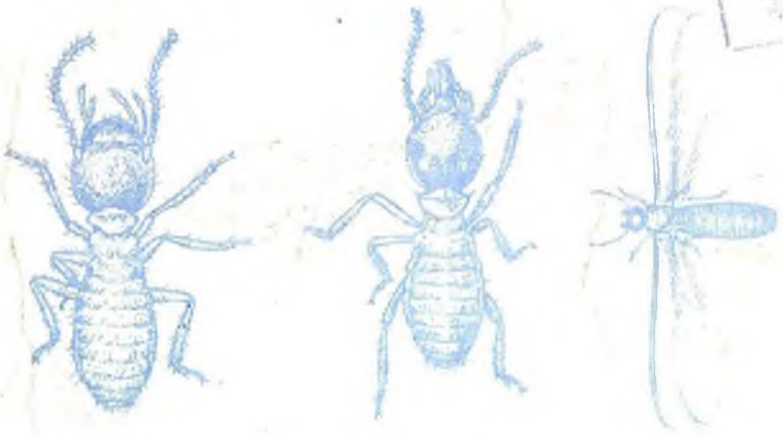
SOME ARTHROPOD PESTS OF AGRICULTURAL IMPORTANCE IN WESTERN ETHIOPIA



Abraham Tadesse
and
Adane Kassa

INSTITUTE OF AGRICULTURAL RESEARCH

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INTRODUCTION

One of the most important limiting factors in crop production is the incidence of pest attack. Knowledge of pest species associated with particular crops and localities is very important to design effective control measures. Survey results of specific or general arthropod pests associated with specific or groups of crops in Ethiopia have been published in the past (Abraham et al., 1993; Adhanom and Abraham, 1985; Adugna and Kemal, 1985; Barnett et al., 1987; Clark and Crowe, n.d.; Crowe and Tadesse, 1984; Crowe et al., 1977; De Lotto, 1947-1950; Gentry, 1965; Hill, 1966; Kemal et al., 1985; McFarlane, 1969; Million and Bayissa, 1985; Nastasi and Andemeskel, 1968; Sands, 1976; Schmutterer, 1971; Stretch-Lilja, 1977; Tsedeke, 1981; 1982; 1984; 1988; Tsedeke et al., 1982; Walker and Boxall, 1974). However, most of these are not region-specific and those which are region-specific deal with either specific group of pests (Sands, 1976; Barnett et al., 1987) or are published long ago (Schmutterer, 1971; Hill, 1966) and therefore it has become necessary to publish new records made during recent years from surveys carried out in the region(s) and to review the status of the previously known species.

The objective of this work is thus to give a comprehensive overview of the arthropod pests associated with crops in the field and in storage in the western part of Ethiopia, based on surveys made by the authors mainly during 1984 to 1989 inclusive. To make the work more complete, references have been made to previous reports mentioned above. Moreover, attempts have been made to review, as much as possible, the relevant current literature.

Many of the arthropods collected in the region are not included here because they are not properly identified. Hence, the list of pests

presented in this volume is far from complete, but the authors claim that it contains relevant and recent information on many of the prevalent arthropod pest species that occur in the western part of the country. Hence, it contributes to the knowledge of the arthropod pest fauna of the country in general and of the region in particular. It is also expected to be useful for researchers working on insect pests of agricultural importance.

The first section of this bulletin contains lists of pest species and notes on their host range and economic importance. Insect families, genera and species are arranged in alphabetical order and are in accordance with the current usage by the Commonwealth Institute of Entomology (CIE). Common name(s), where possible, are given immediately following the scientific name; where no common names existed, proposed common names are given and these are identified by asterisks (*). Most proposed common names are adapted from Tsedeke (1988). Synonyms are provided in parentheses when available. The second section contains pest and host index.

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ORTHOPTERA

Acrididae

***Acanthacris ruficornis* Fabricius**
(= *Gryllus ruficornis* (Fabricius))

Host not known, collected when crawling on the ground. Reported attacking cabbage, citrus, coffee, cotton, grape, groundnut, maize, pigeon pea, soybean, sugarcane, tea, tobacco, vegetables and other crops elsewhere in Africa (COPR, 1982). It has a similar appearance and habit as *Cyrtacanthacris tatarica* (L.). Stretch-Lilja (1977) has recorded both species from most parts of Ethiopia. Records on its extent of damage and association with crops are numerous in general but its status is that of a minor pest (COPR, 1982).

***Afroxyrrhepes procera* Burmiester**
(= *A. obscuripes* (Uvaro),
***Oxya procera* (Burmiester),**
***Oxyrrhepes irradieri* (I. Bolivar),**
***O. flvovittota* (Sjostedt),**
***O. ochracea* (Sjostedt))**

Recorded on grasses. Also recorded by Stretch-Lilja (1977) in Welega. COPR (1982) recorded it on seedling tobacco, castor and maize without actually feeding on the latter two crops in Tanzania where it was noted as a minor pest. It forms large swarms which may be mistaken for migratory locusts *(Locusta migratoria)* (Stretch-Lilja, 1977).

***Atractomorpha acutepennis gerstaeckeri* (Bolivar**

Sweet Potato Grasshopper*

Recorded on sweet potato. Also recorded by Tadeleke (1988) to be very common in the Bako area. Schmutterer (1971) recorded various species of grasshoppers on sweet potato at Bako. COPR (1982) recorded it on cotton, rice, spinach and sweet potato elsewhere in Africa and noted it as an occasional minor pest.

***Gastrimargus africanus* Saussure**
(= *G. africanus orientalis* (Sjostedt))

Host not known. Also recorded by Tredella (1977) in Welega. COPR (1982) recorded it from different countries on bulrush millet, *Eucalyptus saligna*, maize, rice and tobacco.

Gryllidae

***Gryllus bimaculatus* De Geer**
(= *Lyogryllus bimaculatus* (De Geer))

Two-spotted Cricket

Hosts include groundnut, soybean, seedlings of hot pepper and many other crops. Crowe et al. (1977) and Tadeleke (1988) reported it as a sporadically serious pest of cotton, crucifers, cucurbits, tobacco, wheat and seedlings of many other crops in many areas of Ethiopia.

Gryllotalpidae

***Gryllotalpa africana* (Palisot de Beauvios)**

African Mole-Cricket

Recorded crawling on the ground. Reported to be an occasional pest of seedlings of various crops. Crowe et al. (1977) and Tsedeke (1988) recorded it as a very rare pest of cotton, grasses, sugarcane and tobacco, particularly at low altitudes.

Phyrgomorphidae

***Chrotogonus* spp.**

Surface Grasshopper

Desmodium sp. and different grasses are hosts. Crowe et al. (1977) recorded *C. senegalensis abyssinicus* (I. Bolivar) on irrigated cotton fields, but not usually damaging. At least three *Chrotogonus* species are known to occur in Ethiopia: *C. senegalensis* (Krauss), *C. homalodemus* (Blanchard), *C. homalodemus somalicus* (Kevan). The latter two species have been reported attacking beans, beets, bulrush millet, cereals, guinea corn and various vegetables elsewhere in Ethiopia and are regular minor pests (COPR, 1982). *C. senegalensis* (Krauss) damage has not been reported from Ethiopia; however, elsewhere in Africa it has been reported attacking guinea corn, maize, millet and tobacco.

***Phymateus* spp.**

Bush Locust

Recorded on cowpea and soybean. Also recorded by Tsedeke et al. (1982) from Bako. At least six *Phymateus* species are known to occur in Ethiopia: *P. pulcherrimus* (I.Bolivar), *P. purpurascens* (Gerst.), *P. Karschi* (I. Bolivar), *P. leprosus* (F.), *P. purpurascens* (Krsh.), and *P. viridipes* Stal. Stretch-Lilja (1977) recorded *P. viridipes* feeding on shrub weeds and sometimes attacking castor and vegetables in Welega and other parts of Ethiopia. Tsedeke (1988) recorded *P. pulcherrimus* and *P. viridipes* on many plant species in Ethiopia.

***Zonocerus variegatus* (Lennaeus);**
(= *Gryllus locusta variegatus* (Linnaeus));
***Poekilocerus sanguinolentus* (Serville)**

Variegated Grasshopper

Barley, groundnut, maize, millet, noug, pepper, pulses, sorghum, sweet potato, tef and various weed species are hosts of this pest. Tsedeke et al. (1982) recorded it on lima bean and maize at Gambela; Stretch-Lilja (1977) recorded the nymphs feeding on weeds and moving into vegetables. It has also been recorded by Crowe et al. (1977) on various crops elsewhere in Ethiopia. Tsedeke (1988) recorded it on hot pepper, tomato, lupin and other vegetables at Bako, Gambela and the Abay River catchment. It is a pest of regularly substantial importance (COPR, 1982).

Tettigoniidae

***Horatosphaga* sp.**

Soya Longhorn*

Haricot bean, soybean, other pulses are hosts. It has also been recorded by Tsedeke et al. (1982) on soybean elsewhere in Ethiopia.

ISOPTERA

Termitidae

***Adaiphrotermes* sp.**
***A. nr. scapheutes* Sands**
***Alycotermes trestus* Sands**
***Astratotermes nr. pactatus* (Silvestri)**
***Astratotermes* sp.**
***Ateuchotermes rastratus* Sands**
***Firmitermes abyssinicus* Sjostedt**

Soil Termites*

These are soil feeders and therefore not pests. Some are often found in the walls of *Macrotermes* mounds. All species have been encountered almost entirely in western Ethiopia; *Firmitermes abyssinicus* is known only from Ethiopia and except this species all are soldierless termites. They are the second abundant termites in the soil fauna next to *Microtermes* (Barnett et al., 1987).

***Ancistrotermes* spp.**

Termites

Recorded on grasses, maize, wood, roots of various living crops and plants. Barnett et al. (1987) and Cowie and Wood (1989) reported it to be common in west and south-west Ethiopia. Most of them could not be specifically identified. *A. crucifer* and *A. periphrasis* were recorded from Gamo Gofa, and *A. latinotus* from Gambela (Ilubabor) (Barnett et al., 1987).

***Macrotermes subhyalinus* (Rambur)**

Mendi Termite

Barley, cabbage, chickpea, *Eucalyptus* and *Gliricidia* seedlings, various grass spp., *Juniperus procera*, maize, millet, pepper, pulses, sorghum, sugarcane, sesbania seedlings, tef, tomato, wheat, and many other crops are the hosts. It is highly polyphagous; feeds largely on dead plant materials such as wood and buildings but sometimes attacks living plants and causes serious damage to young plants in most parts of Welega. Barnett et al. (1987) reported that it has also been implicated in the denudation of rangelands in Welega region; Crowe et al. (1977) recorded it as a major pest in the region, especially in the Mendi area.

***Macrotermes herus* (Sjostedt)**
***Macrotermes* sp.**

Bark-eating Termites

Maize, hot pepper, eucalyptus seedlings and many other crops are hosts. *M. herus* has been reported by FAO (1984) causing 50% post-harvest damage to maize and pepper and serious damage to eucalyptus seedlings in Asosa and Anger Gutin settlement areas.

***Microcerotermes parvulus* (Sjostedt)**
***Microcerotermes* sp.**

Termites

Recorded on maize stubble, sorghum, other plants including wood. Probably it attacks only maize and sorghum residues after harvest

rather than attacking the living plant; may cause damage to buildings. *M. parvulus* is widespread species, but not common in East Africa; a related species, *M. parvus* has been recorded in the very south of Sidamo and is widely distributed throughout Africa (Barnett et al., 1987).

***Microtermes aethiopicus* (Barnett *et al.*)**
***Microtermes aluco* (Sjostedt)**
***Microtermes magnocellus* (Sjostedt)**
***Microtermes nr. vadschaggae* (Sjostedt)**
***Microtermes* sp.**
***Microtermes* sp. nov.**

Seedling Termites*

Hosts include grasses, groundnut, haricot bean, maize, hot pepper, sorghum, soybean, tef. They also attack buildings and wood. Their normal food is living and dead plant materials and they are often found excavating roots of living crops (Barnett et al., 1987). All species were found in maize stubble while *M. sp. nov.* was found on sorghum stubble. *M. nr. vadschaggae* and *M. sp. nov.* were also found in dead wood, building and in the walls of a *Macrotermes subhyalinus* mound (Barnett et al., 1987). These have been recorded in most parts of Welega. Schmutterer (1971) also recorded *Microtermes* sp. attacking groundnut and soybean at Bako. *M. wagardhi*, *M. yemenensis*, *Microtermes* sp. x and w, *M. subhyalinus* sp. *neghelliensis* and *M. subhyalinus* have been recorded by Barnett et al. (1987) elsewhere in Ethiopia.

M. subhyalinus, *Microtermes subhyalinus* sp. *neghelliensis*, *Microtermes* sp. x and w, and *Microtermes* sp. nov. are known only from Ethiopia. Sands (1976) has also recorded *M. aethiopicus* (Barnett) and

M. magnocellus (Sjostedt), which are known only from Ethiopia, on crop residues in western Ethiopia. Their pest status has not been known.

***Odontotermes anceps* (Sjostedt)**

Groundnut Termite

Recorded on groundnut and wheat. Recorded by Schmutterer (1971) as the most important termite pest of groundnut at Bako. Hill (1966) recorded it also as an important pest of groundnut elsewhere in Ethiopia. The pest decorticates main roots and distal parts of shoots and then causes the death of many plants. Active in the evening and during the night (Schmutterer, 1971).

***Odontotermes* spp.**

Bark-eating Termites*

Hosts include eucalyptus seedlings, and grasses. They feed on dead plant materials including buildings, wood, tree bark, dead grasses and other plants; they occasionally attack living plants but not seriously damaging crops; recorded in some parts of Welega (Barnett et al, 1987). Other species of *Odontotermes*, *O. badius* (Haviland) and *O. classicus* (Sjostedt) have been found attacking garden plants and wheat respectively (Crowe et al. 1977). Wood (1986a) recorded various species of *Odontotermes* feeding on grasslands. Unidentified species, spp. A, D, E, have been recorded by Barnett et al. (1987) and species D is reported to be more common in Welega. Recently another new species, species I, has been recorded from the region (Abdurahman, 1990).

Pseudacanthotermes militaris **(Hagen)**

Sugarcane Termite

Hosts include eucalyptus seedlings, pasture, wood, and dead plant materials. Common in Welega but occasionally attack living plants. Not seriously damaging crops; but it has been recorded causing damage to badly denuded grasslands in the region (Barnett et al., 1987; Sands, 1976; Wood, 1986a; 1986b); it has been also recorded in Ilubabor and Gamo Gofa (Barnett et al., 1987).

THYSANOPTERA

Phlaeothripidae

***Haplothrips articulosus* Bagnall**

Noug Flower Thrips

Recorded on noug and pigeon pea. Widespread and common in flower heads of noug in association with *Synaptothrips* sp. and on pigeon pea leaves in association with *Craspedothrips hargreaveski* Karny at Bako; apparently not very harmful and cause little damage to pigeon pea leaves (Schmutterer, 1971). Crowe et al. (1977) recorded another *Haplothrips* sp. to be common in noug flowers.

Thripidae

***Anaphothrips sudanensis* (Tryb.)**
***(= Anaphothrips alternans* (Bagn.),**
***A. flavicinctus* (Krn.))**

Recorded on wheat. Listed by Schmutterer (1971). Occurs in small numbers on the ears in the Bako area. Crowe et al. (1977) recorded it as a minor pest of wheat and maize in Ethiopia.

***Chirothrips atricorpus* Giard**

Melon Thrips

Recorded on cucumber, melon, and squash. Occurs in large number

on young leaves on tips of shoots around Bako (Schmutterer, 1971). Crowe et al. (1977) recorded it as a minor pest of melon.

***Diarthrothrips coffeae* Williams**

Coffee Thrips

Recoreded on coffee. Schmutterer (1971) observed in the adult and nymphal stages on leaves in neglected plots in the Bako area. Reported as a major pest of coffee in Kenya and Tanzania (Crowe et al., 1977).

***Selenothrips rubrocinctus* (Giard)**

Red-banded (Cacao) Thrips

Recorded on coffee. Schmutterer (1971) observed in small numbers around Bako nymphs causing slight damage to leaves. Very rare in Ethiopia (Crowe et al., 1977). In the pantropics it is known to attack avocado, beans, cacao, cashew, guava, pear and mango (Hill, 1983).

***Thrips* spp.**

Flower Thrips

Hosts include cowpea, millet, noug, and sesame. Widely distributed in Welega region. Another *Thrips* sp. (flavus group) has been recorded by Schmutterer (1971) on cucumber, melon, and squash in large numbers on leaves on tips of shoots in the Bako area.

***Thrips tabaci* Lindeman**

Onion Thrips

Hosts include cabbage, celery, faba bean, fieldpea, haricot bean, leek (*Allium porrum*), and onion. Major pest of onion, to a lesser degree to leek (Schmutterer, 1971; Crowe et al., 1977). Important in the transmission of chlorosis, groundnut spotted wilt and tomato spotted wilt (COPR, 1973). Common in most parts of Welega. Widely distributed in Ethiopia (Tsedeke, 1988).

***Taeniothrips sp. nr. nigricornis* (Schmutz)**

Pea Thrips

Recorded on faba bean. Schmutterer (1971) recorded from Gedo causing slight damage to the upper surface of young faba bean leaves. Crowe et al. (1977) recorded other species of *Taeniothrips* elsewhere in Ethiopia: *T. nigricornis* (Schmutz), *T. simplex* (Morison) and *T. sjostedt* (Trybom). *T. sjostedt* is common in the flowers of many legumes (Crowe et al., 1977) and known as a vector of "cowpea (yellow) mosaic" virus in Nigeria (COPR, 1973).

Coreidae

Anoplocnemis curvipes **(Fabricius)**

Giant Twig Wilter

Recorded on cowpea, groundnut, haricot bean, noug, okra, pepper, sorghum, soybean, and sunflower. Gowen et al. (1977) recorded it as a minor pest of citrus, mango, and many other crops. Common in mid-altitude areas of southwestern, southern, and central Ethiopia (Tsedeke, 1988).

Clavigralla horrida **(Germar)**
(= *Acanthomia horrida* (Germar))
Clavigralla tomentosicollis **(Stal)**
(= *Acanthomia tomentosicollis* (Stal))

Spiny Brown Bugs

Cowpea, haricot bean, kenaf, noug, soybean, wheat are hosts. Common on pulse crops in the Bako and Didesa areas. Tsedeke et al. (1982) recorded *C. horrida* from Bako and Didessa and *C. tomentosicollis* from many other parts of the country. *C. tomentosicollis* is the commoner of the two species. Bohlen (1973) reported that these and *Acanthomia hystricoides* are very common and important pests of many pulses in Tanzania.

***Cletus* sp.**

Cletus Bug*

Light trapped; host not known. Tsedeke et al. (1982) recorded *Cletus* sp. on cowpea, weeds belonging to the Compositae at Arba Minch and on citrus at Gibe. *C. fuscescens* (Walker) has been recorded on *Amaranthus*, *Chenopodium*, citrus, legumes and sweet potato, occurring in large numbers on weeds rather than crops (Tsedeke, 1988). Bohlen (1973) recorded it on green gram and on weeds of the *Chenopodium* and *Amaranthus* spp.

***Riptortus dentipes* (Fabricius)**

Yellow-sided Pod Bug*

Recorded on cowpea and soybean. Also recorded by Tsedeke et al. (1982), causing light infestations on these pulses at Bako and Didesa; on haricot bean at Ataye and on mungbean at Chiri. Common on legumes and sorghum in Tanzania and Zanzibar (Bohlen, 1973); a major pest of cowpea in West Africa (Singh and Taylor, 1978).

Lygaeidae

***Graptostethus rufus* Distant**
***Graptostethus servus* (Fabricius)**

Red Sweet Potato Bugs*

Recorded on cowpea, sesame, sweet potato, sorghum, and tef. First recorded by Tsedeke (1988) in Ethiopia. *G. rufus* was common in the Bako area and *G. servus* was common in Welega and Kefa. Bohlen

(1973) recorded *G. servus* on haricot bean, green gram, cotton and maize elsewhere in Africa.

***Lygaeus negus* Distant**
***Lygaeus* sp.**

Red Sorghum Bug*

Cowpea, Irish potato, sorghum, soybean, sunflower and sweet potato are hosts. *Lygaeus* species was observed on cowpea, haricot bean, noug, okra, sorghum and tef and was common at Asosa and Didesa. *L. negus* occurs in small numbers. Tedeke (1988) recorded it on sweet potato, sunflower, and sorghum in southwestern Ethiopia and parts of Bale.

***Lygus amoenus* Bolivar**

Recorded on pearl millet. Recorded by Schmutterer (1971) in very small numbers feeding on milky [illegible] Bako. No recent record.

***Oxycarenus hyalinipennis* (Costa)**
***Oxycarenus* sp. Izavatarii (I)**
Oxycarenus spp.

Cotton Seed Bugs

Recorded on kenaf and cotton. Recorded from Didesa in large numbers late in the season when seeds were ripe. Schmutterer (1971) recorded *Oxycarenus* spp. on cotton at Melka Werer. Crowe et al. (1977) noted *O. hyalinipennis* to be important when cotton is grown for seed because its viability is affected. Tedeke et al. (1982) recorded it on pigeonpea at Koka. Bohlen (1973) indicated that *Hibiscus* spp. are

favored as alternative hosts for *O. hyalinipennis*. Samy (1969), cited by Crowe et al., (1977) recorded five other species of *Oxycarenus* in Ethiopia.

***Spilostethus pandurus* (Scopoli)**
(= *Lygaeus pandurus* Scopoli)

Red Bug

Cowpea, soybean, sunflower and tef are hosts. Also recorded by Tsedeke et al. (1982), in small numbers, on cowpea and soybean from Bako and Didesa. It has also been recorded on artichoke, citrus, cotton, grape, legumes, maize, sesame, sorghum, sunflower and tomato in Ethiopia (Tsedeke, 1988). It is widely distributed in the country but usually occurs in small numbers and does not appear to inflict economic damage. Solitary individuals are often seen on many crops but heavy infestations are rare (Crowe et al., 1977).

Miridae

***Helopeltis schoutedeni* Reuter**

Cotton Helopeltis

Recorded on cotton and sweet potato. First recorded by Schmutterer (1971) on a few severely stunted cotton plants at Bako. A few local severe outbreaks have been recorded on cotton in Gojeb (Kefa) and Bako areas (Crowe et al., 1977; Tsedeke, 1988). Apparently, more important in the humid parts of southwestern Ethiopia (Tsedeke, 1988) as a potential pest of tea (Crowe et al., 1977). In the Sudan and across equatorial Africa it is recorded on cotton, legumes, mango, guava and many other crops (Tsedeke, 1988).

***Erystylus ?Kivuensis* Scouteden**

Castor Mirid*

Recorded on sorghum. Listed by Schmutterer (1971). Very numerous nymphs and adults occurred in heads in association with other mirids at Bako, but no obvious damage observed. No recent record.

***Taylorilygus ?ricini* (Tayl.)**
***Taylorilygus ?virens* (Tayl.)**

Lygus Bugs

Recorded on sorghum. Occurs in large numbers on sorghum heads in association with other mirids at Bako (Schmutterer (1971). No obvious damage observed. Hill (1966) has recorded *T. ricini* on castor bean from Harerge.

***Taylorilygus simyoni* (Reut.)**

Sweet Potato Bug

Haricot bean, sorghum, sunflower, sweet potato and *Crotolaria* spp. are hosts. Also recorded by Tsedeke (1988) from Bako, parts of Shewa and Gojam.

***Taylorilygus vosseleri* (Poppius)**
(= *Lygus vosseleri* Poppius)

Cotton Lygus

Recorded on haricot bean, castor bean, cotton and sorghum. Also listed

by Schmutterer (1971). Occurs in large numbers on sorghum heads and on haricot bean at Bako and Didesa, but no obvious damage observed. Tsedeke et al. (1982) recorded it on mungbean from Rasa. It is not a significant pest of cotton in the major production areas (Crowe et al., 1977).

Pentatomidae

Acrosternum ?pallidoconspersum

Larger Green Stink Bug*

Recorded on cowpea, haricot bean, sorghum and soybean. Abraham (1987) recorded it as one of the common pests of cowpea at Bako; it occurs in small numbers. Bohlen (1973) recorded this and *A. acutum* on castor, cowpea, green grams, sorghum and soybean from the eastern parts of Africa.

***Agonoscelis pubescens* Thunberg**
(= *Agonoscelis versicolor* (Fab.))

Cluster Bug

Hosts include cowpea, haricot bean, sesame, sorghum, soybean and sunflower. Tsedeke et al. (1982) recorded it on cowpea and soybean at Bako and Didesa. Tsedeke (1988) recorded it on *Chrysanthemum coronarium*, citrus, cucurbits, sesame, sorghum, *Solanum incanum*, sunflower, *Tagetes minuta*, tomato and many legumes with more preference to sesame, sunflower and sorghum. Crowe et al. (1977) and Tsedeke (1988) reported it as a minor pest of sorghum and sesame in western Ethiopia. A related species, *A. puberula* (Stal), was observed in clusters on milky sorghum heads in Shewa and Arsi provinces (Crowe et al., 1977).

Antestiopsis intricata (Ghesquiere and Carayon)

Antestia Bug

Recorded on coffee. First recorded by Schmutterer (1971) as fairly common around Bako and Gimbi. Crowe et al. (1977) reported it as a major pest of coffee in Welega, Illubabor, Kefa and Sidamo regions. Tadesse and Bayissa (1981) and Tsedeke (1988) recorded it on citrus in Sidamo destroying over 90% of orange flowers. Two other spp., *A. orbitalis* Ghes. and Car. from Shewa and *A. decoloides* Greathead from western Harerge provinces have also been recorded (Crowe et al., 1977).

Aspavia pallidispina **Stal**

Recorded on cowpea, soybean, groundnut and tef. It occurs in small numbers. Tsedeke et al. (1982) recorded it from soybean at Nedjo (Welega), from cowpea at Chiri (Shewa) and on groundnut from Jima. It has been recorded as a pest of haricot bean, sorghum, and rice in central Tanzania where a similar sp., *A. albidomaculata*, was also reported to be found on these crops (Bodkin, 1973).

Carbula recurva **Distant**

Carbula Bug*

Hosts include legumes, sweet potato, tef and grasses. It is a more common pest on legumes and grasses than on sweet potato; apparently not damaging. First recorded by Tsedeke (1988) in 1983 from Bako.

***Deroplax nigropunctata* Stal**

Recorded on soybean. Recorded by Tsedeke et al. (1982) from Didesa; no previous record in Ethiopia. Reported as a pest of rice in central Africa (Buyckx, 1962, cited by Tsedeke et al., 1982).

***Durmia conjugens* (Germar)**

Durmia Bug*

Recorded on beans and sweet potato. Occurs in small numbers. First recorded by Tsedeke (1988) from Bako.

***Eurydema ornatum* L.**
(= *E. festivum* (L.))

Cabbage Bug

Recorded on radish. Single specimen collected from leaves at Bako (Schmutterer, 1971), recorded as *E. ornatum* L. F. *pictum* H.S. Crowe et al. (1977) recorded it as a common but minor pest of cabbage and other brassicas. Tsedeke (1988) recorded it on cabbage, cereals, cotton, *Lepidum sativum*, pigeon pea, potato, and many weeds such as *Brassica napa* and *Xanthium abyssinicum* in medium and high altitudes (above 1500 m) in the country.

***Nezara viridula* (Linnaeus)**

Green Stink Bug

Barley, cotton, cowpea, faba bean, flax, groundnut, haricot bean, kenaf, maize, millet, mungbean, noug, okra, pepper, potato, sesame, sorghum, soybean, sunflower, sweet potato and wheat are hosts. Widely distributed and very polyphagous pest but usually present in

small numbers. One of the common pests of cowpea (Abraham, 1987). Schmutterer (1971) recorded it on cotton from Bako. Crowe et al. (1977) and Tsedeke (1988) recorded it as a common pest of many crops in Ethiopia.

***Piezodorus inexpertus* (Walker)**

One-banded Stink Bug

Recorded on cowpea, haricot bean, and soybean. Occurs in fairly large numbers both in the vegetative stage and at pod formation at Bako (Abraham, 1987). Tsedeke et al. (1982) also recorded it on cowpea and soybean at Bako and Didesa; infestation being more severe on soybean at Didesa. Tsedeke et al. (1982) recorded a related species, *P. rubrofasciatus (F.)*, on soybean at Gobeb.

***Piezodorus pallescens* (Germ)**

Recorded on soybean. Recorded by Schmutterer (1971) as fairly common at Bako; no damage observed on infested plants. Bohlen (1973) recorded another sp., *P. hybneri* Gmel. on green gram, sesame, cowpea and sorghum from Tanzania.

***Sphaerocoris annulus* (F.)**

Ringed Bug*

Hosts include citrus, lima bean, lupin (*Lupinus albus*), pigeonpea, noug and beans. Tsedeke (1988) reported that outbreaks occurred on lupin in parts of Shewa and Wellega in some seasons.

***Veterna abyssinica* Lethiery**

Linseed Stink Bug*

Soybean, beans, linseed, noug, sweet potato and tef are hosts. Tsedeke (1988) recorded it on most of these crops in small numbers from parts of Gojam, Welega, Sidamo and Shewa.

Plataspidae

***Brachyplatys* sp.**

Black Helmet Bug

Recorded on cowpea. Occurs in small numbers. Tsedeke et al. (1982) observed very light infestations on haricot bean for the first time at Bako and Didesa. *B. testudonigra* Debi has been recorded on several pulses in Tanzania (Bohlen, 1973).

***Coptosoma* sp.**

Helmet Bug

Hosts include cowpea, haricot bean, potato, soybean and tef. First recorded by Tsedeke et al. (1982) on haricot bean at Bako and Didesa. Bohlen (1973) recorded it on green gram, haricot bean, and soybean in Tanzania.

Pseudococcidae

***Dysmicoccus brevipes* (Cockerell)**
(= *Pseudococcus bromeliae* (Bch.))

Pineapple Mealybug

Recorded on pineapple. Recorded by the senior author in large numbers from pineapple propagules brought from Kefa to the Bako Research Center in 1985. The infestation was so severe that all of the planting materials were buried in order to avoid further dissemination. Tsedeke (1988) recorded it from pineapple, banana, citrus, palms, sugarcane, mung bean, coffee, soybean and other pulses; common in parts of Eritrea, Gamo Gofa, Ilubabor, Kefa and Welega. Tsedeke et al. (1982) recorded it to be more severe on soybean than on mungbean in Arba Minch. The pest is associated with pineapple wilt disease (Bohlen, 1973).

Pyrrhocoridae

***Dysdercus* spp.**

Cotton Stainers

Hosts include cotton, kenaf, maize, okra, pepper, sorghum and tef. Tsedeke (1988) also recorded *Dysdercus* spp. on carrot, hot pepper, lupin, okra, cotton and many wild Malvaceae. Three spp. of *Dysdercus* are known in Ethiopia: *D. nigrofasciatus* Stal, *D. cardinalis* Gerstaecker, and *D. superstitiosus* (Fabricius). Recorded by Crowe et al. (1977) on wild malvaceous trees and shrubs. Sporadic pest of cotton and very minor pest of horticultural crops in Ethiopia (Tsedeke, 1988). Schmutterer (1971) recorded heavy populations of *D. cardinalis* and *D.*

nigrofasciatus on cotton in Awash Valley, the former being more frequent. *Dysdercus* spp. are very important cotton pests in Tanzania and in most African countries south of the Sahara (Bohlen, 1973).

Other heteropterans

Acoloba lanceolata (Fabricius)

Recorded on wheat by Schmutterer (1971). Nymphs and adults were recorded on wheat ears in the milky stage at Bako. No recent records.

Opistholeptus elegans Hesse

Recorded on tef by Schmutterer (1971); fairly common at Bako feeding on tef grain. Economic status unknown. No recent records.

HOMOPTERA

Aleyrodidae

Bemisia tabaci **(Gennadius)**
(= Bemisia gossypiperda (Mis. and Lam.))

Tobacco Whitefly

Haricot bean, tomato, tobacco are major hosts. Common on leaves in the vegetable garden of Bako Research Center (Schmutterer, 1971). Tsedeke et al. (1982) recorded it on haricot bean from Bako. Tsedeke (1988) recorded it on cotton, cucurbits, haricot bean, hot pepper, potato, tobacco, and tomato in Ethiopia. Polyphagous and widely distributed in the country but more severe on cotton along the Awash Valley (Crowe et al., 1977; Tsedeke, 1988). Vector of the tomato yellow leaf curl virus (TYLCV) (Tsedeke, 1988), cowpea golden mosaic, mungbean yellow mosaic and soybean yellow mosaic viruses (COPR, 1981; Battacharya and Rathore, 1977). Yield losses of tomato from TYLCV in Ethiopia have been reported to be up to 24% (Tsedeke, 1988)

Aphididae

Acyrthosiphon pisum **Harris**
(= *A. onobrychidis* (B. de F.)
(= *Macrosiphum pisi* (Kalt.))

Pea Aphid

Hosts include barley, faba bean, fieldpea, haricot bean and soybean.

Occurs in small numbers. Tsedeke et al. (1982) recorded it on soybean at Bako, fieldpea and lentil at Debre Zeit and Holetta. Schmutterer (1971) recorded it on soybean, haricot bean and pea at Bako and on faba bean at Gedo in association with other aphid species. Common on fieldpea and other legumes and sometimes damaging young plants (Crowe et al., 1977). An important vector of several virus diseases such as bean common mosaic (BCMV) (COPR, 1981).

***Aphid* spp.**

Aphids

Hosts include barley, cabbage, egg plant, faba bean, maize, okra, pepper, rapeseed, sorghum, vetch and wheat. Occurs in large numbers at seedling stage. Crowe and Kemal (1983) reported the occurrence of 64 species of aphids in Ethiopia.

***Aphis craccivora* Koch**
(= *A. laburni* Kalt)

Groundnut Aphid

Recorded on cowpea, groundnut, safflower, thistle (kosoru) (*Echinops* sp.), and *Cliricidia sepium.* An average of 95 individuals on haricot bean and 52 on groundnut per 20 sweeps were recorded in the 1984/85 season (IAR, 1986). Tsedeke et al. (1982) recorded it on cowpea, fieldpea, and soybean from Bako. Schmutterer (1971) recorded it on faba bean and flax near Gedo and on lucerne from Melka Werer. Tsedeke (1988) recorded it on alfalfa, beans, groundnut, *Krauhnia floribunda* and roses at medium and lower altitudes. Hill (1966) listed it on alfalfa, cowpea, faba bean and lima bean in Harerge. An important pest of cowpea, specially at seedling stage (Abraham,

1987). It is also known in the transmission of several virus diseases (COPR, 1973; 1981; Irwin, 1978; Kabir, 1978; Turner, 1978). The pest is distributed all over the world (Bohlen, 1978) and could claim 20 to 40% of cowpea yield (Tsedeke et al., 1982; Abraham, 1987).

***Aphis gossypii* Glover**

Cotton Aphid

Hosts include cotton, citrus, coffee, groundnut, melon, okra, potato and soybean. First recorded by Schmutterer (1971). Tsedeke et al. (1982) also recorded it on soybean from Bako. Tsedeke (1988) listed it on citrus, cotton, cucurbits, egg plant, groundnut, hot pepper, mango, okra, water melon, potato and ornamental plants such as bougainevillea, jacaranda and fuchsia (*Fuchsia* sp.). Common in low-altitude areas. A major pest of cotton throughout Ethiopia (Crowe et al., 1977). Implicated in the transmission of several virus diseases (COPR, 1973; 1981; Irwin, 1978; Kabir, 1978).

***Brevicoryne brassicae* (Linnaeus)**

Cabbage Aphid

Hosts include cabbage, oil radish and rape. Commonly found in large numbers in association with *Myzus persicae* at Bako and Gedo. Also recorded by Schmutterer (1971). Tsedeke (1988) recorded it on cabbage, cauliflower, eruca (*Eruca sativa*), mustard and radish in Ethiopia. Very common and a major pest of cabbage and other brassicas at medium and high altitudes throughout Ethiopia (Crowe et al., 1977; Tsedeke, 1988).

Dactynotus compositae **(Theobald)**

Safflower Aphid

Recorded on safflower. Recorded from Didesa by the senior author. Schmutterer (1971) noted it on safflower at Bako and between Addis Abeba and Nazreth. Crowe et al. (1977) reported heavy infestations on safflower at low-altitudes. Tsedeke (1988) listed it on artichoke, chrysanthemum, safflower, sunflower, and many *Solanaceae* spp.; *Bidens pilosa* and *Vernonia abyssinica* are important alternative hosts recorded in Ethiopia. A related species, *D. junceae* (L.), has been recorded on *Carduus* (thistle) and *Centaurea* spp. (both compositae) in Ethiopia by Gentry (1965).

Lipaphis erysimi **(Kaltenbach)**
(= *L. pseudobrassicae* (Kan. Dev),
Rhophalosiphum pseudobrassicae **(Davis))**

Mustard Aphid

Recorded on cabbage, oil radish and rape. Also recorded by Schmutterer (1971); commonly found at Bako in association with *B. brassicae* but less important than the latter. Tsedeke (1988) recorded it on cabbage, rapeseed and other Brassicae in Ethiopia. It infests stalks, mainly of rape. Widely distributed.

Macrosiphum africanum **(H.R.L.)**

African Aphid*

Recorded on sorghum. Schmutterer (1971) recorded in small dispersed colonies on lower surfaces of older leaves of sorghum. No recent record.

***Macrosiphum ?avenae* (F. and M.)**

Grain Leaf Aphid*

Recorded on sorghum. Schmutterer (1971) recorded it in small dispersed colonies on lower surfaces of older leaves. It was also recorded on oat and wheat in association with *Schizaphis graminum* and other *Macrosiphum* species. No recent record.

***Macrosiphum euphorbiae* (Thomas)**
(= *M. solanifolii* Ashm.)

Pepper Aphid (Potato Aphid)

Recorded on hot pepper, potato and tomato. Also recorded by Schmutterer (1971) from Bako on lower surfaces of leaves in scattered colonies in association with peach and cotton aphids. Tsedeke (1988) recorded it on haricot bean, hot pepper, okra, potato, tomato, roses, *Antirrhinum majus, Solanum jasminoides* and *S. muricatum*. Common on pepper and potato (Crowe et al., 1977). Widely distributed in medium and high altitudes of Harerge, Shewa and Welega. Hill (1966) recorded two related species, *M. porosum* (Sand.) and *M. rosae* (L.) on roses from Harerge. Probably important as a virus vector (Schmutterer, 1971; Crowe et al., 1977; Tsedeke, 1988) and it transmits soybean mosaic virus (Irwin, 1978).

***Macrosiphum nigrinectaria* (Theo.)**

Grass Aphid

Recorded on pigeon pea. Recorded by Schmutterer (1971); occurrs in small colonies on pods. No recent record.

Melanaphis sacchari **(Zhnt.)**
(= *Aphis sorghi* Theob.,
Longuinguis sacchari **(Zentner)**

Sorghum Aphid

Recorded on sorghum. Schmutterer (1971) recorded medium-sized to large colonies on lower surfaces of older leaves producing large quantities of honey dew (found as shining sticky layer on upper surface of leaves). Heavy infestations are common but do not appear to cause much reduction in crop yield (Crowe et al., 1977). An important sorghum pest during the dry periods in Tanzania (Bohlen, 1973).

Metopolophium dirhodium **(Walker)**

Grass Aphid

Recorded on barley. Schmutterer (1971) recorded it near Bako (Gedo). Kot and Bilewicz-Pawinska (1989) recorded it on maize from Warsaw region. The major aphid pest of barley in high-altitude areas (≥ 2400 masl) in Ethiopia is the Russian wheat aphid (*Diuraphis noxius* (Mordv.) (Adugna and Kemal, 1985).

Myzus persicae **(Sulzer)**

Green Peach Aphid

Cabbage, haricot bean, oil radish, potato, radish, rape, red pepper and tomato are hosts. Schmutterer (1971) recorded it at Bako in association with *Brevicoryne brassicae, Lipaphis erysimi* on oil radish, with *Macrosiphum euphorbiae, Aphis gossypii* on potato and *Macrosiphum*

euphorbiae on tomato; and Tsedeke et al. (1982) on haricot bean. Tsedeke (1988) recorded it on hot pepper, tobacco, tomato, potato, cabbage, radish, fieldpea, sesame, Rosacea, bougainevilla and vernonia. Attacks lower surfaces of leaves of Solanaceae crops; flowers and leaves are preferred feeding sites on fieldpea. Widely distributed and an important vector of many virus diseases (Schmutterer, 1971; Tsedeke et al., 1982; Tsedeke, 1988; COPR, 1973; 1981; Irwin, 1978).

***Pentalonia nigronervosa* Coquerel**

Banana Aphid

Recorded on banana. First recorded by Schmutterer (1971) at Bako; only one small colony found under leaf sheath. Crowe et al. (1977) and Tsedeke (1988) recorded it on banana and enset from Bako and Gamo Gofa colonizing leaf sheaths, shoots or underground parts. Known in all banana-growing countries of the world (Hill, 1983) and is a vector of "bunchy top" virus of banana in the tropics (Crowe et al., 1977; Hill, 1983; Tsedeke, 1988).

***Rhophalosiphum maidis* (Fitch)**
(= *Aphis maidis* Fitch)

Maize Aphid

Recorded on barley, finger millet, maize, sorghum and wheat. Schmutterer (1971) and Abraham (1986) recorded it on sorghum at Bako; less common than sorghum aphid on sorghum. A minor pest of maize and sorghum (Crowe et al., 1977). On Barley and finger millet only small colonies have been observed on young leaves on few plants. Infestations are severe in some seasons, in some localities and on some plants. Serious attacks have been recorded on wheat in Tigray

region. A minor pest of maize and sorghum in Tanzania and known to occur throughout the world (Bohlen, 1973).

Schizaphis graminum **(Rondani)**
(= *Toxoptera graminum* (Rondani))

Wheat Aphid

Recorded on wheat. Schmutterer (1971) recorded it in dispersed colonies on the lower surface of leaves and ears in association with *Macrosiphum avenae* and other *Macrosiphum* species on wheat. Status uncertain but heavy aphid attacks reported on wheat may refer to this species (Crowe et al., 1977). Bohlen (1973) recorded it on barley, grasses, maize, pasture, sorghum, and wheat in Tanzania as a pest of minor importance.

Toxoptera aurantii **(Boyer de Fanscolombe)**

Coffee Aphid (Black Citrus Aphid)

Recorded on citrus and coffee. Also recorded by Schmutterer (1971) in large numbers from Bako and Gimbi. Tsedeke (1988) recorded it on *Carissa edulis*, citrus, coffee, mango, tea, *Dovyalis abyssinica*, and *Dovyalis caffra* in Ethiopia. Common on flush leaves of coffee but well controlled by *Syrphid* predators (Crowe et al., 1977). Very widely distributed in the country and is implicated in the transmission of tristeza virus (Tsedeke, 1988). A related species, *T. citricidus* (Kirkaldy) has been recorded on citrus by Tsedeke (1988) as common in the Upper and Lower Awash and infestations by both species on the same tree is not uncommon.

Cercopidae

***Locris auripennis* (Distant)**

Red Spittle Bug

Hosts include sorghum, millet, groundnut and wild grasses. Recorded from Bako, Didesa and Asosa; in numerous numbers at Hoha (Asosa) on pearl millet. Tsedeke (1988) recorded it on citrus, sorghum and *Pennisetum adoense*, being more common on the latter; prevalent in the Didesa (Welega) and Gibe (Shewa/Kefa) areas.

***Locris aethiopica* Stal.**

Spittle Bug

Recorded on sorghum, *Pennisetum* and wild grasses at Didesa. Also recorded by Tsedeke (1988) in 19[illegible] from Didesa.

Cercopids

Spittle Bug

Recorded on *nougbiyie* (Amharic) (a broad-leaved weed) and *Spathodea nilotica* at Bako. Abundant in meadows. Hill (1983) reported that nymphs of some species of cercopids are found on grasses and various herbaceous shrubs or trees. Except *Locris* and a few other cercopids that are found in Africa, most cercopid spp. are confined to S. and C. America and the W. Indies (Hill, 1983).

Cicadellidae

Cicadulina spp.

Cicadulina Leafhoppers

Hosts include maize, several species of wild grasses such as *Digitaria, Setaria, Hyparrhenia, Panicum,* and *Pennisetum*. Twenty-two species of cicadulina leafhoppers have been described to date, of which eight are known to be virus vectors. Five of these species have been recorded in Ethiopia (Webb, 1987). *C. bipunctella* (Melichar), *C. mbila* (Naude) and *C. storeyi* China have been recorded from Ilubabor, Kefa and Welega. *C. ghaurii* Daborowski and *C. niger* Ghauri have been recorded from Shewa (Mesfin et al., 1991). Cicadulina leaf-hoppers are important in the transmission of maize streak virus (MSV) on maize. *C. mbila* is the most important vector with transmission efficiency of 70 to 90%. The insects are rarely seen but the incidence of the disease is often quite high in some localities and years.

Empoasca lybica (De Berg)

Cotton Jassid

Cotton, cowpea, groundnut, haricot bean, soybean and tomato are hosts. Schmutterer (1971) recorded on cotton causing heavy damage ('hopper burn') between Nekemte and Gimbi. Once a major pest of cotton in Eritrea and the Lower Awash Valley (Crowe et al., 1977) and a very minor pest of tomato in the western lowlands of Eritrea (Nastasi and Andemeskel, 1968). One species of *Empoasca, E. dolichi* (Pao.), was reported to cause more than 40% yield loss on susceptible cultivars of cowpea (Raman et al., 1978).

***Empoasca* spp.**

Leafhoppers

Recorded on haricot bean, cowpea, groundnut, soybean and green beans. Schmutterer (1971) recorded it in limited numbers as nymphs and adults on lower surface of haricot bean leaves at Bako. Tsedeke et al. (1982) recorded *Empoasca* spp. on cowpea and soybean at Didesa and on haricot bean, lima bean and pigeon pea at Arsi Negele, Melkasa and Koka. Several spp. of *Empoasca*: *E. barbistyla* Paoli on yam, haricot bean, soybean and other grain legumes and *E. fascialis* (Jacoby) on sweet potato, castor bean, and cotton have been recorded from many parts of Ethiopia (Tsedeke, 1988).

***Poecilocarda nigrinervis* Stal**

Black-striped Jassid

Hosts include cowpea, groundnut, haricot bean, noug, potato, sesame, sorghum, soybean, sunflower, *and Guizotia scabra*. *Kalanchoe deficiens*, a weed locally known as 'Bosoke', is an important wild host (Tsedeke et al., 1984; Tsedeke, 1988). Tsedeke (1988) recorded it on beans, enset, radish and yam in mid and low altitude areas of Ethiopia; it is suspected to be a vector of the causative agent of the enset wilt disease and viruses of grain legumes.

Coccidae

Ceroplastes spp.

Waxy Scales

Recorded on coffee. Schmutterer (1971) recorded low infestations of various species of *Ceroplastes* on small branches at Bako and Gimbi. Crowe et al. (1977) and Tsedeke (1988) recorded *C. rubens* (Maskell) on coffee and citrus in Ethiopia. Tsedeke (1988) also reviewed other species, *C. africanus* (Green), *C. destructor* (Newstead), and *C. rusci* (Linnaeus) on various tree species in Eritrea and Upper Awash.

Coccus viridis (Green)

Green Scale

Recorded on citrus, coffee, guava and mango. Tsedeke (1988) recorded it to be common on coffee in western and southwestern Ethiopia. Other species, *C. elongatus* (Signoret) and *C. niger* Nietner were recorded on various tree species in the country (Gentry, 1965; De Lotto, 1947-50).

Coccus alpinus De Lotto

Soft Green Scale

Recorded on coffee. First recorded by Schmutterer (1971); rarely seen at Bako and Gimbi except on one heavily infested young tree at Bako. Hill (1966) recorded it on *Carissa edulis*, coffee and guava from Harerge. No other records.

***Coccus hesperidum* (Linnaeus)**

Soft Brown Scale

Recorded on citrus and pawpaw. Recorded by Schmutterer (1971) attacking leaves and branches; also recorded on citrus and cotton in the Awash Valley. Tsedeke (1988) recorded it on various cultivated and wild plants; heavy infestations have been observed on citrus and occasionally on mango in many parts of the country at medium and low altitude areas. Usually checked by natural enemies and heavy rains.

Diaspididae

***Aspidiotus nerrii* Bouche**
***(= Aspidiotus hederae* (Vall.)**

Oleander Scale

Recorded on citrus. Schmutterer (1971) recorded it in large numbers attacking branches, leaves, and fruits. Tsedeke (1988) listed it on acacia, *Aleurites montana*, apple, avocado, citrus, *Hedera helix*, *Ligustrum japonicum*, mango, oleander, olive, and palms from Bako, Ambo and other parts of Ethhiopia. Crowe et al. (1977) recorded it as a minor pest of lemon and common on oleander bushes in most provinces. A related species, *A. destructor* Signoret, has been recorded on castor bean, coconut, banana, mango, palm, papaya (Gentry, 1965) and on palm (Crowe et al. (1977). Another sp., *A. fularum* Bal. has been recorded on oleander (Crowe et al., 1977).

***Borchseniaspis palmae* Cockerell**

Banana Scale*

Recorded on banana. Attacks lower surface of leaves along the main rib; damaged parts become yellowish. Only one record from the Bako area by Schmutterer (1971). No recent record.

***Ischnaspis longirostris* (Signoret)**
(= *Ischnaspis filiformis* (Signoret))

Black-Thread Scale

Recorded on coffee. First recorded by Schmutterer (1971). Common at Bako infesting small branches, leaves, and berries; the latter is sometimes malformed and spotted. A minor pest of citrus and palm trees (Crowe et al., 1977). Also recorded on citrus, mango, and palms in small numbers from Eritrea, Kefa and Upper Awash (Tsedeke, 1988).

***Selanaspidus articulatus* (Morgan)**

Rufous Scale (West Indian Red Scale)

Recorded on coffee and citrus. Recorded as a minor pest at Mugi (Welega), Tepi, and Metu (Ilubabor) (Tsedeke, 1988). Schmutterer (1971) recorded it on citrus leaves in small numbers from Ambo. Listed by Tsedeke (1988) on citrus, coffee, *Euphorbia polycantha*, ivy, kei apple (*Dovyalis* spp.), oleander, and olive from Ambo and other parts of Ethiopia. Crowe et al. (1977) recorded it as a minor pest of citrus and coffee. Gentry (1965) reported heavy infestations on palms.

Margarodidae

***Icerya purchasi* Maskell**
(= *Pericerya purchasi* (Maskell))

Cottony Cushion Scale

Recorded on citrus and pigeon pea. A major pest of citrus orchards in Ethiopia (Schmutterer, 1971; Crowe et al., 1977). Schmutterer (1971) recorded large colonies at Bako and in the Awash Valley. Tsedeke (1988) recorded it on citrus, pigeon pea, fennel (*Foeniculum vulgare*), rice, roses, oleander, acacia, sesbania, and other plants. Heavy populations occur during the dry periods but appear to be checked by abiotic factors (such as rainfall) and natural enemies (Schmutterer, 1971; Tsedeke, 1988). At least six importations of the Vedalia ladybird, *Rodolia cardinalis*, have been made with the hope of biologically controlling the bug (Crowe et al., 1977).

Membracidae

***Oxyrhachis* sp.**

Treehopper

Recorded on pigeon pea. Occurs in small colonies on tips of shoots and attended by ants. Only one record by Schmutterer (1971) from Bako. Tsedeke et al. (1982) observed populations of unidentified membracid on growing shoots of off-season crops of pigeon pea in 1981 at Melkasa. In East Africa two species, *Centrotus bovinus* Dist. and *O. zanzibarensis* Cap. have been recorded on fieldpea and haricot bean (Le Pelley, 1959).

Psyllidae

Trioza erytreae **(Del Guercio)**
(= *Spanioza erytreae*)

Citrus Psyllid

Recorded on citrus. Very common on young leaves causing galls but not important on large trees. First recorded by Schmutterer (1971). A major pest of citrus at altitudes above 1500 m (Tsedeke, 1988; 1988b). A vector of mycoplasma causing "greening" disease which is widespread in Ethiopia (Crowe et al., 1977).

Heteropsylla cubana **(Crawford)**

Leucaena Psyllid

Leucaena (*Leucaena leucocephala* [Lam.] de Wit) is the host. Both nymphs and adults were found causing severe damage to young actively growing shoots of leucaena. It was recorded for the first time in May 1994 on leucaena trials at Bako Research Center, western Ethiopia. The psyllid was first observed by Abraham in mid August 1993 at Awasa, southern Ethiopia, on leucaena planted as hedgerows around hotels and on the campus of the Awasa College of Agriculture. However, from the severity of the damage caused and the population density of the pest it was assumed that the pest might have arrived at Awassa some time earlier than August 1993. The psyllid was detected in Kenya in August 1992 (Reynolds and Bimbuzi, 1992). Leucaena psyllid was described in 1914 from Cuba, but it has not been regarded as a serious pest of leucaena until an outbreak occurred in Florida in 1983, followed by its discovery in Hawaii in 1984 (FAO, 1994).

COLEOPTERA

Apionidae

***Piezotrachelus fuliginosus* (Wagner)**

Peach Weevil

Recorded on cowpea. First recorded by Tsedeke (1988) from Didesa. A related species, *P. microcephalus* (Wagner) was also recorded by Nastasi and Andemeskel (1968) on peach from highlands of Eritrea.

***Piezotrachelus milkoi* Balfour-Brown**

Peach Weevil

Recorded on noug. First recorded by Tsedeke (1988) attacking young leaves and flower buds at Ilalla (near Bako). No previous record.

***Apion* sp *?varium* Wagner**

Bean Pod Weevil

Barley, cowpea, faba bean, haricot bean, millet, mungbean, noug, soybean, tef and wheat are hosts. Tsedeke et al. (1982) recorded it on cowpea, haricot bean, mungbean and soybean from Gamo Gofa, Shewa and Welo; heavy infestations observed on mungbean (50 to 70% pod destruction). Tsedeke (1988) recorded *Apion* species on peach, potato, sweet potato, green beans and other legumes, sunflower and tea and noted its wide distribution in Ethiopia. Gentry (1965) listed *A. illux* (Fau.) on soybean, in Ethiopia. Sixteen species of apion have

been recorded on several pulses including cowpea, haricot bean and pigeon pea in Uganda alone (Nyiira, 1971, cited by Tsedeke et al., 1982).

Bostrychidae

Apate spp.

Black Borers

Hosts include coffee, Persian lilac, and wild trees of various species. Recorded in small numbers in 1990. Adults bore the main stem, twigs and branches making a clean cut, circular, fairly straight tunnel upwards in the main stem. Sawdust-like fragments drop to the ground whenever the beetle is actively boring (Crowe and Tadesse, 1984). Tsedeke (1988) recorded three species: *A. indistincta* Murray, *A. monachus* Fabricius and *A. terebrans* (Pallas) attacking acacia, citrus, coffee, grape, guava, mango, palms, and neem tree. Widely distributed along the Rift Valley and the Middle and Upper Awash. Crowe et al. (1977) noted the former two species on coffee, the latter as a minor pest of grapevine, and the occurrence of other *Apate* spp. in Ethiopia.

Rhizopertha dominica (Fabricius)

Lesser Grain Borer

Recorded on maize and sorghum. Recorded in fairly high numbers on stored maize and sorghum in the Bako area (Abraham, 1991) . McFarlane (1969) recorded it on maize and wheat and Walker and Boxall (1974) on barley, Durra (sorghum sp.), dried fruit, shelled maize, millet, sorghum, tef, and wheat in storage. Besides whole grain cereals the pest can develop on milled rice and cereal flours but not on highly

polished rice. Dried cassava is a major host. Many pulses also provide suitable diets, although no development occurs on lentils or soybeans. There have been several reports of small populations of the pest on cereals in the field before harvest but infestation is mostly post-harvest (NRI, 1991). Another most destructive bostrychid, the larger grain borer (*Prostephanus truncatus* (Horn)), has been reported for the first time in Africa in 1981 (assumed to have been introduced with grain imports into Tanzania during the 1970s); in Kenya it was first reported in 1983. It has not been reported from Ethiopia to date. However, it has the potential to spread to other major maize growing areas in the continent.

Bruchidae

Zabrotes subfasciatus (Boheman)

Mexican Bean Weevil

Recorded on haricot bean. Recorded for the first time in 1989 as the most important bruchid causing heavy damage at Bako Research Center (Abraham, 1992). About 14% weight loss was found on haricot bean at Bako (Adane and Abraham, 1993). It is a major pest of haricot bean and lima bean but sometimes attacks seeds of other legumes including cowpea in Uganda and west Africa, and bambara groundnuts in Tanzania (NRI, 1993). No previous record in Ethiopia. Several other bruchids: *Callosobruchus chinensis* (L.), *C. maculatus* (F.), *C. phaseoli* (Gyllenhal), *Bruchus* species and *Acanthoscelides obtectus* (Say) have been recorded from haricot bean, soyabean, cowpea and other pulses in storage and in the field in Ethiopia (McFarlane, 1969; Walker and Boxall, 1974; Tsedeke et al., 1982).

Chrysomelidae

***Ergana bifrons* Laboissiere**
***Ergana* sp.**

Bean Leaf Beetle*

Recorded on haricot bean. First recorded by Tsedeke et al. (1982) from Bako and Gimbi areas. *E. bifrons* was recorded at Bako and Gimbi while *Ergana* sp. was recorded from Gimbi in small numbers. Tsedeke (1988) reported localized outbreaks of *E. bifrons* on green beans and many other legumes in parts of Shewa, Welega, and Welo.

***Erlangerius niger* Weise**

Black Tef Beetle

Hosts include barley, faba bean, fieldpea, flax, millet, noug, sorghum, tef and wheat. Common in tef and wheat fields. Crowe et al. (1977) reported serious damage on tef in Shewa region.

***Haltica pyritosa* Erichson**
(= *Altica pyritosa* Erichson)

Linseed Flea Beetle

Recorded on sorghum. Recorded from Bako and Didesa. Tsedeke (1988) recorded it on carrot, grapes, sweet potato, rhubarb (*Rheum rhaponticum*), green beans and *Rumex nervosus* (main wild host). This flea beetle is widely distributed in the highlands damaging many highland crops. Several varieties are known (Crowe et al., 1977).

***Medythia quaterna* (Fairmaire)**

Striped Foliage Beetle

Recorded on cowpea, haricot bean, and soybean. Fairly common at Bako and Didesa. First recorded by Tsedeke et al. (1982) on cowpea from Shewa and haricot bean from Welo. An important pest of cowpea in Ghana (Agnye-Sampong, 1978) and Nigeria (Singh and Taylor, 1978). Reported to be a vector of cowpea mosaic virus (Singh and Taylor, 1978; Singh and Emden, 1979).

***Megalognatha aenea* Laboissiere**

Acacia Beetle

Recorded on maize. Recorded in small numbers around Bako. Crowe et al. (1977) and Tsedeke (1988) recorded it on peach, avocado, and wild acacia in parts of Shewa. Other related species, *M. abyssinica* (Jacoby) and *M. viridipennis* (Weise) have also been recorded on peach trees by Crowe et al. (1977) and Tsedeke (1988). Hill (1983) reported that *M. rufiventris* Baly periodically occors in large numbers in East Africa and damages maize.

***Megalognatha ?viridipennis* Weise**

Caliandra Leaf Beetle*

Recorded on caliandra (*Caliandra calothyrsus*), leucaena (*Leucaena leucocephala*, *L. diversifolia*), *Acacia abyssinica*. The beetle was first recorded in the fourth week of April 1993 on 15-month-old caliandra in the agroforestry nursery at Bako Research Center. It caused complete defoliation of caliandra and then attacked *Leucaena leucocephala* of

the same age. Damage done to the latter was not severe. The pest population was very heavy (about 100 adults/branch of caliandra). The pest occurred for the second and third time in the first week of May 1994 and 1995 at the same density and damage level in the same area.

***Monolepta* spp.**

Spotted Leaf Beetles*

Recorded on soybean and tef. Recorded in small numbers from Didesa. Tsedeke et al. (1982) recorded it on soybean at Nedjo (Welega). Tsedeke (1988) recorded *M. intermedia* Riteseman on green beans, many other legumes, roses and other ornamental plants at high altitudes. Hill (1966) recorded *M. puncticeps* Chapuis on alfalfa and roses from Harerge. Nastasi and Andemeskel (1968) recorded *M. leuce* Weise from wheat in Eritrea. Crowe et al. (1977) recorded *M. intermedia* as a chronic pest of ornamentals in the highlands of Ethiopia damaging flower petals and soft leaves.

***Ootheca* spp.**

Bean Leaf Beetles

Recorded on haricot bean and tef. Occurs in large numbers in tef fields in the Bako area. Bohlen (1973) recorded *O. bennigseni* as a major pest of haricot bean and occasionally of cowpea only in Tanzania, Uganda and Zanzibar; while another closely related species, *O. mutabilis* (Sahlb.), has been found in many African countries. Several other closely related species are also found mostly on leguminous crops (Hill, 1983).

***Phyllotreta mashonana* Jacoby**
***Phyllotreta weisei* Jacoby**

Cabbage Flea Beetles

Cabbage, oil radish, radish, and mustard are hosts. Schmutterer (1971) recorded it in large numbers from Bako. *P. mashonana* is much more frequent than others and damage to seedlings may be severe. Crowe et al. (1977) reported these beetles on cabbage and other brassicas throughout Ethiopia. Tsedeke (1988) recorded *P. atra* (Fab.) and the above two species on brassicas: beet, cabbages, *Eruca sativa* and radish in the highlands of Ethiopia.

***Podagrica puncticollis* Weise**

Cotton Flea Beetle

Hosts include okra, kenaf and cotton. Widespread and harmful by riddling of the leaves and devouring of capsules. First recorded by Schmutterer (1971) on okra at Bako. Tsedeke (1988) recorded on these hosts and on many other Malvaceae in Ethiopia. Gentry (1965) lists *P. pallidicolor* (Pic.) and *P. pallida* Jacoby as cotton pests. A major pest of cotton in the Setit Humera area where seedlings are destroyed soon after germination (Crowe et al. 1977).

***Podagrica* spp.**

Flea Beetles

Hosts include cotton, groundnut, kenaf, okra, soybean, haricot bean and sunflower. Very common at Bako and Didesa. Tsedeke et al. (1982) recorded it on soybean at Bako and Didesa and on haricot bean,

in Shewa. Common on a weed called Molukia (*Cochorus olitorius*) in bean fields.

***Sesselia pusilla* (Gerstaecker)**
(= *Exora) pusilla* (Gerstaecker)

Black Leaf Beetle

Recorded on cowpea, groundnut, haricot bean, kenaf, maize, millet, noug, sesame, sorghum, soybean, sweet potato and wheat. First recorded by Tsedeke et al. (1982) on soybean at Didesa. Tsedeke (1988) recorded it on groundnut, legumes, maize, sorghum, and sweet potato in Ethiopia. Attacks leaves of sweet potato, heads of sorghum (during early stages) and silks of maize. Outbreaks have bean observed on many of these crops in parts of Shewa and Welega but its economic importance is uncertain. *S. abyssinica* Lab. has been recorded by Nastasi and Andemeskel (1968) on faba bean from Adi Keyh (Eritrea).

Coccinellidae

***Chnootriba similis tellini* (Weise)**

Maize Ladybird Beetle

Recorded on barley. Only one record by Schmutterer (1971) feeding on leaves of young plants at north Gedo. No recent record.

***Epilachna similis* (Thumberg)**
(= *Chnootriba similis* (Thumberg))

Tef Epilachna (Maize Ladybird Beetle)

Hosts include tef, maize, sorghum, millet, wheat, barley, wild oat, grasses, faba bean and haricot bean. There was an outbreak on forage grasses at Bako Research Center during the 1985/86 crop season (IAR, 1990). Schmutterer (1971) recorded it from Gedo (near Bako) feeding on leaves of young barley plants. Tsedeke (1988) recorded it on cereals, potato, sunflower, sweet potato and *Pennisetum* species. Common on tef and other cereals and grasses and sometimes damaging. *E. vigintipunctata* (Muls) has also been recorded from cereal crops (Gentry, 1965).

***Henosepilachna elaterii* (Rossi)**
(= *Epilachna chrysomelina* (F.))

Twelve-spotted Melon Beetle (African Melon Ladybird)

Recorded on anchote. Recorded in large numbers on anchote (*Coccinia abyssinica* (W & A) Cogn. Cucurbitaceae) (IAR, 1990). There were serious outbreaks in the main and off-seasons at Bako Research Center in 1986. Larvae damage the leaves. Tsedeke (1988) recorded it on cucurbits, green beans, potato and wild *Solanum* species. It is known to attack all Cucurbitaceae including watermelon, melon, cucumber, pumpkin, vegetable marrow and other crops such as cotton, lettuce and sunflower (Schmutterer (1969). It is common on melons and sometimes damages (Crowe et al., 1977).

***Epilachna hirta* (Thumberg)**

Potato Epilachna

Hosts include potato, vegetables (Solanaceae), wild *Solanum* species and grasses. Sporadic but widely distributed pest in Ethiopia (Crowe et al., 1977; Tsedeke, 1988).

***Epilachna fulvosignata* Reiche**
(= *Henosepilachna fulvosignata* Reiche)

Egg Plant Epilachna

Recorded on egg plant and potato. First recorded by Schmutterer (1971) from Bako. More harmful to egg plant by feeding on leaves in its larval and adult stages. Occurs in small numbers. Also recorded on egg plant, potato and wild *Solanum* species as a minor pest occurring in many parts of Ethiopia (Tsedeke, 1988). Usually a minor pest of egg plant and potato but few heavy outbreaks have been recorded in many parts of the country (Crowe et al., 1977).

***Henosepilachna reticulata* (Ob.)**

Reticulate Cucurbit Beetle*

Recorded on melon and cucumber. Also recorded by Schmutterer (1971) from Bako. Recently Tsedeke (1988) recorded it as a minor pest of wild cucurbits at higher altitudes.

Curculionidae

Afrophytoscaphus variabilis **Hustache**
Afrophytoscaphus variabilis **subsp.** ***subvirgatus*** **Marshall**

Soya Leaf Weevils*

Hosts include maize, sorghum, cowpea, groundnut, haricot bean, pepper, sesame, sunflower, soybean and tef. First recorded by Tsedeke et al. (1982) on cowpea and soybean from Bako and Didesa; heavy infestations were observed on soybean during the 1980/81 cropping season. Up to 48 individuals per cob were also noted on maize silks and sorghum heads at Didesa in the 1983/84 and 1984/85 seasons (IAR, 1986). The two species occur together.

Blosyrus rugulosus **Aurivillius**
Blosyrus rugulosus abyssinicus **Aurivillius**

Rough Sweet Potato Weevils

Recorded on sweet potato. Tsedeke (1988) recorded it attacking stems of the plant at Bako and Awasa where sporadic outbreaks have been observed.

Cylas **sp.**

Sweet Potato Weevil

Recorded on sweet potato. Only one record from Bako attacking tubers. Tsedeke (1988) recorded *C. compressus* Hartman on sweet potato from Harerge, Shewa, Gamo Gofa and Sidamo. The same species was also recorded by Crowe et al. (1977) to be common in

Arsi and Shewa but apparently rare in other provinces. Other species may also be present in the country. *C. puncticollis* Boh. has been recorded on sweet potato and wild Convolvulaceae family in Tanzania (Bohlen, 1973) and Hill (1983) reported *C. formicarius* (F.) and *C. puncticollis* Boh. as a serious pest of sweet potato in tropical Africa.

***Lixus latro* Marshall**

Cabbage Weevil

Recorded on cabbage and rape. A very serious pest at Bako and between Nekemte and Gimbi. Larvae bore the stems, causing stunted growth and eventual death of attacked plants; adults may also feed on the leaf (Schmutterer, 1971). Some damage to cabbage and other brassicas, especially in Eritrea, has been reported (Crowe et al., 1977). Gentry (1965) reported up to 66% infestation in Eritrea while Tsedeke (1988) recorded it in the highlands of Eritrea, Shewa and Welega on cabbage, rape, radish and many other crucufers. *L. incurvinasus* Csk. is recorded as a minor pest of sorghum (Gentry, 1965).

***Nematocerus brachyderes* Marshall**

Shiny Cereal Weevil

Hosts included cowpea, maize, sorghum, millet, tef, soybean, okra, pepper, and sesame. Another species of *Nematocerus* was also recorded on cowpea and soybean at Bako and Didesa (Tsedeke et al., 1982). Only light infestations have been observed. Considered to be the most serious leaf-feeding beetles on haricot bean in Kenya (Khamala, 1978). Barley, maize, wheat, and other cereals are major hosts while beans, coffee, tea and many other crops and plants are recorded as alternate hosts (Hill, 1983).

***Sitophilus oryzae* (Linnaeus)**
(= *Calandra oryzae* (L.))

Rice Weevil

Recorded on maize and sorghum. Recorded as one of the major pests of stored maize in the vicinity of Bako (Abraham (1991; 1992). It occurs more on sorghum than maize and is less frequent than the maize weevil in Bako area (not recorded from Bako Research Center). Walker and Boxall (1974) recorded it on chickpea, coffee beans, haricot bean, macaroni/spaghetti, maize, millet, rice, sorghum and wheat in Ethiopia. It attacks all cereals in storage and is one of the commonest and most distractive storage pests in the warmer parts of the world, occurring both in field and in storage (NRI, 1991, Hill, 1983).

***Sitophilus zeamais* Motschulsky**
(= *Calandra zeamais* (Motsch.))

Maize Weevil

Recorded on maize and sorghum. Recorded as the most important pest of maize and sorghum in stores (Schmutterer, 1971; Abraham, 1991; 1992). Infestation starts in the field. Up to 80% (Schmutterer, 1971), 100% (Abraham, 1991) damage was observed in stored maize at Bako. Walker and Boxall (1974) recorded it on maize, barley, haricot bean, sorghum and wheat in Ethiopia. A major pest of maize and also commonly found on sorghum. It is one of the commonest and most destructive storage pests in the warmer parts of the world (NRI, 1991; Hill, 1983). A third species *S. granarius* (L.) has been recorded in small numbers on maize, wheat, barley, beans and sorghum in the highlands of Ethiopia (McFarlane, 1969).

***Systates* spp.**

Systates Weevils

Hosts include coffee, citrus and soybean. Occurs in small numbers; rarely seen in the day time and feeds on edges of leaves producing characteristic feeding damage. Tsedeke et al. (1982) recorded from soybean at Didesa. Crowe et al. (1977) noted characteristic damage symptoms of the pest on chat (*Catha edulis*), citrus, coffee and many other crops in Ethiopia. Many *Systates* spp. are probably concerned. Hill (1966) listed *Systates* sp. nr. *noxius* Hust. from Harerge. *S. pollinosus* (Gerst.) has been recorded on citrus, coffee, and a wide range of cultivated and wild plants in other parts of the world (Hill, 1983).

Cucujidae

***Cryptolestes pusillus* (Schonherr)**

Flat Grain Beetle

Recorded on maize. Recorded in large numbers on stored maize in the Bako area (Abraham, 1991). Walker and Boxall (1974) recorded it in small numbers on maize, sorghum, safflower, wheat and McFarlane (1969) recorded it on maize and sorghum. Mixed populations of more than one species of *Cryptolestes* often occur. This species is more common in humid tropical situations. It is found in mills and grain stores in the tropics. NRI (1991) recorded *C. pusilloides* (Steel and Howe) in East Africa and other parts of the world.

***Cryptolestes ugandae* Steel and Howe**

Flat Bark Beetle

Recorded on maize. Recorded on stored maize from Bako area (Abraham, 1991). No previous record in Ethiopia. It has been found on cassava, groundnut, maize and sorghum from Uganda, Ghana and Nigeria, especially where the humidity is high. It appears to be restricted to tropical Africa (NRI, 1991).

***Cryptolestes ferrugineus* (Steph.)**

Flat Grain Beetle

Recorded on maize. Recorded in large numbers from maize samples collected from farm stores in the Bako vicinity (Abraham, 1991) . Walker and Boxall (1974) reported it on barley, garlic, groundnut, chilli pepper, maize, sorghum and wheat; more common on wheat, maize and sorghum (McFarlane, 1969). It is an important secondary pest of cereal grains and nuts and is a common pest of oilseed cake, dates and other dried fruits, often following infestations by other insects (NRI, 1991).

Lagriidae

***Chrysolagria* sp.**

Hosts include finger millet, forage grasses and weeds. Tsedeke (1988) recorded one species, *Chrysolagria cuprina* (J. Thompson) on beans, sunflower, sweet potato, wheat and several weed species. Widely distributed but apparently not damaging.

***Lagria villosa* Fabricius**

Metalic Leaf Beetle

Hosts include cowpea, egg plant, faba bean, groundnut, haricot bean, kenaf, millet, potato, sesame, soybean, and tef. A very polyphagous and widespread but minor pest. An important pest of cowpea at Bako (Abraham, 1987). Tsedeke (1988) recorded it on beans, cabbage, cotton, fig, oleander, potato, tomato, spinach, sweet potato, Swiss chard, tea, and many weeds including *Setaria verticillata*. Tsedeke et al. (1982) reported it from cowpea and soybean in Shewa, Kefa and Gamo Gofa. Crowe et al. (1977) also listed it as a minor pest of beans, potato, sweet potato and tomato. Suspected to be a vector of cowpea mosaic virus (Singh and Taylor, 1978).

Meloidae

***Coryna* spp.**

Pollen Beetles

Recorded on cowpea, haricot bean, lupin, soybean, pigeon pea and desmodium (*Desmodium unicenatum*). Occurs in large numbers and cause damage by devouring the flowers. Tsedeke et al. (1982) recorded *Coryna* spp. on pigeon pea at Nazreth and Crowe et al. (1977) reported several species of *Coryna* including *C. apicicornis* Gr. and *C. tigrina* Kl. on bean flowers and other plants, sometimes damaging the ovary and preventing fruit set. Bohlen (1973) recorded *C. kersteni* to be a common pest in many African countries.

***Epicuta albovittata* Gestro**

Striped Blister Beetle

Hosts include cowpea, haricot bean and soybean. Also recorded by Tsedeke et al. (1982) as a minor pest at Didesa and other parts of Ethiopia. Tsedeke (1988) recorded it on beans, beet, egg plant, and hot pepper. Adults feed on leaves and flower pods; it is more important on beans in the lowlands. Another species, *E. tomentosa* (Makl), is known to cause similar damage in eastern Gonder (Tsedeke, 1988).

***Mylabris designata* Reiche**
***Mylabris flavoguttata* Reiche**
***Mylabris* spp.**

Pollen Beetles

Cowpea, faba bean, fieldpea, haricot bean, lupin, soybean other *Solanacea* and *Desmodium unicinatum* are hosts. Fairly common and widespread, feed on flowers and destroying them partly or completely. *M. designata* was first recorded by Schmutterer (1971) on pigeon pea at Bako. Tsedeke (1988) reported *M. designata* and *M. flavoguttata* on beans, cucurbits, potato, other *Solanacea* and other wild *Crotolaria* spp. and acacias. Crowe et al. (1977) recorded *M. flavoguttata, M. designata and M. abyssinica* feeding on flowers of beans and other plants, sometimes damaging the ovary and preventing fruit set. At least five species including *M. bifasciata* Deg., *M. abyssinica* Mars., *M. ligata* Mars and *M. convexior* Pic. are known to occur in Ethiopia (Tsedeke, 1988).

Mycetophagidae

***Mycetophagus* sp.**

Fungus Beetle

Recorded on maize. Recorded on stored maize in the vicinity of Bako (Abraham, 1991). Occurs in fairly large numbers. Walker and Boxall (1974) observed it in small numbers on sorghum and wheat and McFarlane (1969) on wheat in storage in Ethiopia. It is not an important pest but a reliable indicator of damp and mouldy storage conditions (NRI, 1991).

***Typhaea stercorea* (Linnaeus)**

Hairy Fungus Beetle

Recorded on maize. Recorded in small numbers on stored maize from the vicinity of Bako (Abraham, 1991). Walker and Boxall (1974) recorded it on chickpea, coffee beans, groundnut, chilli pepper, maize, sorghum and wheat (found mainly on sorghum residues); and McFarlane (1969) recorded it on coffee bean residues. It is recorded on a wide range of commodities and most common in the tropics; it is fungivorous but low numbers have been reported in the absence of obvious mold growth (NRI, 1991).

Nitidulidae

***Brachypeplus* sp.**

Recorded on maize. Recorded in small numbers on stored maize in the

vicinity of Bako (Abraham, 1991). Walker and Boxall (1974) made one record on shelled and cob maize in Hararge province. *B. pilosellus* (Murray) and *B. gabonensis* (Grouvelle) have been recorded from stored cob maize, cacao and castor beans in several African countries (NRI, 1991).

Carpophilus dimidiatus **(Fabricius)**

Corn Sap Beetle

Recorded on maize. Recorded in large numbers (in association with other *Carpophilus* spp.) on maize and sorghum in field and storage in Bako area (Abraham, 1991). Walker and Boxall (1974) recorded it on chickpea, coffee beans, red pepper, Dura (*Sorghum* sp.), groundnut, haricot bean, maize and sorghum. Fairly common on maize and sorghum. It is probably the commonest species of *Carpophilus* occurring in storage; commonly found on cereals and cereal products, but also on oilseeds, cacao, nuts and several other commodities. On whole cereal grain it appears to be particularly associated with maize (NRI, 1991).

Carpophilus freemani **Dobson**

Sap Beetles*

Recorded on maize. Recorded in small numbers in association with other *Carpophilus* spp. on stored maize and sorghum in the Bako area (Abraham, 1991). No previous record in Ethiopia. It is not common in stores but has been recorded from cereal grains and nuts in Africa (NRI, 1991).

***Carpophilus* spp.**

Sap Beetles*

Recorded on maize. Recorded in association with the above species (Abraham, 1991; 1992). Walker and Boxall (1974) recorded *C. hemipterus* (L.) on Durra, maize and sorghum and *C. zeamais* Dobson on newly harvested maize in Ethiopia. *C. zeamais* is mainly restricted to eastern Africa where it was recorded from stores in Ethiopia, Kenya, Uganda and Swaziland on maize. Many other species including *C. fumatus* Boh., *C. ligneus* Murry, *C. maculatus* Murry, *C. margiuellus* Motsch., *C. mutilatus* Erichson, *C. obsoletus* Erichson, *C. pilosellus* Motsch (= *C. halli* Dobson), and several others were recorded to be associated with several commodities in many parts of the world (NRI, 1991).

***Pria* sp.**

Solanum Sap Beetle

Recorded on Sodom apple (*Solanum incanum*). May be potentially important on cultivated Solanacea. Recorded by Tsedeke (1988) from Arjo (Welega) and from Harerge by Hill (1966).

Scarabaeidae

***Schizonycha* spp.**

Chaffer Grubs

Hosts include maize, sorghum, groundnut, soybean, many other cereals and weeds. Severe outbreaks occurred particularly on maize and sorghum seedlings in state farms in Welega (Belo, Berida, Didesa, Fincha, Jirma, Loko, Uke) during the 1985/86 crop season. About 15,000 ha of maize was attacked in these farms of which about 6000 ha was replanted because of severe damage by the pest. Damage is commonly reported from all parts of Ethiopia. Crowe and Tadesse (1984) reported on coffee in Ethiopia. Several species have been observed.

***Pachnoda abyssinica* Blanford**

Yellow Rose Chaffer*

Recorded on rose at Bako. Most often reported as damaging garden flowers, especially yellow roses; it has also been recorded on *Acacia abyssinica*, citrus and roses from the highlands of Eritrea, Gojam, Ilubabor and Shewa (Tsedeke, 1988; Clark and Crowe, n.d.). Fairly uncommon and is endemic to Ethiopia (Clark and Crowe, n.d.).

***Pachnoda stehelini* Schaum**

Rose Chaffer

Recorded on sorghum. Heavy infestations occurred on sorghum in 1985 at Bako; otherwise, a minor pest but widely distributed. Clark and

Crowe (n.d.) and Tsedeke (1988) recorded it on sorghum, *Schinus molle*, roses and other ornamentals. *P. crassa crassa* Schaum, *P. crassa fairmairei* Raffray, *P. interrupta* (Oliv.), *P. massajae* Gestro, *P. peregrina* Kolbe, *P. thoracica* (Fab.), *P. sobrina* Gory and Pench have been recorded on several crops and plants in Ethiopia (Clark and Crowe, n.d.; Tsedeke, 1988).

***Trichothyrea mulsanti* Guerin**

Recorded on noug and fieldpea. Recorded by Schmutterer (1971) on noug at Bako and on field pea at Gedo. No recent record.

Silvanidae

***Ahasverus advena* (Waltl)**

Foreign Grain Beetle

Recorded on maize. Observed to be widely distributed but was not recorded in large numbers (Abraham, 1991). McFarlane (1969) recorded it from maize and Walker and Boxall (1974) from maize, wheat, coffee beans, groundnut and haricot bean. Found in a wide variety of commodities including cereal grains and grain products, cocoa beans, copra, groundnut, palm kernels and other oilseeds, especially if the commodity is damp and mouldy; good indicator of damp storage conditions. Most common in tropical Africa and Asia; frequently found, but of insignificant pest status in most situations (NRI, 1991).

***Oryzaephilus gibbosus* Aitken**

Flat Bark Beetle*

Recorded on maize. Observed in small numbers from maize samples collected from farmers' stores (Abraham, 1991). No previous record in Ethiopia. In east Africa it is recorded on coconut and groundnut (NRI, 1991).

***Oryzaephilus mercator* (Fauvel)**

Merchant Grain Beetle

Recorded on maize and sorghum. Recorded in fairly small numbers from maize in on-farm storage in the Bako area (Abraham, 1991). McFarlane (1969) recorded one specimen on sunflower seed while Walker and Boxall (1974) recorded it from sorghum, wheat, Durra, dried fruits, groundnut, and sunflower seeds. Fairly common on sorghum. It is mostly found in the warmer temperate and tropical regions, more commonly on oilseeds, though it is also sometimes found on cereals (NRI, 1991).

***Oryzaephilus surinamensis* (Linnaeus)**

Saw-toothed Grain Beetle

Recorded on maize. Recorded in fairly large numbers from farm-stored maize in the Bako area (Abraham, 1991). McFarlane (1969) observed it on maize, sorghum and sunflower seeds and Walker and Boxall (1974) found it on bone meal, groundnut cake, groundnut, maize, millet, rice, shade tree seeds, sorghum, safflower seed and wheat.

Common on maize and sorghum. Also common secondary pest of cereals and cereal products and is cosmopolitan by distribution (NRI, 1991).

Tenebrionidae

***Gnatocerus cornutus* (Fabricius)**

Broad-horned Flour Beetle

Recorded on maize. Recorded in fairly large numbers from farm-stored maize samples collected from Bako area (Abraham, 1991). McFarlane (1969) and Walker and Boxall (1974) found it on haricot bean, macaroni/spaghetti, maize, sorghum and wheat. It has a widespread distribution but not common. It is a minor secondary pest of cereals and has frequently been found in flour mill, oilseeds, semolina, cacao beans and ginger are among other commodities it can infest. A related species, *G. maxillosus* (Fab.) has been recorded in abundance on maize cobs stored in cribs in Nigeria (NRI, 1991).

***Gonocephalum simplex* (Fabricius)**
(= *Dasus simplex (Fabricius)*)

Dusty Brown Beetle

Recorded on cabbage. Also recorded by Schmutterer (1971) feeding on stems of young plants near ground level at Bako. Both the soil dwelling larvae (false wireworms) and the adults are sometimes damaging to cereal seedlings (Crowe et al. (1977). The adult is also a sporadic pest of coffee bushes, eating barks and the stalks of berries (Crowe et al., 1977; Crowe and Tadesse, 1984). Tsedeke et al. (1982) listed it on chickpea while Tsedeke (1988) recorded it as a polyphagous pest

attacking beans, coffee, cotton, maize, potato, tobacco and vegetables in Ethiopia. A related species, *C. batatae* (Erichson) has also been recorded on artichoke (*Cynara scolymus*), cabbage and radish from Harerge (Hill, 1966) and *G. dermestoides* Herst. on cotton (Crowe et al., 1977).

***Gonocephalum* sp.**

Recorded on maize. Adults recorded in a very small numbers on farm-stored maize in the Bako area (Abraham, 1991). Walker and Boxall (1974) recorded one specimen on stored sorghum in Harerge province. Unusual pest of stored products. Occurs in tropical and sub tropical regions of Africa and Asia, and has been recorded on cereals and palm kernels (NRI, 1991).

***Palorus laesicollis* (Fairmaire)**

Darkling Beetle*

Recorded on maize. Recorded in fairly large numbers on farm-stored maize in the Bako area (Abraham, 1991). McFarlane (1969) recorded one specimen on sorghum and Walker and Boxall (1974) made several records from wheat and sorghum. The highlands of Kenya and Ethiopia are the limits of the recorded distribution. Occurs on damaged maize and is sometimes abundant on various cereal grain residues in farm stores, but is not a significant pest of stored grain (NRI, 1991).

***Palorus subdepressus* (Wollaston)**

Deperssed Flour Beetle

Recorded on maize. Recorded in fairly large numbers on farm-stored

maize in the Bako area (Abraham, 1991). McFarlane (1969) and Walker and Boxall (1974) recorded it on stored sorghum. Schmutterer (1969) recorded it as a minor pest of cereals and cereal products and is often found associated with *Sitophilus* spp. Many other related species are known to occur elsewhere in the world (NRI, 1991).

Tribolium castaneum **((Herbst)**

Red Flour Beetle

Hosts include maize and sorghum. Recorded in large numbers on stored maize in the Bako area (Abraham, 1991). Very common and widespread secondary pest of stored products. It was also recorded by McFarlane (1969) on maize, sorghum and wheat and by Walker and Boxall (1974) on barley, beans, biscuits, bone meal, *Carum copticum* L., castor beans, chickpea, coffee beans, cotton seed, dried fish, dried fruit, groundnut cake, haricot bean, faba bean, lentils, maize, millet, rice, sorghum, tef, and wheat. Larvae and adult feed on a wide range of durable commodities and are important secondary pests of cereals throughout the world (NRI, 1991).

Tribolium confusum **J. du val**

Confused Flour Beetle

Recorded on maize and sorghum. Recorded in large numbers on stored maize (Abraham, 1991) and sorghum (Schmutterer, 1971; McFarlane, 1969; Walker and Boxall, 1974), coffee beans and groundnut (Walker and Boxall, 1974). It is believed to have originated in Ethiopia and is much less frequent in the tropics. This species has been found to be more successful than *T. castaneum* on undamaged cereal grains.

Competition between them is complex and mixed populations of the two species are usually found only when the populations are small (NRI, 1991).

***Tribolium* sp.**

Flour Beetle*

Recorded on maize. Unidentified species has been recorded on maize (Abraham, 1991; 1992). *T. destructor* Uttenb. is recorded by Walker and Boxall (1974) on groundnut, haricot bean, sorghum and wheat in small numbers. *T. destructor* is reported to occur in the highlands of Ethiopia (NRI, 1991). Several other species have also been known to occur in the world (NRI, 1991).

Trogossitidae

***Tenebroides mauritanicus* (Linnaeus)**

Cadella

Recorded on maize and sunflower. Recorded by Schmutterer (1971) from sunflower and Abraham (1991) from stored maize at Bako Research Center. McFarlane (1969) recorded only one specimen from sunflower seeds. It is the only trogossitid known to occur frequently in stored products, and is well known as a minor pest and predator of other insects (NRI, 1991).

LEPIDOPTERA

Epiplimidae

***Leucoplema* sp. nr. *dohertyi* Warren**
(= *Epiplema dohertyi* (Warr.))

Coffee Leaf Skeletonizer

Recorded on coffee. Found in small number in all coffee plantations at Bako and Gimbi (Schmutterer, 1971). Larvae feed on the underside of leaves, usually near the midrib; everything, except the veins and upper epidermis is eaten, leaving irregular lace-like patches in the leaf. Very common on coffee throughout Ethiopia but usually well controlled by parasites (Crowe et al., 1977).

Gelechiidae

***Phthorimaea operculella* Zeller**
(= *Gnorimoschema operculella* (Zeller))

Potato Tuber Moth

Recorded on potato. Recorded by Abraham on farm-stored seed tuber at Bako Research Center in 1986 when there was an outbreak. Tsedeke (1988) recorded it on eggplant, hot pepper, potato, tomato, radish, tobacco and on weeds like *Datura stramonium, solanum incanum* and *S. muricatum*. On tobacco, it mines the lower leaves, causing gall formation in shoots of seedlings; on tomatoes, it is important as a fruit borer and leaf miner.

***Sitotroga cerealella* (Olivier)**

Angoumois Grain Moth

Recorded on maize and sorghum. It has been recorded in large numbers on stored maize and sorghum (Walkingham, 1991; 1992). It has been recorded on wheat, barley, maize, sorghum and beans (McFarlane, 1969; Walker and Bozal, 1979). It is an important primary pest of cereal grains throughout the region followed by Sitophilus weevils. More prevalent on unshelled maize and unthreshed sorghum.

Gracillaridae

***Acrocercops bifasciata* Walsingham**

Cotton Leaf Miner

Recorded on cotton. First recorded by Schmutterer (1971); Crowe et al. (1977) recorded it to be more common in the Ogaden area.

***Acrocercops* sp.**

Cotton Leaf Miner

Recorded on coffee. Recorded by Schmutterer (1971) in small numbers on coffee in all coffee plantations at Bako and Gimbi; a minor pest of no economic importance. No recent records.

Lymantriidae

***Euproctis* sp.**

Recorded on sorghum. Common in sorghum heads at Bako and Didesa. De Lotto (1950), cited by Tsedeke (1988), recorded *E. dewitzi* Grunb from Asmara. Hill (1966) recorded *E. aethiopica* Sn. from cabbage in Harerge.

Lyonetiidae

***Bedella somnulentella* Zeller**

Sweet Potato Leaf Miner

Recorded on sweet potato. Occurs sporadically in small numbers in the Bako area. First recorded by Schmutterer (1971). Gentry (1965) noted heavy populations in sweet potato in Kefa province. No other host is recorded in Ethiopia but in other parts of the world it is known to attack many species of *Convolvulaceae* including the hedge bind weed (*Convolvulus sepium*) and morning glory (*Ipomoea purpureae*). Outbreaks occur sometimes and could claim up to 23% yield loss. Common in southwestern Ethiopia (Tsedeke, 1988).

***Leucoptera meyricky* Ghesquiere**

Coffee Leaf Miner (= Coffee Blotch Miner)

Recorded on coffee. Typical mines of the pest with scattered eggs have been seen near Dembi Dolo and Agaro although no moths were reared. It is a very rare pest. Also recorded by Crowe et al. (1977).

***Leucoptera sp. near. coffeina* Washbourn**

Coffee Leaf Miner (= Coffee Blotch Miner)

Recorded on coffee. Occurs in small numbers in all coffee plantations at Bako and Gimbi. Recorded by Schmutterer (1971). Crowe et al. (1977) recorded it to be common but not usually damaging in all coffee-growng areas of Ethiopia. Crowe and Tadesse (1984) recorded this and the above species on coffee in Ethiopia.

Noctuidae

***Agrotis* spp.**

Cutworms

Recorded on cabbage, maize, onion, pepper, potato, sorghum, sunflower, tef and many other crops. There were serious outbreaks on seedlings of onion at Bako Research Center in 1984/85 and 1985/86, being more serious during off-seasons. Schmutterer (1971) noted a few caterpillars near damaged stems of young cabbage plants at Bako. Five species of *Agrotis* are known in Ethiopia, these are *A. ipsilon* (Hufn), *A. segetum* (Schiff) and *A. spinifera* (Hbn) (Crowe et al., 1977) and *Euxoa cymogapta* Hampson and *E. longidentifera* Hampson (Tsedeke, 1988). *A. segtum* and *A. ipsilon* are probably the commonest cutworms in southern and northern Ethiopia respectively. *A. spinifera* is common in the Sudan (Crowe et al., 1977).

***Busseola fusca* (Fuller)**

Maize Stalk Borer

Hosts include maize, pearl millet, sorghum and sugarcane. An important major pest of maize and sorghum in Kefa, Ilubabor, Welega and Asosa areas (IAR, 1985) mainly in late-sown fields. Very heavy infestations (up to 15 larvae/plant) have been recorded on seedling maize in the 1984/85 and 1992/93 on on-farm demonstration plots at Cheri area and in the 1993/94 on off-season breeding materials at Bako Research Center. Also recorded by Schmutterer (1971) on maize and sorghum at Bako. A major pest of maize and sorghum at higher altitudes and cooler areas in Ethiopia (Crowe et al., 1977; Assefa, 1985) and in many sub-Saharan Africa (Bohlen, 1973; Bosque-Perez, 1992).

***Earias biplaga* Walker**
***Earias insulana* (Boisduval)**

Spiny Bollworm

Recorded on cotton. Also recorded by Schmutterer (1971). Crowe et al. (1977) reported it as a serious pest of cotton all over Ethiopia. *E. insulana* is more common in desert areas while *E. biplaga* is more common in Sidamo. Seven species of *Earias* are found on cotton in different parts of the old world (Hill, 1983).

***Eublemma gayneri* Rothschild**

Maize Cob Worm

Hosts include sorghum and maize. Schmutterer (1971) recorded it from sorghum at Bako and maize (cobs already damaged by other pests) at

Melka Werer, in association with *H. armigera*, *Salebria mesozonella* and other caterpillars. It pupates in sorghum heads. Another species, *E. olivacea* (Walker), has been recorded by Hill (1966) on fig from Harerge. No recent records.

***Helicoverpa armigera* (Hübner)**
(= *Heliothis obsoleta* (F.),
***Heliothis armigera* (Hübner))**

African Bollworm

Hosts include alfalfa, barley, chickpea, cowpea, cotton, cucumber, *Datura stramonium*, *Dolichos lablab*, egg plant, faba bean, fieldpea, fig, flax, groundnut, *Guizotia scabra*, haricot bean, kenaf, lentil, lupin, maize, noug, oil radish, okra, rapeseed, red pepper, sesame, sorghum, soybean, sunflower, sweet clover, tef, tomato, potato, vetch, wheat, etc. *Guizotia scabra* is the most preferred wild host from which it migrates to crops. First recorded by Schmutterer (1971) on numerous crops in Bako area. A major pest of hot pepper, tomato, grain legumes, cotton and sorghum throughout Ethiopia (Crowe et al., 1977; Tsedeke et al., 1982; Tsedeke, 1988; Adhanom et al., 1985). Common on maize but not very damaging. Infestations are more severe on crops growing in warmer, low altitude areas (Tsedeke et al., 1982); 34% damage was recorded on red pepper at Bako (Schmutterer, 1971) and 46% yield loss on haricot bean in Ethiopia (Tsedeke et al., 1982). A sporadically very serious pest of cotton and beans in many parts of the old World (Hill, 1983). *H. nubigera* H-S. which also has a wide host range has been recorded in Eritrea (De Lotto, 1947-50).

***Heliothis peltigera* Schiffermuller**

Safflower Budworm

Recorded on safflower. Recorded in limited numbers feeding on leaves and flowers at Bako (Schmutterer, 1971). Common on safflower, especially grown at lower altitudes in Ethiopia (Crowe et al., 1977). Tsedeke et al. (1982) recorded it from mungbean at Kobo.

***Mentaxya ignicollis* (Walker)**

Red Tef Worm

Recorded on tef. Severe infestations and losses ranging from 10 to 30% have been reported since 1970 when it was first reported as a pest of tef grown on Vertisols, especially in Shewa, Kefa and Welega (Adugna and Kemal, 1985); infestations are usually reported in October (Crowe et al., 1977).

***Sesamia calamistis* Hampson**

Pink Stalk Borer

Hosts include maize and sorghum. Recorded from Mendi area; a minor pest of maize and sorghum in Ethiopia (Assefa, 1985). Previously recorded from Sidamo province (Crowe et al., 1977). Pest of sporadic importance on a wide range of gramineous crops in Africa; maize, sorghum, millets, rice, sugarcane and various species of wild grasses (Bohlen, 1973; Hill, 1983). Other species, *S. cretica* Lederer on sorghum, *S. epunctifera* Hampson on wheat have been recorded in Eritrea (Crowe et al., 1977) and *S. botanephaga nonagriaoides* Tams and Bowder on sugarcane in the mid and upper Awash (Tsedeke,

1988). *S. inferens* (Walk.) was recorded on rice, sugarcane, maize, sorghum, wheat, other cereals and many other grasses in East Africa (Hill, 1983).

***Spodoptera exempta* (Walker)**
(= *Laphygma exempta* (Hübner))

(African) Armyworm

Hosts include maize, sorghum, tef, finger millet, other cereals and various grasses. Leaves eaten down to the midrib; a major migratory and sporadic pest that causes great devastation in outbreak years. In non-outbreak years they are non-gregarious; Schmutterer (1971) recorded single caterpillars causing damage to young leaves of maize and sorghum at Bako. Outbreaks occur from every other year to every two to four years in the vicinity of the Bako Research Center.

***Spodoptera exigua* (Hübner)**
(= *Laphygma exigua* (Hüb.))

Lesser Armyworm

Recorded on fieldpea. Recorded by Schmutterer (1971) on fieldpea from Bako and on alfalfa from Melka Werer. The worm defoliates seedlings of many crops. Tsedeke et al. (1982) recorded it on haricot bean, pigeon pea, soybean, sorghum, maize and onion. Outbreaks occur in some seasons. Crowe et al. (1977) noted it as a serious pest of maize, cotton, sesame and other seedlings. Tsedeke (1988) recorded it on onion, beet, lettuce, Swisschard, alfalfa, cotton, lupin, maize, pea, sesame, sorghum, and *Datura stramonium*.

***Spodoptera littoralis* (Boisduval)**
(= *Prodenia litura* Auct)

Cotton Leafworm

Recorded on groundnut. A few caterpillars caused slight damage to young leaves. First recorded by Schmutterer (1971) from Bako and Melka Werer. A major pest of irrigated crops grown in the dry season. Locally severe outbreaks have been noted on cotton, pea, alfalfa and other crops (Crowe et al., 1977). Tsedeke et al. (1982) recorded it on cowpea and soybean from Melka Werer. It was also recorded on cabbage, sweet potato, *Capsicum* spp., alfalfa, cotton, cowpea, and faba bean (Tsedeke, 1988). A polyphagous pest widely distributed in Ethiopia. Another species, *S. mauritia* (Boisd.) has been recorded on rice, maize, sugarcane, Cruciferae, and other Gramineae from Tanzania and Uganda (Hill, 1983).

Papilionidae

***Papilio demodocus* Esp.**

Orange Dog (Lemon Butterfly)

Recorded on citrus. Widespread and common but causes slight damage in the Bako area. First recorded by Schmutterer (1971). Crowe et al. (1977) noted it to be very common on citrus and Tsedeke (1988) recorded it on citrus and alfalfa throughout Ethiopia; infestations on young trees may need to be controlled. A related species, *P. dardanus* Brown was recorded as a minor pest of citrus in many citrus growing areas of Ethiopia (Crowe et al., 177; Tsedeke, 1988).

Phycitidae

***Salebria mesozonella* (Bradl)**

Phycitid Moth*

Recorded on sorghum by Schmutterer (1971). Active caterpillars feed on sorghum grain in association with *Eublemma gayneri, H. armigera* and others at Bako. No recent record. Schmutterer (1969) recorded it to be a recently described species attacking sorghum in the Sudan.

Psychidae

Psychid sp.

Bagworm

Recorded on *Cupressus lusitanica*. Recorded by Abraham in 1993 when heavy infestation and damage were observed in late November on the host planted as hedgerows at Bako School. The larvae build cases out of leaf fragments in which the body is protected. When feeding, the thorax and head protrude from the case, and attachment is effected by the thoracic legs holding on to the leaf. Larvae hanging from the twigs or leaves defoliate the host by eating the leaves, and the plant generally is festooned with the hanging cases. Hill (1966) recorded *Acanthopsyche* sp on flamboyant tree in Harerge. Hill (1983) reported that many bagworms show polyphagous feeding habits, and have been recorded from many different host plants throughout the tropical regions of the world.

Pyralidae

Chilo partellus **(Swinhoe)**
(= *Chilo zonellus* (Swinhoe))

Spotted Stalk Borer

Recorded on maize and sorghum. An important stem borer in some localities and years than in others. There were very heavy infestations on maize seedlings in on-farm trial sites between Bako and Nekemte in the 1984/85, 1985/86 and in 1989/90 crop seasons. Farmers' fields nearby were not attacked as seriously as the trial plots, probably because of early planting. Schmutterer (1971) recorded it as a major pest of maize and a minor pest of sorghum and sugarcane in Melka Werer. Tsedeke (1988) recorded it from sugarcane, sorghum, maize and many wild Gramineae. A major pest of maize and sorghum at low altitudes (below 1500 m) (Crowe et al., 1977; Tsedeke, 1988). It was recorded as a major stem borer species in Gambela (510-540 m) (IAR, 1985; Assefa, 1985). A widespread pest in east and north East Africa and in other parts of the tropics (Bohlen, 1973).

Ephestia cautella **(Walker)**
(= *Cadra cautella* (Walker))

Tropical Warehouse Moth (Almond Moth)

Recorded on maize and sorghum. Recorded in large numbers in association with other stored products pests (Schmutterer, 1971; Abraham, 1991). It was also recorded on wheat, oilseed cakes, beans, groundnut, barley, dried fish, haricot bean, maize, chilli pepper, rice, sorghum and sunflower seed in Ethiopia (McFarlane, 1969; Walker and Boxall, 1974). A serious pest of wide range of commodities, especially

cereal flours and cereal products in the tropics and subtropics (NRI, 1991). Another species, *E. kuehniella* Zeller, is also recorded on maize and sorghum in Ethiopia (Walker and Boxall, 1974).

***Hedylepta indicata* (Fabricius)**

Bean Webworm (Bean Leaf Folder)

Recorded on haricot bean and soybean. Occurs only in small numbers. Larva spins webs and folds the leaf. No previous record in the Bako area. Tsedeke et al. (1982) recorded it on soybean from Jima and noted that it could become a very important pest of soybean if large hectarages are to be produced. Singh and Taylor (1978) recorded it as a serious pest of legumes in Nigeria.

***Hellula undalis* (Fabricius)**

(Oriental) Cabbage Webworm

Recorded on cabbage. A very minor and rare pest recorded by Schmutterer (1971) from Bako. Tsedeke (1988) recorded it on cabbage from other parts of Ethiopia. Attacks stems, leaves and growing points; attacked leaves are spun together by a web of silk. It is only found on crops belonging to the family Cruciferae and occurs in many African countries (Bohlen, 1973).

***Marasmia* sp.**

Maize Webworm

Recorded on maize and sorghum. Recorded in small numbers in 1988/89 and 1989/90 seasons from Bako and Fincha areas. The larvae

bind the two edges of the leaf together with silk to form a funnel and feed inside by biting small pieces from the upper surface. Hill (1983) recorded *Marasmia trapezalis* (Gn.) on maize, sorghum, millet, sugarcane, rice, wheat and many wild grasses from East Africa. Not usually a serious pest but infestations are common in some seasons and are quite conspicuous.

***Maruca testulalis* (Geyer)**

Spotted Bean Borer (Bean Pod Moth)

Hosts include cowpea, soybean and haricot bean. Recorded in small numbers. Tsedeke et al. (1982) recorded it on these hosts and on limabean and mungbean from different parts of Ethiopia. It is a regular but usually minor pest of pulses in East Africa and other parts of the tropics, although occasional serious outbreaks have been recorded (Hill, 1983).

***Plodia interpunctella* (Hubner)**

Indian Meal Moth

Recorded on maize, sorghum and red pepper. Recorded in large numbers on stored maize and sorghum (Abraham, 1991). Widespread and common pest of cereals but on hot pepper it was recorded for the first time in 1993 when there was an outbreak in farm-stores in the Bako area and at the Research center. Walker and Boxall (1974) made only two records on shelled maize while Kurtz (1961) reported its common occurrence on cereal grains in Ethiopia. It is prevalent in the highlands (NRI, 1991).

Spingidae

***Hippotion celerio* (Linnaeus)**

Silver-striped Hawk Moth (Vine Hawk Moth)

Host not known. Recorded from Bako. Tsedeke (1988) recorded it on citrus, cotton, grape, sweet potato and other wild hosts such as *Polygonum senegalensis, Rumex nervosus* and *Zantedeschia aethiopica*; very common at Melka Werer and Awasa. Hill (1983) recorded it as a minor pest of sweet potato and taro in Africa.

Yponomeutidae (= Plutellidae)

***Plutella xylostella* (Linnaeus)**
(= *P. maculipennis* (Curt.))

Diamond-back Moth

Hosts include cabbage, oil radish (*Raphanus sativus var. oleifera*), rape, and radish (*Raphanus sativus*). An important pest of cabbage at Bako. First recorded by Schmutterer (1971). Common on cabbage throughout Ethiopia but usually well controlled by natural enemies (Crowe et al., 1977). Tsedeke (1988) recorded it on cabbage, radish, carrot, sweet potato, *Matthiola incana* and *Rulac* sp. (Aceraceae); a major pest of cabbage in many parts of Ethiopia.

DIPTERA

Agromyzidae

Ophiomyia phaseolia **(Tryon)**
(= *Melanagromyza phaseolia* (Tryon))

Bean Stem Maggot (= Bean Fly)

Recorded on haricot bean. Recorded in small numbers from Bako. It is one of the major pests of haricot bean in other parts of the country (Crowe et al., 1977; Tsedeke et al., 1985). Tsedeke et al. (1982) recorded it on haricot bean and soybean from the southern and northern parts of Ethiopia and stated that heavy infestations occur during dry spells and can wipe out the whole crop during establishment in Tigray and northern Wolo. *O. spencerella* and *O. centrosematis* are also known to exist in Ethiopia attacking beans. A related species, *M. conavistae*, has been recorded on *Dolichos lablab* from Tanzania (Bohlen, 1973).

Tropicomyia flacourtiae **(Seguy)**

(=Melanagromyza coffea **Konigs.)**

Serpentine Leaf Miner (Coffee Leaf Miner)

Recorded on coffee. A few miners observed at Bako and Gimbi (Schmutterer, 1971). Crowe et al. (1977) recorded it on coffee in Ethiopia. No recent record.

Anthomyiidae

Delia arambourgi **(Seguy)**
(= *Hylemya arambourgia* Seg.)

Barley Fly

Tef, barley, wheat and various wild grasses are hosts of this pest. Occurs in large numbers, especially on late-sown tef. There was a complete destruction of late-sown tef fields near Bako in 1985. A serious pest of barley (Crowe et al., 1977), barley, wheat and tef (Adugna and Kemal, 1985) in Ethiopia. Another species, *D. cilicrura* (Rondani) has also been recorded attacking beans, cucurbits and maize in Ethiopia (Tsedeke, 1988).

Diopsidae

Diopsis thoracica **(Westw)**
(= *Diopsis longicornis* (Macquart))

Stalk-eyed Shoot Fly

Recorded on haricot bean, rice and sorghum. Recorded in small numbers on haricot bean and sorghum. Schmutterer (1971) recorded it to be abundant in rice plots at Bako. *Diopsis* sp. are common near swamps and are potential pests of rice. *D. affinis* (Adm.) and *D. ichneumonea* (Linnaeus) are also recorded in this country (Crowe et al., 1977).

Drosophilidae

***Drosophila* spp.**

Small Fruit Flies*

Recorded on maize. Recorded in large numbers from stored maize samples obtained from the Bako area (Abraham, 1991). No previous record on stored grain. *D. simulans* Sturt. was recorded on peach from Harerge (Hill, 1966).

Muscidae

***Atherigona var. soccata* Rondani**
(= *A. indica* Malk.)

Sorghum Shoot Fly

Hosts include sorghum, various grasses and tef. The most serious shoot fly pest of sorghum seedlings, especially in late-planted fields (Abraham, 1986; Adhanom and Abraham, 1985). Usually a minor pest if large areas of sorghum are sown early in the rains (Schmutterer, 1971). It is recorded on *Sorghum* spp., maize, millets, rice, wheat and the grasses *Andropogon sorghum, A. s. saccharatum, Cynodon dactylon, Eleusine* spp. and *Panicum* spp. from many countries including Ethiopia (Hill, 1983). Crowe et al. (1977) noted the occurrence of several *Atherigona* spp. on cereals and Adugna and Kemal (1985) reported *A. hyalinipennis* Emden and an unidentified species on tef in Ethiopia. In Nigeria 50 species have been recorded on cereal crops (Hill, 1983).

Trypetidae (Tephritidae)

***Acanthiophilus helianthi* (Rossi)**

Safflower Fly

Recorded on safflower. Recorded by Schmutterer (1971). Larvae and pupae found in flower heads at Bako and other parts of Ethiopia. A few severe local outbreaks have been observed (Crowe et al., 1977). No recent record.

***Ceratitis rosa* Karsch**
(= *Pterandrus rosa* (Kar.))

Natal Fruit Fly

Recorded on coffee and hot pepper. Maggots observed in numerous ripening berries of coffee and capsules of pepper at Bako (Schmutterer, 1971) and in southern Ethiopia (Tsedeke, 1988). Common in the pulp of ripe coffee and is a minor pest of pepper grown on light soils (Crowe et al., 1977). Related species, *C. capitata* (Wiedeman), *C. coffeae* (Bezzi) and *C. anonae* (Grah.) have also been recorded on coffee in Ethiopia (Crowe et al., 1977). *C. coffeae* is the only ceratitis listed as a pest of coffee by Crowe and Tadesse (1984). *C. capitata* has also been found on citrus, guava, hot pepper, coffee, and sugarcane (Tsedeke, 1988).

***Dioxyna sorocula* Wiedeman**

Noug Fly

Recorded on noug. First recorded by Schmutterer (1971). It is the most harmful pest of noug (maggots in heads destroy seeds). It has not been seen in great numbers in recent years but fresh outbreaks could occur at any time. Crowe et al. (1977) recorded it as a serious pest of noug in Welega and Shewa.

THYSANURA

Lepismatidae

***Thermobia domestica* (Packard)**

Firebrat

Recorded on maize. Only two specimens were found out of 1000 maize grain samples collected from Bako area (Abraham, 1991). No previous record in Ethiopia. Walker and Boxall (1974) recorded *Lepisma saccharina* L. on dried fruit, shelled maize, sorghum and wheat from Ethiopia and stated its widespread distribution but rarely found in large numbers. The Thysanura are detritus feeders; they need moist conditions and are not usually common in stores unless hygiene is very poor. In tropical stores *T. domestica* is the usual representative, although the cosmopolitan *L. saccharina* is also found (NRI, 1991).

REFERENCES

Abdurahman Abdulahi. 1990. Foraging activity and control of termites in western Ethiopia. A Thesis submitted for the degree of Doctor of Philosophy of the Univ. of London and for the Diploma of Imperial College. Dept. of Pure and Applied Biol. Imperial College of Science and Medicine. Silwood Park, Ascot, U.K.

Abraham Tadesse. 1987. The biology and seasonal fluctuation of some cowpea insect pests at Bako. Paper presented at the 19th NCIC, 22-26 April 1987, Addis Abeba, Ethiopia. IAR, Addis Abeba.

_____. 1986. Major insects of sorghum in Ethiopia and strategies for their control. Paper presented at the 5th Regional Workshop on Sorghum and Millet Improvement in Eastern Africa, 5-12 July 1986, Bujumbura, Brundi.

_____. 1991. The biology, significance and control of the maize weevil, *Sitophilus zeamais* Motsch. (Coleopt.: Curculionidae) on stored maize. MSc Thesis, Alemaya University of Agriculture, Alemaya, Ethiopia.

_____. 1992. Stored product insects associated with farm-stored maize in the Bako area, western Ethiopia (abstract). Proceedings of the Joint Conference of the Ethiopian Phytopathological Committee and Committee of Ethiopian Entomologists. 5-6 March 1992. EPC/CEE, Addis Abeba.

Abraham Tadesse, Ferdu Aszerefegn, Assefa G.Amlak and Adhanom Negassi. 1993. Research highlights on maize insect pests and their management in Ethiopia. p. 34-42. *In:* Benti Tolessa and Joel K. Ransom (eds.). Proceedings of the First National Maize Workshop of Ethiopia, 5-6 May 1992, Addis Abeba, Ethiopia. IAR/CIMMYT, Addis Abeba.

Adane Kassa and Abraham Tadesse. 1993. Damage to weight and germination of haricot bean caused by Mexican bean weevil, *Zabrotes subfasciatus* Boh. (Coleoptera: Bruchidae) at Bako. *In:* Proceedings of the First Conference of the Crop Protection Society of Ethiopia, 14-15 April 1993, Addis Abeba, Ethiopia. CPSE, Addis Abeba

Adhanom Negassi and Abraham Tadesse. 1985. A review of research on maize and sorghum insect pests in Ethiopia. p. 7- 19. *In:* Tsedeke Abate (ed.). A review of crop protection research in Ethiopia. Proceedings of the First Ethiopian Crop Protection Symposium. 4-7 Feb. 1985. Institute of Agricultural Research (IAR), Addis Abeba.

Adhanom Negasi, Tsedeke Abate, and Emana Getu. 1985. Research on insect pests of root and tuber crops in Ethiopia. p. 421-428. *In:* Tsedeke Abate (ed.). A review of crop protection research in Ethiopia. Proceedings of the First Ethiopian Crop Protection Symposium. 4-7 Feb. 1985. Institute of Agricultural Research (IAR), Addis Abeba.

Adugna Haile and Kemal Ali. 1985. A review of research on the control of insect pests of small cereals in Ethiopia. p. 57- 77. *In:* Tsedeke Abate (ed.). A review of crop protection research in Ethiopia. Proceedings of the First Ethiopian Crop Protection Symposium. 4-7 Feb. 1985. Institute of Agricultural Research (IAR), Addis Abeba.

Agyne-Sampong, M. 1978. Pests of cowpea and their control in Nigeria. p. 85- 98. *In:* S.R. Singh, H.F. Van Emden and T. A. Taylor (eds.). Pests of grain legumes: ecology and control. Academic Press, London.

Assefa G/Amlak. 1985. Survey of lepidopterous stem borers attacking maize in Ethiopia. Ethiop. J. Agric. Sci. 7:15-26.

Barnett, E.A.; R.H. Cowie, W.A. Sands and T.G. Wood. 1987. Identification of termites collected in Ethiopia in Jan.- Feb. and July 1986. Report prepared for the Ministry of Agriculture, Government of Ethiopia. Trop. Dev. and Res. Inst. (TDRI), Contract number Co696. 18 pp.

Battacharya, A.K. and Y.S. Rathore. 1977. Survey and study of the bionomics of major soybean insects and their chemical control. Dept. of Entomol., College of Agric., G. B. Part Univ. of Agric. and Technol., India, Res. Bulletin No. 107.

Bohlen, E. 1973. Crop pests in Tanzania and their control. Paul Parey, Berlin and Hamburg.

Bosque-Perez, N.A. 1992. Major insect pests of maize in Africa: biology and control. IITA Res. Guide 30. Training Program, IITA, Ibadan, Nigeria.

Clark, R.O.S. and T.J. Crowe (n.d.). The genus Pachnoda in Ethiopia: identification, pest status and control of the species. IAR, Addis Abeba, Ethiopia.

COPR (Centre for Overseas Pest Research). 1973. Pest control in groundnuts. PANS Manual No. 2, COPR, London.

_____. 1981. Pest control in tropical grain legumes. COPR, London.

_____. 1982. The locust and grasshopper. Agricultural Manual. COPR, London.

Cowie, R.H. and T.G. Wood. 1989. Damage to crops, forestry and rangeland by fungus-growing termites (Termitidae: Macrotermitinae) in Ethiopia. Sociol. 15 (2): 139-153.

Crowe, T.J. and Kemal Ali. 1983. A checklist of aphids recorded from Ethiopia (Homoptera: Aphididae). (2nd ed.), IAR Bull. No. 3, IAR, Addis Abeba. 9 pp.

Crowe, T.J. and Tadesse G.M. 1984. Coffee pests in Ethiopia: their biology and control. IAR, Addis Abeba. 45 p.

Crowe, T.J.; Tadesse G.M. and Tsedeke A. 1977. An annotated list of insect pests of field crops in Ethiopia. IAR, Addis Abeba. 71 p.

De Lotto, Giovanni. 1947-50. Gli insetti dannosi alle piante coltivate e spontanee dell' Eritrea. 1-4. Elenco delle specie riscontrate nel 1946 -1949. Boll. Soc. Ital. Med. Ig. Trop. (Sez. Eritrea).

FAO. 1984. Emergency assistance to control ants and termites in settlements of the Relief and Rehabilitation Commission, Ethiopia. TCP/ Eth./2312,8. FAO, Rome.

_____. 1994. Leucaena psylli in the Asia-Pacific region:implications for its management in Africa. Regional Office for Asia and the Pacific (RAPA) Publication: 1994/13.

Gentry, Joseph W. 1965. Crop insects of Northeast Africa-Southeast Asia. ARS, Agricultural Handbook No. 273. USDA, Washington, D. C.

Hill, B.G. 1966. Insects of cultivated and wild plants, Harar Province, Ethiopia, 1960-1964. Bull Entomol. Res. 56: 649- 670.

Hill, D.S. 1983. Agricultural insect pests of the tropics and their control. Cambridge Univ. Press, Cambridge.

IAR (Institute of Agricultural Research). 1985. Crop Protection Department Progress Report for the period 1983/84. IAR, Addis Abeba.

_____. 1986. Crop Protection Department Progress Report for the period 1984/85. IAR, Addis Abeba.

_____. 1990. Bako Research Center Progress Report for the Period 1985/86. IAR, Addis Abeba.

Irwin, M.E. 1978. Pests of soybean in the USA and their control. P. 141-150. *In:* Singh et al. (eds). Pests of grain legumes: ecology and control. Academic Press, London.

Kabir, A.K.M.F. 1978. Pests of grain legumes and their control in Bangladesh. p. 33-36. *In:* Singh et al. (eds.). Pests of grain legumes: ecology and control. Academic Press, London.

Kemal Ali, Alemayehu Referra and Adhanom Negassi. 1985. A review of oilcrops entomology in Ethiopia. p. 281- 289. *In:* Tsedeke Abate (ed.). A review of crop protection research in Ethiopia. Proceedings of the First Ethiopian Crop Protection Symposium. Addis Abeba, Ethiopia. 4-7 Feb. 1985. Institute of Agricultural Research, Addis Abeba.

Khamala, C.P.M. 1978. Pests of grain legumes and their control in Kenya. p. 127-134. *In* Singh et al. (eds). Pests of grain legumes: ecology and control. Academic Press, London.

Kot, J. and T. Bilewicz-Pawinska. 1989. Preliminary investigation of the maize entomofauna in Warsaw region. Acta Phytopatol. et Entomol. 24 (1&2) :141-144.

Kurtz, W.C. 1961. Summary of insect conditions in Ethiopia. Co-op. Econ. Insect Rep. II. p. 308.

Le Pelley, R.H. 1959. Agricultural insect pests of East Africa. East African High Commission, Nairobi.

McFarlane, J.A. 1969. A study of storage losses and allied problems in Ethiopia. ODNRI (TPS) Report R40. 67 + xii.

Mesfin T, Den Hollander, J and P.G. Markham. 1991. *Cicadulina* species and maize streak virus in Ethiopia. Trop. Pest Management 37(3): 240-244.

Million Abebe and Bayissa Mormone. 1985. A review of coffee pest management research in Ethiopia. p. 163- 177. *In* Tsedeke Abate (ed.). A review of crop protection research in Ethiopia. Proceedings of the First Ethiopian Crop Protection Symposium. 4-7 Feb. 1985, Addis Abeba, Ethiopia. Institute of Agricultural Research, Addis Abeba.

Nastasi, Vittorio and Andemeskel Woldehaimanot. 1968. A list of insect pests found on plants, their parasites and predators in Eritrea, 1954-1967. IEG Dept. Agric. Asmera,

NRI (Natural Resource Institute). 1991. Insect and Arachnids of tropical stored products: their biology and identification, a training manual. (2nd ed.). Overseas Development Administration.

Raman, K.V., S.R. Singh and H.F. Van Emden. 1978. Yield loss in cowpea following leafhopper damage. J. Econ. Entomol. 71 (6): 936-938.

Reynolds, L. and S. Bimbuzi. 1992. Leucaena psyllid arrives in Kenya. Agroforestry Today 4(3): 2.

Sands, W.A. 1976. A visit to Ethiopia to examine termite problems in Wellega Province, 17-26 May 1976. Report No. CVR 176/10. Center for Overseas Pest Research, London.

Schmutterer, H. 1969. Pests of crops in Northeast and Central Africa. Paul-Parey, Stuttgart.

_____. 1971. Contribution to the knowledge of the crop pest fauna in Ethiopia Z. Angew. Entomol. 67:371-389.

Singh, S.R. and H.F. Van Emden. 1979. Insect pests of grain legumes. Ann. Rev. Entomol. 24:255-278.

Singh, S.R. and T.A. Taylor. 1978. Pests of grain legumes and their control in Nigeria. p. 99-111. *In:* Singh et al. (eds.). Pests of grain legumes: ecology and control. Academic Press, London.

Stretch-Lilja, Christine. 1977. Short-horned grasshopper pests in Ethiopia. IAR, Addis Abeba.

Tadesse G. M. and Bayissa M. 1981. Orange as an alternative host plant to Antestia bug of coffee. Committee of Ethiopian Entomol. Newsletter. 1 (1): 9.

Tsedeke Abate. 1981. Preliminary notes on the citrus insect and mite pest situation in Ethiopia. Ethiop. J. Agric. Sci. 3:121-128.

_____. 1982. Cotton pest problem and their control. p. 111-128. *In:* Mesfin Abebe (ed.). Proceedings of the symposium on cotton production under irrigation. Melka Werer, IAR, Ethiopia.

_____. 1984. Observation on population of the red scale, *Aonidiella aurantii*, and its natural enemies on citrus at Koka. Ethiop. J. Agric. Sci. 6:102-115.

_____. 1988. Insect and mite pests of horticultural and miscellaneous plants in Ethiopia. IAR Handbook. IAR, Addis Abeba.

Tsedeke Abate, Tadesse G. M. and Kemal Ali. 1982. Arthropod pests of grain legumes in Ethiopia. IAR, Addis Abeba.

Tsedeke Abate, Ferede Negasi, and Kemal Ali. 1985. A review of grain legume pest management research in Ethiopia. p. 327-347. *In:* Tsedeke Abate (ed.). A review of crop protection research in Ethiopia. Proceedings of the First Ethiopian Crop Protection Symposium. 4-7 Feb. 1985. Addis Abeba, Ethiopia. Institute of Agricultural Research, Addis Abeba.

Turner, J.W. 1978. Pests of grain legumes and their control in Australia. p. 73-81. *In:* Singh et al. (eds.). Pests of grain legumes: ecology and control. Academic Press, London.

Walker, M.D. and R.A. Boxall. 1974. An annotated list of the insects associated with stored products in Ethiopia, including notes on mites found in Harar Province. E. Afr. Agric. For. J. 39:330-335.

Webb, M.D. 1987. Species recognition in *Cicadulina* leafhoppers (Hemiptera: Cicadellidae), vectors of pathogens of Gramineae. Bull. Ent. 77:683-712.

Wood, T.G. 1986a. Assessment of termite damage in Ethiopia and recommendation for short-term control and development of long-term pest management practices. Report prepared for the World Bank and MOA, Ethiopia. (mimeo.).

_____. 1986b. Report on a visit to Ethiopia to advise on assessment of termite damage to crops. Report No. R1347, Tropical Development and Research Institute. (mimeo.)

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