

INSECTS FROM NATIVE AND CULTIVATED SUNFLOWERS (*HELIANTHUS*) IN SOUTHERN LATITUDES OF THE UNITED STATES¹

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Abstract: Non-pest species of insects found on both cultivated sunflower and native species of *Helianthus*, as well as pests alternatively found on native sunflowers in southern latitudes of the United States, are categorized by order, family, genus, and species and by host species and location. Brief comments about the more prominent species of insects associated with cultivated sunflower are included in the text. Also included is an addendum to an earlier paper on natural enemies of insect pests of sunflower.

Key Words: *Helianthus* species, Coleoptera, Lepidoptera, Diptera, Natural Enemies, Insecta.

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Sunflower, *Helianthus annuus* (L.), as a native cultivated crop of North America, is sometimes inundated by indigenous insect faunas. Naturalists of the early 1900's reported on insects visiting the common annual sunflower, *H. annuus* (Cockerell 1915; Robertson 1922; and Walker 1936). Several papers also have described insects associated with cultivated sunflower in localized areas (Genung and Green 1979; Lynch and Garner 1980; Phillips et al. 1973; Walker 1936), bees visiting sunflower (Hurd et al. 1980; Parker 1981; Robertson 1922), the incidence of insect species on native *H. annuus* (Hilgendorf and Goeden 1981), and management of insect pests on cultivated sunflower (McBride et al. 1981; Schulz 1978). Bibliographies of insect pests of sunflower and their natural enemies also are available (Rajamohan 1976; Rogers 1979a, 1980). Charlet et al. (1987) recently reported on insects associated with cultivated sunflower in the northern Plains. However, there is a paucity of literature for insect faunas of native sunflower (*Helianthus*) species. This paper reports the occurrence of innocuous insects on cultivated and native species of sunflower, as well as records of pest species on native sunflower hosts in mostly southern latitudes of the United States.

MATERIALS AND METHODS

Miscellaneous and innocuous species of insects were collected from cultivated sunflower during field plot work from native species of sunflower during excursions to collect *Helianthus* germplasm (Rogers et al. 1982). Standard entomological collecting techniques were used to document host, habitat, etc., of collected specimens. Representative specimens of initial collections of unidentified species were sent to taxa specialists (see acknowledgments) for species determination. Voucher specimens of selected species were deposited in the USDA Systematic Entomology Research Laboratory at the time of determination. Reference specimens of each species were subsequently deposited in the Department of Entomology, Texas A&M University, for proper cataloging and preservation.

RESULTS AND DISCUSSION

Native sunflowers are recognized by ecologists as key niches for the sustenance of beneficial insects (Rogers 1985a) and as alternate hosts for several pests of

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cultivated sunflower (Cockerell 1915; Rogers 1988). The extent to which native species of sunflowers function in the natural history of native insect fauna is not recognized by most entomologists. The species reported herein exclude major economic pests except to report their occurrence on non-cultivated sunflowers, and certainly are not exhaustive of the insect fauna encountered on *Helianthus*. However, this listing may serve as a reference from which more detailed studies may be undertaken. Species are listed below by order and family to facilitate discussion.

Coleoptera

The Coleoptera are well represented among the insect fauna of sunflowers (Table 1). Cerambycids commonly found on sunflowers throughout southern latitudes, e.g., *Ataxia hubbardi* Fisher, *Dectes texanus* LeConte and *Mecas* spp., may become serious pests of cultivated sunflower (Rogers 1977a). Although adult cerambycids are common on native species of sunflowers, visual damage that may be caused by larval burrowing is rare.

Sunflowers harbor several species of Chrysomelidae, among which the sunflower beetle, *Zygogramma exclamationis* (Fabricius) is a serious pest in the Great Plains (Rogers 1977b; Westdal 1975). Pollen of sunflower appears to be a major attractant for the chrysomelids, for these species most often are found on the inflorescence. The flea beetle, *Systema blanda* Melsheimer, often becomes extremely abundant and skeletonizes the bracts of the capitulum in late summer in the southern Plains.

The family Curculionidae is of particular importance to the sunflower industry of the United States. Species of *Apion*, *Cylindrocopturus*, *Haplorhynchites*, and *Smicronyx* often cause economic losses in cultivated sunflower, both as direct pests and as mechanical vectors of plant pathogens (Charlet 1983; Gaudet and Schulz 1981; Oseto and Braness 1979; Rogers et al. 1983; Yang et al. 1983). *Haplorhynchites aeneus* (Boheman) and other species of this genus also frequent several species of *Helianthus* (Table 1) (Hamilton 1974). The cocklebur weevil, *Rhodoaenus tredecimpunctatus* (Illiger), is a common pest of cultivated sunflower (Vaurie 1981) and occurs on several species of *Helianthus*. Although not collected by me, species of *Lixus* have been collected from *H. annuus*, *Helianthus grosseserratus* Martens, *Helianthus rigidus* (Cass.) Desf. and *Helianthus tuberosus* L. (Webster 1889; Williams 1942.)

Colorful meloids are common pollen and nectar-feeders on sunflowers. *Gnathium* sp. and *Nemognatha lurida lurida* (LeConte) are among the most common insect inhabitants of cultivated sunflower in the southern Plains. The adults of these species have siphoning mouth parts and feed on floral nectar. Masses of several hundred orange eggs of *N. lurida* commonly occur on the back of sunflower capitula. When larvae hatch, they crawl to the inflorescence and attach themselves to visiting bees. At the nest or hives of the bees, the larvae become parasitic on bee eggs and food stores in brood cells (White 1983). The impact of *N. lurida* on bee broods is unknown. Mordellids (tumbling flower beetles) also are common on the inflorescence of cultivated sunflower in the southern Plains. Larvae of *Mordellistena* sp. are frequently found burrowing in the stalk of sunflower.

Scarabs sometimes becomes pests of cultivated sunflower and often are found on native *H. annuus* in the southern Plains (Rogers 1974; Rogers and Morrison 1978). Curiously, the adult rather than the grub is the stage that attacks sunflowers, and they may be found feeding on the roots, stems, florets, and immature seeds. *Cotinis nitida* (L.) often congregates on diseased tissue of sunflowers and feeds on fermenting plant exudates. Adults of *Cyclocephala dimidiata* Burmeister, *Euphoria inda* (L.), and *Euphoria kermi* Haldeman sometimes feed on immature achenes in large enough populations to be of concern to farmers.

Table 1. Coleoptera collected from cultivated and wild sunflower (*Helianthus*) species in southern latitudes of the United States (1974-1983).

Insect species	Host species	Collection site and year
COLEOPTERA		
Anthicidae		
<i>Notoxus constrictus</i> Casey	cultivar: Capitulum*	Vernon, TX 1976
Bruchidae		
<i>Acanthoscelides prosopoides</i> (Schaeffer)	cultivar: Capitulum	Chillicothe, TX 1976
Buprestidae		
<i>Acmaeodera scalaris</i> Mann	<i>praecox</i> Engleman: Capitula	Encinal, TX 1976
<i>Acaemodera, mixta</i> LeConte	cultivar: Captium	Vernon, TX 1975
Cantheridae		
<i>Chauliognathus scutellaris</i> (LeConte)	cultivar: Capitulum & Leaves	Texas (General) 1975-1982 & Capulin, NM
Carabidae		
<i>Microlestes</i> sp.	cultivar: Seedling	Friona, TX 1979
Cerambycidae		
<i>Hippopsis lemniscata</i> (Fabricius)	cultivar: Stalk	Vernon, TX 1975
" "	<i>atorubens</i> L.: Stalk	McGee, MS 1977
<i>Strangalia sexnotata</i> (Haldeman)	<i>resinosus</i> Small: Capitula	McGee, MS 1977
<i>Tragidion coquus</i> (L.)	cultivar: Stalk	Bushland, TX 1977
<i>Typocarnus sinuata</i> (Newman)	cultivar: Stalk	Vernon, TX 1977
" "	<i>resinosus</i> Small: Stalk	McGee, MS 1977
" "	<i>heterophyllus</i> Nuttall: Stalk	Hattiesburg, MS 1977
Chrysomelidae		
<i>Diabrotica tricincta</i> (Say)	cultivar: Capitulum	Vernon, TX 1974
<i>Diabrotica undecimpunctata howardii</i> Baker	cultivar: Capitulum	Vernon, TX 1974
<i>Diachus auratus</i> (Fabricius)	<i>annuus</i> : Leaves	Uvalde, TX 1975
<i>Disonycha</i> sp.	cultivar: Leaves	Uvalde, TX 1975

Table 1. continued.

Insect species	Host species	Collection site and year
<i>Labidomera clivicalis</i> Kirby	cultivar: Leaves	Uvalde, TX 1975
<i>Omophoita octomaculata</i> Crotch	cultivar: Leaves	Uvalde, Weslaco, TX 1975
<i>Ophraella notulata</i> (Fabricius)	cultivar: Leaves	Uvalde, Corpus Christi, TX 1975
<i>Sinea didema</i> (Fabricius)	cultivar: Leaves	Bushland, TX 1979
	<i>anomolus</i> Blake: Leaves	Sand Mountain, UT 1978
<i>Systema blanda</i> Melsheimer	cultivar: Bracts	Texas (General) 1975-1983
<i>Trirhabda</i> nr. <i>bacharidis</i> (Weber)	<i>pumilus</i> Nuttall: Capitula	Manitoba Springs, CO 1977
<i>Zygogramma conjuncta pallida</i> Beland	cultivar: Leaves	Bushland, TX 1977
<i>Zygogramma exclamationis</i> (Fabricius)	cultivae & <i>annuus</i> : Leaves & Capitula	Texas (General) 1976-1983
Cleridae		
<i>Enoclerus zonatus</i> (Klug)	cultivar: Leaves	Bushland, TX 1977
Coccinellidae		
<i>Neomysia pullata</i> (Say)	cultivar: Leaves	Bushland, TX 1976
Curculionidae		
<i>Anthonomus heterothecae</i> Pierce	cultivar: Leaves	Bushland, TX 1976
<i>Apion occidentale</i> Fall	<i>annuus</i> : Stalk	
" "	<i>argophyllus</i> Torrey & Gray: Stalk	Texas (General) 1975-1983
<i>Apion</i> sp.	cultivar: Stalk	Uvalde, TX 1976†
<i>Baris strenua</i> LeConte	<i>paradoxus</i> Heiser: Leaves	Ft. Stockton, TX 1977
<i>Baris</i> sp.	cultivar: Stems	Bushland, TX 1978
<i>Centrinaspis picumnus</i> (Herbst)	<i>carneus</i> Small: Capitulum	San Mateo, FL 1977
<i>Chalcodermus aeneus</i> Boheman	<i>annuus</i> (L.) Stems	McLoud, OK 1976
<i>Compsus auricephalus</i> (Say)	cultivar: Capitulum	Uvalde & Vernon, TX 1975
<i>Contrahelus leucophaeatus</i> (Fabricius)	cultivar: Capitulum	Jones Co., TX 1975
<i>Curculio</i> sp.	cultivar: Capitulum	Vernon, TX 1974
<i>Curculio victorienses</i> (Chittenden)	cultivar: Capitulum	Jones Co., TX 1975
<i>Cylindrocopturus adpersus</i> (LeConte)	cultivar & <i>annuus</i> : Stalk & Roots	Texas (General), 1976-1983

<i>Haplorhynchites aeneus</i> (Boheman)	<i>annuus</i> : Capitula	Texas (General), 1976-1983
" "	<i>argophyllus</i> : Capitula	South Texas 1978
" "	<i>nuttallii</i> Torrey & Gray: Capitula	Trinidad, CO 1977
<i>Haplorhynchites pseudomexicanus</i> Hamilton	<i>rigidis</i> (Cass.) Desf.: Capitula	Lorenzo, NM 1977
" "	<i>lacineatus</i> Gray: Capitula	Lorenzo, NM 1977
" "	<i>niveus</i> (Benth.): Capitula	Sanderson, TX 1976
<i>Haplorhynchites quadripennis</i> (Fall)	cultivar: Leaves	Vernon, TX 1974
<i>Hyperodes dorsalis</i> (Dietz)	cultivar: Leaves	Bushland, TX 1976
<i>Hyperodes</i> sp.	cultivar: Leaves	Bushland, TX 1976
<i>Microlarinus lareynii</i> Jac duVal	cultivar: Capitulum	Vernon & Bushland, TX 1975, 1976
<i>Ophryastes tuberosus</i> LeConte	cultivar: Capitulum	Chillicothe, TX 1975
<i>Pantomorus cervinus</i> (Boheman)	<i>tuberosus</i> L. Leaves	Bamberg, SC 1977
<i>Pantomorus elegans</i> (Horn)	cultivar: Capitulum	Vernon, TX 1974
<i>Rhodoaenus tredecimpunctata</i> (Illiger)	<i>annuus</i> : Stalk	TX & OK (General), 1974-1983
" "	<i>grosserratus</i> Martens: Stalk	TX & OK (General), 1974-1983
<i>Rhodoaenus tredecimpunctata</i>	<i>maximiliani</i> Schrader: Stalk	" "
<i>Rhynchites</i> sp.	cultivar: Capitulum	Vernon, TX 1974
<i>Smicronyx fulvus</i> LeConte	cultivar: Capitulum	Texas (General) 1974-1983
" "	<i>annuus</i> : Capitula	Sand Mountain, UT 1977
" "	<i>anomalus</i> Blake: Capitula	Sand Mountain, UT 1977
<i>Smicronyx rectirostris</i> Blatchley	<i>angustifolius</i> L.: Capitula	Alvin, TX 1976
<i>Smicronyx scapalis</i> (LeConte)	cultivar: Capitulum	Vernon, TX 1976
<i>Smicronyx sordidus</i> LeConte	cultivar: Capitulum	Texas (General) 1974-1983
<i>Tanymecus confertus</i> Gyllenhal	<i>annuus</i> : Capitula & Stems	Vernon, TX 1974
" "	cultivar: Capitulum	Vernon, TX 1976
<i>Trichobaris texana</i> LeConte	cultivar: Bud	Bushland, TX 1978
<i>Melanopleurus belfragei</i> (Stral)	cultivar: Leaves	Vernon, TX 1974
Elateridae		
<i>Conoderus</i> sp.	cultivar: Stalk	Bushland, TX 1982
Languriidae		
<i>Languria</i> sp.	cultivar: Stems & Capitula	Uvalde, TX 1975
Lathridiidae		
<i>Melanophthalmus</i> sp.	<i>annuus</i> : Leaves	Trivoli, TX 1976

Table 1. continued

Insect species	Host species	Collection site and year
Meloidae		
<i>Gnathium</i> sp.	cultivar: Capitulum	Texas (General) 1975-1983
"	<i>annuus</i> : Capitula	
"	<i>anomalous</i> : Capitula	Sand Mountain, UT 1977
"	<i>praecox</i> ssp. <i>hirtus</i> Heiser: Capitula	Crystal City, TX 1976
<i>Nemognatha lurida lurida</i> (LeConte)	cultivar: Capitulum	TX & KS (General) 1977-1982
<i>Zonitis bilineatus</i> (Say)	cultivar: Capitulum	Bushland, TX 1976
<i>Zonitis dunniana</i> Casey	<i>neglectus</i> Heiser: Capitula	Monohans, TX 1976
<i>Zonitis punctipennis</i> (LeConte)	<i>niveus</i> (Benth.) Brandegees: Capitula	Sanderson, TX 1976
Mordellidae		
<i>Mordellistena</i> sp.	<i>paradoxus</i> Heiser: Stalk	Ft. Stockton, TX 1976
"	cultivar: Stalk	Texas (General) 1976-1980
Nitidulidae		
<i>Carpophilus mutitabus</i> Erichson	cultivar: Capitulum	Weslaco, TX 1975
Phalacridae		
<i>Phalacrus</i> sp.	<i>annuus</i> : Leaves	Tivoli, TX 1976
Scarabaeidae		
<i>Anomala foraminosa</i> Bates	<i>annuus</i> : Capitula	Chillicothe, TX 1975
<i>Cotinis nitida</i> (L.)	cultivar: Stalk & Leaves	Texas (General) 1976-1983
<i>Cyclocephala dimidiata</i> Burmeister	cultivar: Seedlings	Brownsfield, TX 1977
<i>Euphoria inda</i> (L.)	<i>annuus</i> : Stems	Brownsfield, TX 1977
<i>Euphoria kermi</i> Haldeman	<i>annuus</i> : Capitula	Chillicothe, TX 1975
<i>Phyllophaga lanciolata</i> Say	<i>annuus</i> : Capitula & Stems	Chillicothe, TX 1975
<i>Phyllophaga</i> sp.	<i>annuus</i> : Capitula & Stems	Chillicothe, TX 1975
Tenebrionidae		
<i>Blapstinus pratensis</i> LeConte	cultivar: Seedlings	Friona, TX 1979
<i>Bothrotes plumbeus plumbeus</i> (LeConte)	cultivar: Leaves	Vernon, TX 1974
" " "	<i>maximiliani</i> : Capitula	Big Springs, TX 1974
<i>Eleodes opaca</i> Say	cultivar: Seedlings	Friona, TX 1979

* Cultivar refers to cultivated *H. annuus*.

† Also collected from a cultivar in Glyndon, MN 1976.

Tenebrionids are uncommon on sunflower. However, sunflower seedlings emerging from fallow wheat stubble have been destroyed in the High Plains of Texas by adults of *Blapstinus pratensis* LeConte and *Eleodes opaca* Say.

Diptera

Larvae of several species of Diptera use sunflowers as hosts (Table 2). *Melanagromyza* (Agromyzidae) spp. have larvae that commonly burrow in the capitula, stems (and stalk), and leaves of sunflowers. Larvae of *Hylemya* (Anthomyiidae), *Euxesta* (Otitidae), *Seioptera* (Ptitidae), and *Resseliella* (Cecidomyiidae) are stem borers in sunflowers. The Cecidomyiidae associated with sunflowers have been reported (Rogers et al. 1979). Larvae of the sunflower midge, *Contarinia schulzi* Gagné, and the sunflower seed midge, *Neolasioptera helianthi* (Felt), have become economically damaging to cultivated sunflower seed production (Schulz 1973; Kreitner and Rogers 1981). Adults of *Physiphora demandata* (Fabricius) frequently congregate near the terminals of sunflowers and feed on extrafloral nectar.

Tephritids often may be the most noticeable insects on sunflowers, with the wing-waving adults engaged in mating and territorial duels. The larva of these species is the stage that inflicts damage to sunflower plants. Larvae of *Neotephritis finalis* (Loew) develop in immature achenes (Foote 1960). Both the capitula and the stalk of sunflowers are attacked by larvae of *Paracantha cultaris* Coquillett (Cavender and Goeden 1984). *Trupanea* spp. larvae burrow in the capitula of both cultivated and native sunflowers (Cavender and Goeden 1982). Larvae of the sunflower maggot, *Strauzia longipennis* (Wiedemann), tunneling into the stalk of cultivated sunflower, sometimes cause economic losses in the northern Plains (Westdal and Barrett 1962). *Gymnocarena diffusa* Snow larvae are common in the capitula of cultivated sunflower, *Helianthus annuus* and *H. maximiliani* Schrader (Kamali and Schulz 1974).

Hemiptera

Hemipterans are common but not abundant on sunflowers in the United States (Table 3). *Nysius* spp. (Lygaeidae) sometimes colonize the capitulum of cultivated sunflower in the southern Plains where pigweeds (*Amaranthus* spp.) infest fields. *Chlamydatus associatus* (Uhler) adults often feed on the leaves of sunflower in the southern Plains.

Homoptera

Aphids (Aphididae) colonize both cultivated sunflower and native species of *Helianthus* (Rogers et al. 1978) (Table 3). Leafhoppers (Cicadellidae) of *Aceratagallia* and *Empoasca* spp. attack the leaves of sunflowers, often resulting in chlorosis of the plants. A treehopper, *Vanduzeeia laeta* (Goding), is a common insect on cultivated sunflower as well as on several species of *Helianthus* in southern latitudes. This treehopper colonizes stems of plant terminals and leaf petioles, and usually is tended by ants. *Phenacoccus solani* Ferris (Pseudococcidae) is a common pest of sunflower in the greenhouse, and *Phenacoccus solenopsis* Tinsley occurs on *Helianthus paradoxus* Heiser, where colonies develop on the rootcrown and hypocotyl of the plant at the soil surface.

Lepidoptera

Species of Lepidoptera rival Coleoptera in dominating insect faunas of sunflowers (Table 4). Several lepidopterous species become serious economic threats to

Table 2. Diptera collected from cultivated and wild sunflower (*Helianthus*) species in southern latitudes of the United States (1974-1983).

Insect species	Host species	Collection site and year
Agromyzidae		
<i>Calycomyza</i> sp.	cultivar: Leaves*	Bushland, TX 1976
<i>Melanagromyza minimoides</i> Spencer†	cultivar: Stalk	Vernon, TX 1974
<i>Melanagromyza viridis</i> (Frost)	<i>arizonensis</i> R. Jackson: Capitula	Snow Flake, AZ 1977
"	<i>deserticola</i> Heiser: Capitula	Virgin, UT 1977
Anthomyiidae		
<i>Calythea monticola</i> (Bigot)	cultivar: Stem	Bushland, TX 1978
<i>Adia platyura</i> (Meigen)	cultivar: Leaves	Chillicothe, TX 1976
<i>Adia cinerella</i> (Fallen)	cultivar: Capitulum	Vernon, TX 1974
Bibionidae		
<i>Plecia neartica</i> Hardy	<i>annuus</i> : Leaves	Moscow, TX 1976
Bombyliidae		
<i>Phthiria</i> sp.	cultivar: Capitulum	Bushland, TX 1976
Cecidomyiidae		
<i>Contarinia schulzi</i> Gagné	<i>annuus</i> : Capitula	Knox County, TX 1972
<i>Neolasioptera helianthi</i> (Felt)	cultivar & <i>Helianthus</i> spp.: Capitula	General So. U.S., 1974-1983
<i>Resseliella</i> sp.	<i>nuttalii</i> Torrey & Gray: Stalk	Bushland, TX 1983
Chironomidae		
<i>Procladius</i> sp.	cultivar: Bud	Bushland, TX 1978
Chloropidae		
<i>Elachiptera costata</i> (Loew)	cultivar: Stalk	Bushland, TX 1981
<i>Fiebrigella</i> n. sp.	cultivar: Leaves	Chillicothe, TX 1975
<i>Thaumatomyia glabra</i> (Meigen)	cultivar: Leaves	Bushland, TX 1976
Calliphoridae		
<i>Cochliomyia macellaris</i> (Fabricius)	cultivar: Capitulum	Vernon, TX 1974
<i>Phaenicia sericata</i> (Meigen)	cultivar: Leaves	Bushland, TX 1974
"	cultivar: Leaves	Vernon, TX 1975
Muscidae		
<i>Musca domestica</i> L.	cultivar: Leaves	Bushland, TX 1971
<i>Orthellia caesarion</i> (Meigen)	cultivar: Capitulum	Vernon, TX 1974
<i>Spilogona</i> sp.	cultivar: Capitulum	Vernon, TX 1974
Otitidae		
<i>Euxesta nitidiventris</i> Loew	cultivar: Leaves	Bushland, TX 1976-1978
<i>Euxesta pechumani</i> Curran	cultivar: Stalk	Bushland, TX 1983

<i>Euxesta</i> sp.	cultivar: Stalk	Bushland, TX 1981
<i>Physiphora demandata</i> (Fabricius)	cultivar: Stalk	Bushland, TX 1978
<i>Tetanops leuridipennis</i> Loew	cultivar: Leaves	Uvalde, TX 1975
Genus unknown	cultivar: Stalk	Bushland, TX 1981
Pttidae		
<i>Seioptera vibrans</i> (L.)	cultivar: Stalk	Bushland, TX 1981
Sarcophagidae		
<i>Blaesoxipha kellyi</i> (Aldrich)	cultivar: Leaves	Texas (General) 1975-1983
<i>Blaesoxipha rudis</i> (Aldrich)	cultivar: Leaves	Texas (General) 1975-1983
Sciaridae		
<i>Bradystia impatiens</i> (Johannsen)	cultivar: Soil	Bushland, TX 1976-1983
Tachinidae		
<i>Clausicella opaca</i> (Coquillett)	cultivar: Leaves	Chillicothe, TX 1976
<i>Nemorilla pysta</i> (Walker)	cultivar: Leaves	Vernon, TX 1974
<i>Hyalomya</i> sp.	cultivar: Leaves	Vernon, TX 1974
<i>Euphoracera</i> sp.		
Syrphidae		
<i>Eristalis tenax</i> (L.)	cultivar: Capitulum	Vernon, TX 1977
<i>Eupeodes valucris</i> Osten Sacken	cultivar: Capitulum	Vernon, TX 1974
<i>Metasyrphus americanus</i> (Wiedemann)	cultivar: Capitulum	Vernon, TX 1974
<i>Toxomerus marginatus</i> (Say)	cultivar: Capitulum	Vernon, TX 1974
Tephritidae		
<i>Gymnocarena diffusa</i> Snow	cultivar: Stalk	Bushland, TX 1983
<i>Euarestoides acutangulus</i> (Thomson)	<i>annuus</i> : Capitula	Variadero, NM 1976
" "	<i>petiolaris</i> : Capitula	Variadero, NM 1976
" "	cultivar: Capitulum & Stalk	Texas (General) 1975-1983
<i>Paracantha cultarisi</i> Coquillett	<i>annuus</i> : Capitula	Variadero, NM 1977
" "	<i>debilis</i> spp. <i>cucumerifolius</i>	East Texas 1977
" "	Torrey & Gray: Capitula	
<i>Neotephritis finalis</i> (Loew)	cultivar: Capitulum	Texas (General) 1974-1983
<i>Orellia palposay</i> (Loew)	cultivar: Capitulum	Vernon, TX 1976
<i>Strauzia longipennis</i> (Weidmann)	cultivar & <i>annuus</i> : Stalk	Bushland, TX 1978
<i>Trupanea nigricans</i> (Coquillett)	<i>annuus</i> : Capitula	Variadero, NC 1976
" "	<i>ciliaris</i> DC: Capitula	Roswell, NM 1976
" "	<i>neglectus</i> : Capitula	Monohans, TX 1976
" "	<i>petiolaris</i> : Capitula	Variadero, NM 1976

* Cultivar refers to cultivated *H. annuus*† *Melanagromyza* sp. also collected from a cultivar at Glyndon, MN, 1975; *M. splendida* Frick was collected from a cultivar in Santiago, Chile, 1978.

Table 3. Heteroptera collected from cultivated and wild sunflower (*Helianthus*) species in southern latitudes of the United States (1974-1983).

Insect species	Host species	Collection site and year
HEMIPTERA		
Coreidae		
<i>Archimerus alternatus</i> (Say)	cultivar: Leaves & Stalk*	Bushland, TX 1976
Largidae		
<i>Largus</i> sp.	cultivar: Leaves	Chillicothe, TX 1975
Lygaeidae		
<i>Nysius californicus</i> Stal	<i>petiolaris</i> : Buds	Chillicothe, TX 1976
<i>Nysius raphanus</i> Howard	cultivar: Capitulum	Sunray, TX 1977
<i>Xyonysius californicus</i> (Stal)	cultivar: Leaves	Vernon, TX 1975
Miridae		
<i>Chalmydatus associatus</i> (Uhler)	cultivar: Leaves	Munday, Bushland, TX 1975
<i>Lopidea</i> sp.	cultivar: Leaves	Uvalde, 1975, Chillicothe 1980
Rhopalidae		
<i>Harmostes reflexulus</i> (Say)	cultivar: Leaves	Chillicothe, TX 1976
HOMOPTERA		
Cercopidae		
<i>Clastoptera xanthocephala</i> Germar	cultivar: Stems	Corpus Christi, TX 1975
<i>Philaenus spumarius</i> (L.)	<i>maximiliani</i> : Leaves	Paris, TX 1976
Cicadellidae		
<i>Aceratogallia uhleri</i> (Van Duzee)	cultivar: Leaves	Bushland, Uvalde, TX 1975
<i>Aceratogallia</i> sp.	cultivar: Leaves	Vernon, Uvalde, TX 1974-1975
<i>Empoasca abrupta</i> DeLong	cultivar: Leaves	Bushland & Chillicothe, TX 1975-1978
<i>Empoasca erigeron</i> DeLong	cultivar: Leaves	Uvalde, TX, Davis, CA 1975
<i>Empoasca</i> sp.	cultivar: Leaves	Vernon, TX 1974
<i>Homalodisca coagulata</i> (Say)	<i>argophyllus</i> : Leaves & Stalk	Vernon, TX 1974

<i>Homalodisca coagulata</i> (Say)	<i>argophyllus</i> : Leaves & Stalk	Falfurias, TX 1976
<i>Xeropholea viridis</i> (Fabricius)	cultivar: Leaves	Vernon, TX 1974
<i>Oncometopia nigricans</i> (Walker)	cultivar: Leaves	Vernon, TX 1974
<i>Scaphytopius</i> sp.	cultivar: Leaves	Uvalde, TX 1975
Cixiidae		
<i>Oliarus aridus</i> Ball	cultivar: Leaves	Vernon, TX 1984
Delphacidae		
<i>Stobaera tricarinata</i> (Say)	cultivar: Leaves	Uvalde, TX 1975
Membracidae		
<i>Publilia modesta</i> Uhler	<i>annuus</i> : Stems	Chillicothe, TX & Variadero, NM 1976
<i>Vanduzee laeta</i> (Goding)	cultivar: Stems	Texas (General) 1974-1983
" "	<i>annuus, maximiliani</i> ,	Texas (General) 1974-1983
" "	<i>petiolaris</i> : Stems	
<i>Vanduzee triguttata</i> (Burmeister)	cultivar: Stems	Vernon, TX 1974
Pseudococcidae		
<i>Phenacoccus solenopsis</i> Tinsley	<i>paradoxus</i> : Stalk	Ft. Stockton, TX 1976
<i>Phenacoccus solani</i> Ferris	cultivar: Stalk	Bushland, TX 1980-1983
Psyllidae		
<i>Heteropsylla texana</i> Crawford	cultivar: Leaves	Lorenzo, TX 1976

* Cultivar refers to cultivated *H. annuus*.

Table 4. Lepidoptera collected from cultivated and wild sunflower (*Helianthus*) species in southern latitudes of the United States (1974-1983).

Insect species	Host species	Collection site and year
Arctiidae		
<i>Estigmene acrea</i> (Drury)	cultivar: Leaves*	Bushland, Vernon, TX 1974-1983
Cochylidae		
<i>Cochylis hospes</i> Walsingham	<i>floridanus</i> Gray ex Chapman: Capitula	Tallahassee, FL 1977
" "	<i>petiolaris</i> : Capitula	Channing, TX 1976
" "	<i>praecox</i> : Stalk	Eagle Lake, TX 1976
<i>Cochylis</i> sp.	<i>argophyllus</i> : Capitula	Ingleside, TX 1976
" "	<i>petiolaris</i> : Capitula	Channing, FL 1976
Gelechiidae		
<i>Isophrictis similiella</i> Chambers	<i>annuus</i> : Stalk & Capitula	Bushland, TX 1975-1983
" "	<i>argophyllus</i> : Capitula	Rufegio, TX 1976
" "	<i>hirsutus</i> Rafinesque: Capitula	Bushland, TX 1982
" "	<i>neglectus</i> : Capitula	Monohans, TX 1976
" "	<i>longifolius</i> Pursh: Capitula	Guest, AL 1977
" "	<i>petiolaris</i> : Capitula	Channing, TX 1976
" "	<i>rigidus</i> : Capitula	Manitor Springs, CO 1977
<i>Isophrictis</i> sp.	cultivar: Stalk	Uvalde, TX 1975
Geometridae		
<i>Synchlora</i> sp.	<i>occidentalis</i> Riddell: Capitula	Kemah, TX 1976
<i>Eupithecia miserulata</i> (Grote)	cultivar: Capitulum	Vernon, TX 1974
Gracillariidae		
<i>Cremastobombycia ignata</i> (Fabricius & Brants)	<i>annuus</i> : Leaves	McLoud, OK 1977
Hesperiidae		
<i>Hylephila phyleus</i> (Drury)	cultivar: Capitulum	Vernon, TX 1974
<i>Lerodea sufala</i> (Edwards)	cultivar: Capitulum	Vernon, TX 1974

Lyonetiidae

Bucculatrix magnelta Chambers

Bucculatrix simulans Braum

Bucculatrix sp.

annuus: Stems

annuus: Stems

angustifolius: Stems

McLoud, OK 1976

Buckeye, AZ 1977

Muenster, TX 1976

Noctuidae

Amphipyinae (unknown genus)

"

"

Heliothis zea (Boddie)

Heliothis virescens (Fabricius)

Pseudaletia unipuncta (Haworth)

Pseudanthoecia tumida (Grote)

Pseudoplusia includens (Walker)

Spodoptera exigua (Hübner)

Spodoptera frugiperda (J. E. Smith)

Stibadium spumosum Grote

Tarachida tortricina (Zeller)

Trichoplusia ni (Hübner)

maximiliani: Capitula

eggertii Small: Capitula

tuberosus: Capitula

cultivar: Capitulum

cultivar: Capitulum

cultivar: Capitulum

annuus: Leaves

cultivar: Capitulum

cultivar: Leaves

cultivar: Capitulum

annuus: Capitula

cultivar: Capitulum

cultivar: Capitulum

Abilene, Austin, TX 1976, 1981

Rocky Dale, IN 1977

Stewart, OK 1977

Texas (General) 1974-1983

Texas (General) 1974-1983

Vernon, TX 1974

Capulin, NM 1977

Vernon, TX 1974

Vernon, TX 1974

Vernon, TX 1974

Bushland, TX & Jal, NM 1978

Vernon, TX 1974

Vernon, TX 1974

Nymphalidae

Chlosyne lacini Geyer

" "

" "

" "

" "

" "

Vanessa cardui (L.)

" "

cultivar: Leaves

annuus: Leaves

argophyllus: Leaves

neglectus: Leaves

niveus: Leaves

cultivar: Leaves

maximiliani: Capitula

Texas (General) 1976-1983

" " "

" " "

" " "

" " "

Texas (General) 1974-1983

Sherman, TX 1977

Tortricidae

Suleima helianthana Riley

" "

" "

annuus: Capitula

anomalus: Capitula

Manitoba Springs, CO 1977

Sand Mountain, UT 1977

Table 4. continued

Insect species	Host species	Collection site and year
<i>Suleima helianthana</i> Riley	<i>argophyllus</i> : Capitula	Rufegio, TX 1976
" "	<i>maximiliani</i> : Capitula	Muenster, TX 1977
" "	<i>niveus</i> : Capitula	Sanderson, TX 1974
" "	<i>occidentalis</i> ssp. <i>plantagineous</i> (T&G) Heiser	Ringgold, TX 1975
" "	<i>paradoxus</i> : Stems	Ft. Stockton, TX 1977
" "	<i>petiolaris</i> ssp. <i>petiolaris</i> : Capitula	Texas (General) 1975, 1982
<i>Suleima helianthana</i>	<i>praecox</i> ssp. <i>hirtus</i> : Capitula	Crystal City, TX 1977
" "	<i>rigidus</i> : Capitula	Adin, CA 1977
Pyralidae		
<i>Achyra ramtalis</i> (Guenee)	cultivar: Capitulum & Leaves	Bushland, TX 1977
<i>Cadra cautella</i> (Walker)	cultivar: Stored seed	Chillicothe & Bushland, TX 1974-1983
<i>Hahncappsia coloradensis</i> (Grote & Robinson)	<i>annuus</i> : Leaves	Bushland, TX 1980
<i>Hahncappsia huachualis</i> (Capps)	cultivar: Leaves	Bushland, TX 1978-1983
<i>Hahncappsia rantalis</i> Guenee	cultivar: Capitulum	Bushland, TX 1977
<i>Hahncappsia</i> sp.	cultivar: Stalk	Uvalde, TX 1975
<i>Nomophila nearctica</i> Munroe	cultivar: Capitulum	Vernon, TX 1974
Tortricidae		
<i>Platynota</i> sp.	<i>carneus</i> : Capitulum	San Mateo, FL 1977

* Cultivar refers to cultivated *H. annuus*.

cultivated sunflower. These species have received adequate coverage in the economic entomology literature; hence, they will be deleted from this paper. Salt marsh caterpillar, *Estigmene acrea* (Drury), larvae frequently defoliate cultivated sunflower and *H. annuus* in the southern Plains. *Cochylis hospes* Walsingham (Cochylidae), the banded sunflower moth, infests the inflorescence of several *Helianthus* species in the southern Plains (Table 1), and it sometimes becomes an economic threat to seed production in cultivated sunflower in the northern Plains (Charlet and Busacca 1986). Likewise, larvae of the gelechiid *Isophrictis similiella* Chambers infest several *Helianthus* species on the High Plains of Texas and New Mexico and sometimes cause severe tunneling in the stalk of cultivated sunflower (Underhill et al. 1987). Larvae of *Bucculatrix magnella* Chambers and *B. simulans* Braum (Lyonetiidae) develop in stem galls of *H. annuus*.

Many species of Noctuidae that are agricultural pests may be collected from sunflowers (Table 4). For the most part, adult noctuids are collected while resting on the plant or while feeding on floral nectar. Occasionally, however, larvae of *Heliothis zea* (Boddie) (corn earworm) attack developing achenes, and larvae of *Spodoptera exigua* (Hübner) (beet armyworm) sometimes defoliate cultivated sunflower (Lynch and Garner 1980). Larvae of an unknown noctuid genus were collected from *Helianthus eggerti* Small, *H. maximiliani*, and *H. tuberosus* L. *Stibadium spumosum* Grote is one of a few noctuids that may be restricted to sunflower. Adults of *S. spumosum* oviposit on the back of the capitula of *H. annuus*. Small larvae burrow through the capitula and develop in the inflorescence while consuming the achenes (Rogers et al. 1986).

Two nymphalids are frequent defoliators of sunflowers. Gregarious larvae of *Chlosyne lacinia* (Geyer) feed on several species of *Helianthus*, as well as on cultivated sunflower (Table 1, Neck 1973). Larvae of *Vanessa cardui* (L.) are solitary feeders and are found on sunflowers and other composites from Canada into Mexico (Williams 1970). This migratory species may appear without warning and completely defoliate fields of cultivated sunflower. The sunflower bud moth, *Suleima helianthana* (Riley) (Tortricidae), is common in cultivated sunflower as well as on several species of *Helianthus* (Rogers 1979b). Larvae of pyralids are common on *Helianthus* spp. in southern latitudes. *Hahncappsia coloradensis* (Grote and Robinson) and *H. huachualis* (Capps) larvae construct leaf-rolls from which they skeletonize one leaf at a time. Leaf-roller larvae are heavily parasitized on *H. annuus* in Texas (Table 2, Rogers 1980). *Eucosma womonana* Kearfott (Tortricidae) larvae may cause extensive damage to the roots of cultivated sunflower and *H. tuberosus* (Rogers 1985b).

Miscellaneous Orders

Native bees (Hymenoptera) of several families are almost always encountered on the inflorescence of sunflowers (Table 5). The interaction of these insects with sunflowers has been adequately discussed by Hurd et al. (1980) and Parker (1981). Parasitic Hymenoptera encountered on sunflowers were presented by Rogers (1980) and are updated later in this paper.

A tree cricket, *Oecanthus argentinus* Saussure (Orthoptera), frequently is seen feeding on pollen of sunflower in northern Texas. *Melanoplus differentialis* (Thomas) and other species of grasshoppers (Acrididae) consume *H. annuus*, *H. petiolaris*, and other rangeland species of *Helianthus* in the Great Plains (Lewis 1979).

Ectopsocopsis crytomeriae (Enderlein) (Psocoptera) are found in decaying capitula of cultivated sunflower that are infected by the *Rhizopus* head rot pathogen.

Thrips (Thysanoptera) are common inhabitants of the sunflower inflorescence, where the life history of hundreds of specimens sometimes occur (Table 5). Presumably, most of the thrips in the inflorescence are feeding on pollen. The bionomics of thrips on sunflower should be investigated.

Natural Enemies

The natural enemies of pests of cultivated sunflower were cataloged by Rogers (1980). The listing in Table 6 is an update of the previous work. *Perilloides bioculatus* (Fabricius) is an effective predator of the sunflower beetle, *Z. exclamationis*, in the southern Plains. Both larvae and adults of this pentatomid prey on larvae and adults of *Z. exclamationis*. Two color variations of *P. bioculatus* in sunflower are black stripes on a bright red background, and brown stripes on a cream-colored background. The latter color variation closely resembles the color of adults *Z. exclamationis*. *Perilloides bioculatus* has been considered an effective predator of the Colorado potato beetle, *Leptinotarsa decemlineata* (Say) (Knight 1923).

The leaf-rollers, *Hahncappsia coloradensis* and *H. huachualis*, are heavily parasitized by species from several families of Hymenoptera on native *H. annuus* in the southern Plains. Because these Lepidoptera rarely occur on cultivated *H. annuus*, parasites must be effectively controlling leaf-roller populations on their native hosts. An investigation of the bionomics of parasites of *H. coloradensis* and *H. huachualis* might be of interest to sunflower pest managers.

Neuropteran species are poorly represented among the insect faunas of sunflowers. *Chrysopa carnea* Stephens (Chrysopidae) larvae and adults are often encountered in the inflorescence, or on petioles, feeding on floral and extrafloral nectar (Table 6).

CONCLUSIONS

From the diversity of taxa reported herein, it is apparent that the *Helianthus* species have rich insect faunas in their native habitats, and that some of the insect species found on native sunflowers have adapted to colonization of *H. annuus* in cultivated conditions. Considering that *Helianthus* species are native to North America (Heiser et al. 1969), that cultivated sunflower has become an important oilseed crop in several areas of the United States, and that native sunflowers are important genetic resources for improving cultivated *H. annuus* (Thompson et al. 1981), it is important that sunflower entomologists become familiar with these faunas in their natural habitats as a basis on which to implement ecologically and economically sound pest management strategies for cultivated sunflower.

Table 5. Hymenoptera, Orthoptera, and Thysanoptera collected from cultivated and wild sunflower (*Helianthus*) species in southern latitudes of the United States (1974-1983).

Insect species	Host species	Collection site and year
HYMENOPTERA		
Halictidae		
<i>Agapostemon texanus</i> Cresson	cultivar: Capitulum*	Vernon, TX 1974
<i>Agapostemon trespennis</i> (Cresson)	cultivar: Capitulum	Vernon, TX 1974
Megachilidae		
<i>Megachile</i> sp. nr. <i>texana</i> Cresson	cultivar: Capitulum	Vernon, TX 1974
Perilampidae		
<i>Perilampus similis</i> Crawford	cultivar: Capitulum	Vernon, TX 1974
ORTHOPTERA		
Gryllidase		
<i>Oecanthus argentinus</i> Saussure	cultivar: Capitulum	Vernon, TX 1974
PSOCOPTERA		
Ectopsocidae		
<i>Ectopsocopsis cryptomeriae</i> (Enderlein)	cultivar: Capitulum	Weslaco, TX 1975
Lachesillidae		
<i>Lachesilla nubilalis</i> (Aaron)	<i>microcephalus</i> Torrey & Gray: Capitula	Asheboro, NC 1977
THYSANOPTERA		
Aeolothripidae		
<i>Aerlothrips duvali</i> Moulton	cultivar: Bud	Chillicothe, TX 1976
Thripidae		
<i>Frankliniella occidentalis</i> (Pergande)	cultivar: Bud	Chillicothe, TX 1976
<i>Microcephalothrips abdominalis</i> Crawford	<i>annuus</i> : Capitula	Weslaco, TX 1975
<i>Orellia palposa</i> (Loew)	cultivar: Bud	Chillicothe, TX 1976
<i>Thrips tabaci</i> Lindeman	cultivar: Bud	Chillicothe, TX 1976

* Cultivar refers to cultivated *H. annuus*.

Table 6. Natural enemies of insects found on sunflowers in southern latitudes of the United States (1974-1983).

Natural enemy	Host species	Collection site and year
HEMIPTERA		
Pentatomidae		
<i>Perilloides bioculatus</i> (Fabricius)	<i>Zygogramma exclamationis</i> (Fabricius)	Bushland, TX 1976-1983
Reduviidae		
<i>Sinea didemo</i> (Fabricius)	<i>Hippodamia convergens</i> Guerin-Meneville	Bushland, TX 1977
" "	Inflorescence of <i>H. anomalus</i>	Sand Mountain, UT 1977
HYMENOPTERA		
Braconidae		
<i>Apanteles</i> sp.	<i>Chlosyne lacinia</i> (Geyer)	McLoud, OK 1979
<i>Chelonus</i> sp.	<i>Homoeosoma eletellum</i> (Hulst)	Bushland, TX 1983
<i>Cremnops virginiensis</i> (Morrison)	<i>Hahncappsia coloradensis</i> (Grote & Robinson)	Bushland, TX 1983
" "	<i>Hahncappsia huachualis</i> (Capps)	Bushland, TX 1983
<i>Schizopyrmus</i> sp.	<i>Mordella</i> sp.	Bushland, TX 1973
Chalcididae		
<i>Brachymeria ovata</i> (Say)	<i>Hahncappsia coloradensis</i>	Bushland, TX 1983
" "	<i>Hahncappsia huachualis</i>	Bushland, TX 1983
Eucolidae		
<i>Hexacola</i> n. sp.	<i>Seioptera vibrans</i> (L.)	Bushland, TX 1982
Eupelmidae		
<i>Eupelmus</i> sp.	<i>Bucculatrix magnelta</i> Chambers	McLoud, OK 1976
Eurytomidae		
<i>Eurytoma</i> sp.	<i>Bucculatrix magnelta</i>	McLoud, OK 1976
Ichneumonidae		
<i>Eipshosoma pyralidis</i> Ashmead	<i>Hahncappsia coloradensis</i>	Bushland, TX 1983
" "	<i>Hahncappsia huachualis</i>	Bushland, TX 1983
<i>Mesochorus discitergus</i> (Say)	<i>Chlosyne lacinia</i>	McLoud, OK 1976
<i>Sinophorus</i> n. sp.	<i>Stibadium spumosum</i> Grote	Bushland, TX 1983
Pteromalidae		
<i>Heteroschema</i> sp.	<i>Seioptera vibrans</i>	Bushland, TX 1982
NEUROPTERA		
Chrysopidae		
<i>Chrysopa carnea</i> Stephens	Inflorescence of cultivars	Vernon, TX 1974
" "	Petioles of <i>H. annuus</i>	Bushland, TX 1982

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