks of stems (Bako). Attended by ants.

#### 2.7.3. Banana (*Musa sapientium*)

*Pentalonia nigronervosa* Coq., banana aphid (Homopt.)

Only one small colony found under leafsheath at Bako. Ants present.

*Borchseniaspis palmae* Ckll. (Homopt.)

Collected on lower surface of leaves along the main rib. Causing yellowish spots by sucking.

### 2.8. Pests of Coffee (*Coffea arabica*)

*Diarthrothrips coffeae* Will., coffee thrips (Thysan.)

Observed in the adult and nymphal stages on leaves in neglected plot at Bako.

*Selenothrips rubrocinctus* Giard (Thysan.)

Found on a few trees in one plantation at Bako. Nymphs causing slight damage to leaves.

+ *Antestiopsis intricata* Ghesq. & Car., antestia bug (Heteropt.)

Fairly common around Bako and Gimbi areas. At Bako in some plots 2-3 bugs per tree observed. Probably pest of increasing importance.

*Toxoptera aurantii* Boy. and *Aphis gossypii* Glov. (Homopt.)

The former found at Bako and Gimbi on young shoots and leaves, the latter at Bako on green berries.

*Coccus alpinus* De Lotto (Homopt.)

Rarely seen at Bako and Gimbi except on one heavily infested young tree (Bako). Honeydew and sooty mould abundant. Natural enemy: *Hyperaspis abyssinica* Fürsch (Col., Coccinellidae).

*Ceroplastes* spp. (Homopt.)

Low infestations by various species on small branches observed at Bako and Gimbi.

*Ischnaspis longirostris* Sign. (Homopt.)

Rather common at Bako. Infesting small branches, leaves, and berries; the latter sometimes malformed and spotted.

*Leucoplema* sp. near *dohertyi* Warr., coffee leaf skeletonizer (Lepid.)  
Found in small numbers in all coffee plantations at Bako and Gimbi.

*Leucoptera* sp. near *caffèina* Washb., coffee leaf miner (Lepid.)  
As the proceeding species; of no economic importance.

*Acrocercops* sp. (Lepid.)  
As proceeding species.

*Melanagromyza coffeae* Königsb., serpentine leaf miner (Dipt.)  
A few mines observed at Bako and Gimbi.

*Ceratitis rosa* Karsch, Natal fruit fly (Dipt.)  
Maggots observed in numerous ripening berries and adults seen during egg-laying.

### 2.9. Pests of Tobacco (*Nicotiana* spp.) and Sugarcane (*Saccharum officinarum*)

*Oecanthus pellucens* Scop. (Orthopt.)  
A few specimens found on young leaves of tobacco at Melka Werer, causing slight damage.

*Chilo partellus* Swinh., spotted stem borer (Lepid.)  
Single caterpillars seen in young sugarcane in Awash Valley. Hardly of economic importance.

### 3. List of Mites, Insectes and Vertebrates Collected or Observed as Crop Pests During the Survey

Taxonomic group	Name	Hostplants	Localities
Acarida	<i>Eutetranychus pantopus</i>	pawpaw	Awash Station
Orthoptera	<i>Oecanthus pellucens</i>	tobacco	Melka Werer
	various grasshoppers	sweet potato	Bako
Isoptera	<i>Microtermes</i> sp.	groundnut, soybean	Bako
	+ <i>Odontotermes anceps</i>	groundnut	Bako
	<i>Amitermes sciangallorum</i>	cotton	Melka Werer
Thysanoptera ++	<i>Thrips tabaci</i>	onion, leek, pea, broadbean, cabbage	Bako
	<i>Diarthrothrips coffeae</i>	coffee	Bako
	<i>Chirothrips atricarpus</i>	melon	Bako
	<i>Thrips</i> sp. ( <i>flavus</i> group)	melon	Bako
	<i>Taeniothrips</i> sp. near <i>nigricornis</i>	broadbean	Gedo
	<i>Selenothrips rubrocinctus</i>	coffee	Bako
	<i>Haplothrips articulatus</i>	niger oil, pigeon pea	Bako
	<i>Synaptothrips</i> sp.	niger oil	Bako
	<i>Anaphothrips sudanensis</i>	wheat	Gedo
	<i>Craspedothrips hargreavesi</i>	pigeon pea	Bako
	<i>Sericothrips occipitalis</i>	French bean	Melka Werer
	+ <i>Frankliniella schultzei</i>	French bean	Melka Werer

Taxonomic group	Name	Hostplants	Localities
Heteroptera	<i>Lygus amoenus</i>	bullrush millet	Bako
	<i>Nezara viridula</i>	cotton	Bako
	<i>Acoloba lanceolata</i>	wheat	Bako
	<i>Opistholeptus elegans</i>	teff grass	Bako
	++ <i>Dysdercus cardinalis</i>	cotton	Melka Werer
	++ <i>Dysdercus nigrofasciatus</i>	cotton	Melka Werer
	<i>Helopeltis schoutedeni</i>	cotton	Bako
	<i>Oxycarenus</i> spp.	cotton	Melka Werer, Nekempt
	<i>Piezodorus pallescens</i>	soybean	Bako
	+ <i>Antestiopsis intricata</i>	coffee	Bako, Gimbi
	<i>Taylorilygus vosseleri</i>	sorghum, castor bean	Bako
	<i>Taylorilygus ? virens</i>	sorghum	Bako
	<i>Taylorilygus ? ricini</i>	sorghum	Bako
	<i>Eurydema ornatum</i> f. <i>pictum</i>	radish	Bako
	Homoptera	++ <i>Empoasca lybica</i>	cotton
<i>Empoasca</i> sp.		French bean	Bako
<i>Hilda patruelis</i>		citrus	Tibila (Awash)
<i>Peregrinus maidis</i>		maize	Melka Werer
<i>Oxyrhachis</i> sp.		pigeon pea	Bako
+ <i>Trioza erythraeae</i>		citrus	Bako
<i>Bemisia tabaci</i>		French bean, tomato	Bako
<i>Brevicoryne brassicae</i>		cabbage, rape	Bako, Gedo
<i>Lipaphis erysimi</i>		cabbage, rape	Bako
<i>Melanaphis sacchari</i>		sorghum	Bako
+ <i>Rhopalosiphum maidis</i>		maize, sorghum, finger millet, barley, wheat	Bako, Melka Werer
<i>Acyrtosiphon pisum</i>		pea, French bean, broadbean, soybean	Bako, Gedo
++ <i>Aphis gossypii</i>		cotton, citrus, coffee, groundnut, soybean, melon, ladiesfingers, potato	Bako, Melka Werer
+ <i>Aphis craccivora</i>		groundnut, broad- bean, flax, lucerne	Bako, Melka Werer
<i>Aphis fabae ? solanella</i>		celery	Addis Ababa
+ <i>Toxoptera aurantii</i>		citrus, coffee	Bako, Gimbi
<i>Metopolophium dirhodum</i>		barley	Gedo
<i>Macrosiphum ? avenae</i>		sorghum, oats	Bako
<i>Macrosiphum</i> sp.		wheat	Bako, Gedo
<i>Macrosiphum euphorbiae</i>		red pepper, potato	Bako, Addis Ababa
<i>Macrosiphum africanum</i>		sorghum	Bako
<i>Macrosiphum nigrinectaria</i>		pigeon pea	Bako
<i>Dactynotus ? compositae</i>		safflor	Bako, Nazareth
<i>Schizaphis graminum</i>		wheat	Bako
<i>Pentalonia nigronervosa</i>		banana	Bako
<i>Myzus persicae</i>		red pepper, potato, cabbage, rape, radish, oil radish	Bako
++ <i>Icerya purchasi</i>		citrus, pigeon pea	Bako, Tibila
+ <i>Coccus hesperidum</i>	citrus, pawpaw, cotton	Bako, Awash Station	
<i>Coccus alpinus</i>	coffee	Bako	
<i>Ferrisia virgata</i>	cotton	Awash Station	
<i>Ceroplastes</i> spp.	coffee	Bako, Gimbi	
+ <i>Aspidiotus hederae</i>	citrus (lemon)	Bako, Ambo	

Taxonomic group	Name	Hostplants	Localities
Homoptera	<i>Selenaspidus articulatus</i>	citrus	Ambo
++	<i>Aonidiella aurantii</i>	citrus	Tibila (Awash)
	<i>Borchseniaspis palmae</i>	banana	Bako
Coleoptera	<i>Podagrica puncticollis</i>	ladiesfingers	Bako
++	<i>Phyllotreta mashonana</i>	cabbage, rape, radish, oil radish	Bako
	<i>Phyllotreta weisei</i>	cabbage, rape, radish, oil radish	Bako
++	<i>Lixus latro</i>	cabbage, rape	Bako, Nekempt
++	<i>Sitophilus zeamais</i>	maize, sorghum (fields and stores)	Bako
	<i>Tribolium confusum</i>	maize (stores)	Bako
	<i>Chnootriba similis tellini</i>	barley	Gedo
	<i>Henosepilachna reticulata aethiopsensis</i>	melon, cucumber	Bako
	<i>Henosepilachna fulvosignata</i>	potato, eggplant	Bako
	<i>Trichothyrea mulsanti</i>	pea, niger oil	Bako, Gedo
	<i>Mylabris designata</i> var.	pigeon pea	Bako
	<i>Gonocephalum simplex</i>	cabbage	Bako
+	<i>Tenebroides mauritanicus</i>	sunflower (stores)	Bako
	various weevils (unidentif.)	niger oil, sweet potato	Bako
Lepidoptera	++ <i>Busseola fusca</i>	sorghum, maize, bullrush millet	Bako
	<i>Spodoptera littoralis</i>	groundnut	Bako
+	<i>Spodoptera exempta</i>	maize, sorghum	Bako
	<i>Spodoptera exigua</i>	lucerne, pea	Bako, Melka Werer
	<i>Diparopsis watersi</i>	cotton	Melka Werer
++	<i>Heliothis armigera</i>	maize, red pepper, sunflower, groundnut, French bean, rape, oil radish, pea, tomato, cotton, flax, wheat	Bako, Melka Werer, Gedo
	<i>Earias insulana</i>	cotton	Awash valley
+	<i>Earias biplaga</i>	cotton	Awash valley
	<i>Agrotis</i> sp.	cabbage	Bako
	<i>Heliothis peltigera</i>	safflor	Bako
	<i>Eublemma gayneri</i>	maize, sorghum	Bako, Melka Werer
++	<i>Chilo partellus</i>	maize, sorghum, sugarcane	Melka Werer
++	<i>Plutella xylostella</i>	cabbage, rape, radish, oil radish	Bako
	<i>Hellula undalis</i>	cabbage	Bako
+	<i>Cadra cautella</i>	maize (stores)	Bako
	<i>Salebria mesozonella</i>	sorghum	Bako
	<i>Acrocercops bifasciata</i>	cotton	Bako, Melka Werer
	<i>Bedellia somnulentella</i>	sweet potato	Bako
+	<i>Phyllocnistis citrella</i>	citrus	Tibila (Awash)
	<i>Leucoprema</i> sp. nr. <i>dobertyi</i>	coffee	Bako, Gimbi
	<i>Leucoptera</i> sp. nr. <i>caffaina</i>	coffee	Bako, Gimbi
	<i>Acrocercops</i> sp.	coffee	Bako, Gimbi
	<i>Papilio demodocus</i>	citrus	Bako, Melka Werer, Tibila
Diptera	<i>Atherigona</i> sp.	sorghum	Bako
	<i>Ceratitidis rosa</i>	coffee, red pepper	Bako
++	<i>Dioxyna sororcula</i>	niger oil	Bako

Taxonomic group	Name	Hostplants	Localities
Diptera	<i>Acanthophilus helianthi</i>	safflor	Bako, Nazareth
	<i>Melanagromyza coffeae</i>	coffee	Bako, Gimbi
	<i>Diopsis thoracica</i>	rice	Bako, Melka Werer
Aves	+ <i>Quelea quelea aethiopica</i>	sorghum, bullrush millet	Bako
	<i>Ploceus</i> sp.	sorghum	Bako
	+ <i>Passer swainsonii</i>	sorghum, bullrush millet, teff grass	Bako
	+ <i>Lamprocolius chalybaeus</i>	sorghum	Ambo, Bako
	<i>Colius macrourus</i>	red pepper	Bako
Mammalia	various doves (unident.)	sunflower	Bako
	++ <i>Papio cynocephalus</i>	maize, cotton	Bako
	<i>Potamochoerus porcus</i>	maize	Bako

### Zusammenfassung

#### Beiträge zur Kenntnis der Schädlingfauna Äthiopiens

Die im Gebiet von Bako in Zentraläthiopien und von Melka Werer in Ostäthiopien angebauten Kulturpflanzen werden von einer beachtlichen Zahl von Schädlingen angegriffen, von denen einige eine erhebliche wirtschaftliche Bedeutung besitzen. Getreidearten werden oft von Stengelbohrern befallen. Der Maisstengelbohrer (*Busseola fusca*) kommt in höher gelegenen Anbaugebieten vor, während der gefleckte Stengelbohrer (*Chilo partellus*) tiefere Lagen bevorzugt. Vögel, wie der Blutschnabelweber (*Quelea q. aethiopica*), Glanzstare (*Lamprocolius chalybaeus*) und Sperlinge (*Passer swainsonii*) können an mildreifem Getreide empfindlichen Schaden anrichten. Ortlich müssen Paviane (*Papio cynocephalus*) und Buschschweine (*Potamochoerus porcus*) als Großschädlinge gelten. In Vorratslagern treten besonders der Maiskäfer (*Sitophilus zeamais*), *Tribolium confusum* und *Cadra cautella* auf.

Ölfrüchte werden vor allem von Raupen befallen. Die Raupe des amerikanischen Baumwollkapselwurmes (*Heliothis armigera*) zerstört an Sonnenblumen die Körner entweder ganz oder teilweise, weshalb letztere im Lager leicht von Vorratsschädlingen wie *Tenebroides mauritanicus* angegriffen werden können. Raps und Ölrettich zeigen starken Befall durch Erdflöhkäfer (*Phyllotreta mashonana*), Kohlschabe (*Plutella xylostella*) und Kohlblattlaus (*Brevicoryne brassicae*). Die Fruchtfliege *Dioxyna sororcula* tritt als wichtiger Schädling an *Guizotia abyssinica* (niger oil) auf, die Termit *Odontotermes anceps* an Erdnuß.

Die Baumwolle ist in Äthiopien, wie überall in Afrika, für Schädlinge besonders anfällig. Rotwanzen (*Dysdercus* spp.), Kapselraupen (*Heliothis armigera*, *Diparopsis watersi*, *Earias* spp.) und Jassiden (*Empoasca lybica*) sind von besonderer Bedeutung. An Gemüsepflanzen wie Paprika und Tomate kann der amerikanische Baumwollkapselwurm (*H. armigera*) sehr schädlich auftreten. Kohlarten werden durch einen Rüsselkäfer (*Lixus latro*), die Kohlschabe (*P. xylostella*), Erdflöhkäfer (*P. mashonana*) und die Kohlblattlaus (*B. brassicae*) stark befallen. An Zwiebel tritt der Tabakblasenfuß (*Thrips tabaci*) als wichtiger Schädling auf. Die wichtigsten Schadinsekten an Zitrusfrüchten sind Schildläuse (*Icerya purchasi*, *Aonidiella aurantii*, *Aspidiotus hederae*), während an Kaffee bisher nur die Kaffeewanze (*Antestiopsis intricata*) besondere Erwähnung verdient.

Ein hoher Prozentsatz der Entwicklungsstadien der meisten Schädlinge ist von Parasiten befallen.

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## Biological Studies on the Predator Mite *Typhlodromus pyri* Sch. (Acarina Phytoseiidae) with the Effect of Prey and Non Prey Substances

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### Abstract

*Typhlodromus pyri* Scheuten is prevalent in Lower Egypt. It inhabits several plants preferring a wide range of fruit trees. It was able to develop and reproduce when fed on the red spider mite *Tetranychus cucurbitacearum* and different pollen grains. Only mated females could lay eggs and copulation occurred several times. The average generation period (incubation, immature stages and preoviposition period) was 23.5 days at 28.0° C when using prey immatures as food. The predator immature stages durated for similar period when fed on different stages of the prey and date palm pollen, while the period significantly prolonged when feeding on hollyhock or cotton pollen. Female deposited an average of 24, 34, 43, 33, 15 and 4 eggs when fed on eggs, immatures and adults and date palm, hollyhock and cotton pollen respectively.

During the whole life span, the female consumed great numbers of different prey stages averaging 1006 eggs or 729 immatures or 509 adults; most of which were attacked during adult longevity.

### Introduction

Members of family Phytoseiidae are world wide predacious mites inhabiting several host plants, yet some of them could develop and reproduce on pollen grains. CHANT (1959) stated that insectary and field experiments showed that the predator *Typhlodromus pyri* Scheuten was inefficient and partially ineffective on the prey red spider mite *Panonychus ulmi* (Koch). On the other hand MATHYS (1958) and SNETSINGER (1959 and 1960) mentioned that genus *Typhlodromus* proved to be an effective factor limiting populations of spider mites in swiss vineyards and apple trees in Illinois respectively.

Preliminary studies showed that *T. pyri* was prevalent in many areas of the U.A.R. inhabiting fruit trees, field and truck crops and ornamental plants. Its occurrence was mostly associated with plant parasitic mites of which *Tetranychus cinnabarinus* (Bois.) was the most common and impor-

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