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Natural Enemies of True Fruit Flies (Tephritidae)

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Psyttalia fletcheri (shown) is the only fruit fly parasitoid introduced into Hawaii capable of parasitizing the melon fly (*Bactrocera cucurbitae*)

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Introduction

Fruit flies in the family Tephritidae are high profile insects among commercial fruit and vegetable growers, marketing exporters, government regulatory agencies, and the scientific community. Locally, producers face huge losses without some management scheme to control fruit fly populations. At the national and international level, plant protection agencies strictly regulate the movement of potentially infested products. Consumers throughout the world demand high quality, blemish-free produce. Partly to satisfy these demands, the costs to local, state and national governments are quite high and increasing as world trade, and thus risk, increases. Thus, fruit flies impose a considerable resource tax on participants at every level, from producer to shipper to the importing state and, ultimately, to the consumer. (McPherson & Steck, 1996)

Indeed, in the United States alone, the running costs per year to APHIS, Plant Protection and Quarantine (PPQ), (the federal Agency responsible) for maintenance of trapping systems, laboratories, and identification are in excess of US\$27 million per year and increasing. This figure only accounts for a fraction of total costs throughout the country, as State, County and local governments put in their share as well as the local industry affected. If a emergency program is mounted against some exotic fruit fly invasion, the costs to PPQ increase again, and may be as much as an additional \$20 million per year. An exceptional program, such as the Medfly eradication Program in California in 1980-82 required the expenditures of \$100 million for this one program alone, over roughly 3 years, for all parties involved (Schribner, 1983). Costs in other areas of the world are no less. For Japan, the cost of eradication of the Oriental Fruit Fly from its south-western islands in the 1980's was US\$32 million (White and Elson-Harris, 1992).

It goes without saying that the discovery of exotic fruit flies in a country result in labor intensive and very costly eradication programs from time to time, whenever a pest is discovered. This is especially true with the growth and globalization of world trade, when fruit produce and their associated pests are carried around the world at speeds unheard of before the nineteenth century.

During the development of a New Pest Response Guidelines for The Economic Fruit Flies, Family Tephritidae, by USDA, APHIS, PPQ, a comprehensive list of natural enemies of Tephritids was developed. This was recognized as a valuable source of information for those interested in classical or augmented biological control for fruit flies in the future. Since the work is still in preparation, the information is considered apart from other means of control that are discussed in the parent document.

This paper provides, as far as is possible, the natural enemies of fruit flies throughout the World. It is limited to fruit pest species, as opposed to leaf, stem and root pest species, following White and Elson-Harris, 1992.

Classical Biological Control

A basic premise of classical biological control is that the target pest will be brought under some degree of control while nontarget organisms are not affected. To do this, the introduced bio-control agent must be relatively host specific.

Often, this can only be determined after release of the agent into the environment. To remedy this dilemma, lab studies attempt to determine the physiological host range of the agent in order to predict the ecological host range as well. This does not always work when nontarget possible hosts are exposed to the agent under the confined circumstances of the lab. Many conditions in the outside environment determine which possible hosts are attacked, such as spatial or temporal overlap, host ranges and/or substrates of target and nontarget species, temperature and humidity, tolerances, and others. (Solter, et al, 1997; Hajek, et al, 1996)

To the extent possible, biocontrol agents should be carefully considered for their possible impact on nontarget organisms. Some general rules are as follows:

- A.** Predators are usually more generalist than parasites.
- B.** The known host specificity of an agent, including information on behavior of related taxa.
- C.** Selection and release of agents known to be host specific or attack only closely related non-target species.

To this end, information on the available Biological Control organisms are given in table form to allow comparisons between different Tephritid species as a decision-making tool, and to help in the selection of the best combination of useful biological control agents.

Microorganisms/microbial toxins - TABLE 1

Table 1 lists the microorganisms/microbial toxins used against the fruit flies species listed therein. Biological Modes are given separately under each species. The Products or Microbiol Pesticides (Biopesticides), are consecutively numbered under each Biological

Mode. The use of such techniques are generally considered as Biotactical techniques, but is included in this document as the products may be considered as coming from natural enemies.

It should be remembered that nongenetic resistance may take place. This includes phenotypic changes in insect behavior or physiology and of host plant interference with pesticide action, including microbial pesticides such as entomopathic bacteria and viruses. These are particularly sensitive to plant chemistry because they infect through the gut. As a consequence, the composition of foliage ingested with the microbial pesticide can dramatically influence its effectiveness. (Appel & Schultz, 1994)

Another factor to consider is rainfall. It has been suggested that a light rainfall may help in prolonging the period of activity of viral preparations by moving the virus downwards, towards the more shaded parts of a plant and away from light. This would help to prolong its effectiveness. No absolute proof of this hypothesis has yet been made. (D'Amico & Elkinton, 1995)

Microorganisms/Microbial Toxins Used Against the Tephritidae - Table 1

Species	Biological Mode	Product	Specifics
<i>Anastrepha fraterculus</i>	Through transovarian transmission	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> .	Laboratory strain of <i>Anastrepha</i> sp. 2 aff. <i>fraterculus</i> . from Brazil . No evidence of alterations in the reproductive ability of <i>A. fraterculus</i> (Selivon, et al., 2002)
<i>Anastrepha ludens</i>	Through adult consumption	Agent:Phloxine B-Mazoferm 802 formulation for field application Mazoferm 802 - corn condensate hydrolyzed by a <i>Lactobacillus</i> sp. Phloxine B - photoactive dye used in formulations of foods or pharmaceuticals and cosmetics	In field trials, aerial application reduced the population of mexfly by 85% against the control catch (Moreno, et al., 2001)
	Immersion in a conidial suspension	A fungus, <i>Metarhizium anisopliae</i> .	Laboratory test, which resulted in mortality rates from 37.9 to 98.75%. Also a conidial suspension (2.5 X 10 ⁶ UFC.ml) was applied to a soil surface, resulting in reduction in adult emergence of 22-43% (Lezama-Gutierrez, et al., 2000)

Species	Biological Mode	Product	Specifics
	<i>Bacillus thuringiensis</i> , a gram-positive, spore-forming soil bacterium fed to larvae & adults.	Agent: beta exotoxin toxic towards 3rd instar larvae	Exposed in lab only (Toledo, et al, 1999)
	<i>Paratransgenesis in which genes and proteins of selected species of the microbial fauna of Mexfly guts are altered, and fed to adults.</i>	Stability of pZeoEGFP, a plasmid.	Stability suggests that derivatives of this plasmid could serve to introduce heterologous genes and proteins, that, when ingested by adults, such proteins/products would be delivered directly to the gut of host flies. If toxic, this would serve to control fly populations. If nutrition is enhanced, they could improve vigor of colony flies for SIT (Peloquin, et al., 2000; Kuzina, et al., 2001).
	<i>Beauveria bassiana</i> , a fungus, fed to larvae and adults.	An entomopathogenic soil-borne fungus that attacks many different insects and exists in many different strains.	In Laboratory, most toxic to adults @ rates ranging from 98 to 100%. Larvae were affected @ rates ranging from 2 to 8%. Doses ranged from 1.0×10^8 to 1.6×10^8 (Rosa, 2002).
<i>Anastrepha obliqua</i>	Airborne conidia	An unidentified fungus in the Entomophthorales	Capable of wiping out laboratory populations via airborne conidia (Baker, et al., 1944).
	Through adult consumption	Agent: Phloxine B-Mazoferm 802 formulation for field application Mazoferm 802 - corn condensate hydrolyzed by a <i>Lactobacillus</i> sp. Phloxine B - photoactive dye used in formulations of foods or pharmaceuticals and cosmetics	In field trials, aerial application reduced the population of medfly by 70% against the control catch (Moreno, et al., 2001)
<i>Anastrepha obliqua</i> (Cont.)	<i>Bacillus thuringiensis</i> , a gram-positive, spore-forming soil bacterium fed to larvae & adults.	Agent: beta exotoxin toxic towards 3rd instar larvae	Exposed in lab only (Toledo, et al, 1999)
<i>Anastrepha serpentina</i>	<i>Bacillus thuringiensis</i> , a gram-positive, spore-forming soil bacterium fed to larvae & adults.	Agent: beta exotoxin toxic towards 3rd instar larvae	Exposed in lab only (Toledo, et al, 1999)
<i>Anastrepha suspensa</i>	Plant growth regulator	A hormone from the fungus <i>Gibberella fujikuroi</i> , gibberellic acid (GA ₃) + a surfactant (L-77) Commercial formulations available	Reduces host susceptibility/attractiveness to fruit flies by preventing aging of the peel (yellowing) 10 ppm GA ₃ /L-77 sprayed to run-off on fruit (Greany et al, 1991)

Species	Biological Mode	Product	Specif ics
	Through larval contact	An Entomogenous nematode Agent: <i>Steinernema carpocapsae</i>	Augmentation to eradication is 500 nematode per cm ² applied to soils. Results similar to fruit flies in Hawaii (Lindgren, 1990)
	<i>Saccharopolyspora spinosa</i> , a soil bacterium, through ingestion.	Spinosad Agent: Spinosyn A Spinosyn D + SolBait	Test plots sprayed through aerial applications at the rate of 1.8 liters/ hectare resulted in 54% reduction in Caribfly populations. At 3.5 liters/ hectare the reduction was 73%. (Burns, et al., 2001)
	Through transovarian transmission	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> .	No evidence of alterations in the reproductive ability of <i>A. suspensa</i> (Werren, et al., 1995)
<i>Anastrepha</i> spp.	Through adult contact (?)	unspecified fungi in the Laboulbeniales	Affect various body parts, but apparently little inconvenience to the host (Baker, et al., 1944)
<i>Bactrocera ascita</i> sp. B	Through adult contact	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> , inducing cytoplasmic incompatibility, thelytokous parthenogenesis, male-killing or feminization.	In field collected adults from Thailand (Jamnongluk, et al, 2002)
<i>Bactrocera cucurbitae</i>	Through adult contact	Agent: Avermectin B ₁ (MK-936) a powerful toxin derived from <i>Streptomyces avermitilis</i> fermentation (EPA, 1989)	In Lab, applied to thorax, at 0.042 ug/g LD ₅₀ 15 days With sublethal doses, fecundity, and fertility reduced by up to 79% (Albrecht & Sherman, 1987)
	Through larval contact	An Entomogenous nematode Agent: <i>Steinernema carpocapsae</i>	Augmentation to eradication is 500 nematode per cm ² applied to soils. Causes 89% mortality (Lindgren, 1990)
<i>Bactrocera cucurbitae</i> (Cont.)	Through adult contact	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> , inducing cytoplasmic incompatibility, thelytokous parthenogenesis, male-killing or feminization.	In field collected adults from Thailand (Jamnongluk, et al, 2002)
<i>Bactrocera carambolae</i> (= <i>B. dorsalis</i> sp. A)	Through adult contact	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> , inducing cytoplasmic incompatibility, thelytokous parthenogenesis, male-killing or feminization.	In field collected adults from Thailand (Jamnongluk, et al, 2002)
<i>Bactrocera caudata</i>	Through adult contact	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> , inducing cytoplasmic incompatibility, thelytokous parthenogenesis, male-killing or feminization.	In field collected adults from Thailand (Jamnongluk, et al, 2002)
<i>Bactrocera diversa</i>	Through adult contact	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> , inducing cytoplasmic incompatibility, thelytokous parthenogenesis, male-killing or feminization.	In field collected adults from Thailand (Jamnongluk, et al, 2002)

Species	Biological Mode	Product	Specifics
<i>Bactrocera dorsalis</i>	<i>Opius oophilus</i> , a Parasite	unspecified bacteria and fungi (EPA, 1989) Agent: <i>Leucothix mucor</i>	Females serve as carriers of bacteria and fungi that destroy a considerable portion of the host eggs (Clausen, 1956) In Lab, applied to thorax, at 0.021 ug/g LD ₅₀ 15 days
	Through adult contact.	Agent: Avermectin B ₁ (MK-936) a powerful toxin derived from <i>Streptomyces avermitilis</i> fermentation.	With sublethal doses, fecundity, and fertility unchanged (Albrecht & Sherman, 1987)
<i>Bactrocera dorsalis</i> (cont.)	Through rotting fruit by contact with larvae and pupae	A Bacterial pathogen	Identified as a major cause of mortality. (Gingrich, 1993)
	Through larval contact.	An Ent Agent: <i>Steinernema carpocapsae</i> an entomogenous nematode	Augmentation to eradication is 500 nematode per cm ² applied to soils. Causes 94% mortality (Lindegren, 1990)
	Through adult consumption	Agent: 3.6% Phloxine B + 7.1% methyl eugenol	In lab trials, males were killed in less than 2 hours (Liquido, et al., 1995)
<i>Bactrocera dorsalis</i> sp. A1	Through adult contact	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> , inducing cytoplasmic incompatibility, thelytokous parthenogenesis, male-killing or feminization.	In field collected adults from Thailand (Jamnongluk, et al, 2002)
<i>Bactrocera modica</i>	Through adult contact	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> , inducing cytoplasmic incompatibility, thelytokous parthenogenesis, male-killing or feminization.	In field collected adults from Thailand (Jamnongluk, et al, 2002)
<i>Bactrocera oleae</i>	<i>Lasioptera berlesiana</i> , a Dipterous predator.	<i>Macrophoma dalmatica</i> , a fungus	Unknown (Narayanan & Chawla, 1962)
	<i>Saccharopolyspora siniosa</i> , a soil bacterium. Through larval contact.	Spinosad Agent: Spinosyn A Spinosyn B	Exemption for use in a proteinaceous bait spray (EPA, 1999)
	Cricket virus, feed to the adult, infection of gut and cross-infection from one fly to another by fecal-oral route (fecal contamination of food and liquid sources).	A picornavirus from Crickets Agent: CrPV	Highly pathogenic to <i>D. olea</i> : 50% within 5 days, 80% within 16 days. (Gingrich, 1993; Manousis & Moore, 1987)

Species	Biological Mode	Product	Specif ics
	Infects pupae in laboratory and natural populations.	A Picorna-like virus	Infestation in several stocks of laboratory and natural populations in Greece (Knowles, 1998; Manousis, et al., 1987)
	<i>Bacillus thuringiensis</i> , a gram-positive, spore-forming soil bacterium fed to larvae & adults.	Isolates TE 37.18 and Mex 63 gave a mortality of over 50% in adults. Isolate JC 120 gave a mortality of over 69.2 to 95% in larvae. Strain A4 with 140kDa and 32kDa have insecticidal activity for olive fly.	Infestation in both laboratory and natural stocks in Spain. (Alberola, et al., 1999) Laboratory testing only (Sivropoulou, et al., 2000)
<i>Bactrocera pyrifoliae</i>	Through adult contact	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> , inducing cytoplasmic incompatibility, thelytokous parthenogenesis, male-killing or feminization.	In field collected adults from Thailand (Jamnongluk, et al, 2002)
<i>Bactrocera tryoni</i>	Queensland fruit fly virus (QFFV), through adult contact. (Moussa, 1978)	A picornavirus, probably the Picornaviridae, in the genus Enterovirus. Agent: QFFV, easily propagated through infestations of laboratory populations (Bashiruddin, et al., 1988)	Infected, probably through feeding, in the midgut. Highly pathogenic, resulting in a mortality of 40-50% in 2nd and 3rd week after emergence of adults. Surviving adults may have reduced fecundity for a few days (Bashiruddin, et al., 1988)
<i>Ceratitis capitata</i>	Through adult contact	Agent: Avermectin B ₁ (MK-936), a powerful toxin derived from <i>Streptomyces avermitilis</i> fermentation (EPA, 1989)	In Lab, applied to thorax, at 0.29 ug/g LD ₅₀ 10 days With sublethal doses, fecundity, ard fertility reduced by up to 29% (Albrecht & Sherman, 1987)
	Through adult consumption	Agent: Phloxine B - Mazoferm 802 formulation for field application Mazoferm 802 - corn condensate hydrolyzed by a <i>Lactobacillus</i> sp. Phloxine B - photoactive dye used in formulations of foods or pharmaceuticals and cosmetics	In field trials, aerial application reduced the population of medfly by 75% against the control catch (Moreno, et al., 2001)
		Agent Phloxine B - Mazoferm 802 + <i>Fopius arisanus</i> (a parasite population in test area	Weekly ground spraying Measured populations only (Vargus, et al., 2001)
	<i>Saccharopolyspora siniosa</i> , a soil bacterium. Through larval contact.	Spinosad Agent: Spinosyn A Spinosyn B + <i>Fopius arisanus</i> (a parasite population in test area	Weekly ground spraying Measured populations only (Vargus, et al., 2001)

Species	Biological Mode	Product	Specifics
<i>Ceratitis capitata</i> (Cont.)	<i>Saccharopolyspora spinosa</i> , a soil bacterium, through ingestion.	Spinosad Agent: Spinosyn A Spinosyn D + SolBait	Test plots sprayed through aerial applications at the rate of 1.8 liters/hectare resulted in 96% reduction in Medfly populations. At 3.5 liters/hectare the reduction was 99%. (Burns, et al., 2001)
	<i>Entomophthora muscae</i> , an entomogenous fungus	Kills the adult through growth and sporulation.	Field collection of adults only (Uziel & Yuval, 2003)
	<i>Entomophthora schizophorae</i>	Kills the adult through growth and sporulation.	Field collection of adults only (Uziel & Yuval, 2003)
	Through adsorption into the peel of the fruit	A hormone from the fungus <i>Gibberella fujikuroi</i> , gibberellic acid (GA ₃) + a surfactant (L-77) Commercial formulations available	Reduces host susceptibility/attractiveness to fruit flies by preventing aging of the peel (yellowing) 10 ppm GA ₃ /L-77 sprayed to run-off on fruit (Rossler & Greany, 1990; Greany et al., 1991)
	Through larval/pupal contact.	An Entomogenous nematode Agent: <i>Steinernema feltiae</i>	Optimal 500 nematode per cm ² as a soil drench. Causes 87.1% mortality. (Lindegren, et al, 1990)
	Through larval/prepupal contact.	An Entomogenous nematode Agent: <i>Steinernema carpocapsae</i>	Augmentation to eradication is 500 nematode per cm ² applied to soils. Causes 97% mortality (Lindegren, 1990)
	Through larval/prepupal/pupal contact.	An Entomogenous nematode Agent: <i>Steinernema riobrave</i>	Optimal 100 nematode per cm ² applied to soils. Causes 82% mortality (Gazit, et al., 2000)
	Through larval contact.	A predator nematode Agent: <i>Diplogaster</i> sp.	Test shows nematodes will devour larva by paralysis and digestion of contents. (Osman, et al., 1990)
	Through contact with the adult.	An exotoxin product Agent: <i>Bacillus thuringiensis</i>	Also lethal to mammals if injected and not registered for use in many countries, including the U.S. (Gingrich, 1993)
	Through contact with the pupa	A fungal Agent: <i>Metarhizium anisopliae</i> var. <i>anisopliae</i>	At applications of 8.25, 7.8 and 28 x 10 ⁶ conidia/ml, deaths were about 6-33.7% in the first week to 24.1-66.3% in the second week and 100% by the 6th week (Garcia, et al., 1989). Through soil inoculation (Ekesi, et al., 2002)
	Through egg contact	A bacterial Agent: <i>Serratia marcescens</i> strain (EC 3.1.21 to EC 3.1.31)	Prevented eggs from hatching under lab conditions (Moore & Nadel, 1961) Dosage?
	Through contact with the pupa	A microsporidian Agent: <i>Nosema tephritidae</i>	Virulent (Steiner & Mitchell, 1966) Dosage?

Species	Biological Mode	Product	Specif ics
<i>Ceratitis capitata</i> (Cont.)	Through contact with adult	A bacterial Agent: <i>Beauveria bassiana</i>	A facultative pathogen attacking adults. (Mitchell & Saul, 1990). Through soil inoculation (Ekesi, et al., 2002)
	In the adult	A Picornavirus Agent: Ceratitis Picornavirus V	In lab, a natural virus found in the species. Pathogeny questionable (Plus &Cavalloro, 1983; Bashiruddin, et al., 1998; Knowles, 1998)
	In the adult	A Reovirus Agent: Ceratitis Reovirus I	In lab, a natural virus found in the species. Pathogeny questionable (Plus & Cavalloro, 1983)
	In the adult	A Rhabdovirus Agent: Rhabdovirus signa	In lab, pathogenic when injected into adult. (Plus & Cavalloro, 1983)
	In the adult	A Picornavirus Agent: Picornavirus C (DCV)	In lab, pathogenic when injected into adult. (Plus & Cavalloro, 1983)
<i>Ceratitis cosyra</i>	Through contact with 3rd instar larvae and pupae	A bacterial Agent: <i>Beauveria bassiana</i>	A facultative pathogen attacking larvae, pupae and deferred mortality of emerging adults through soil inoculation (Ekesi, et al., 2002)
	Through contact with the pupa	A fungal Agent: <i>Metarhizium anisopliae</i> var. <i>anisopliae</i>	A fungal agent attacking larvae, pupae and deferred mortality of emerging adults through soil inoculation (Ekesi, et al., 2002)
<i>Ceratitis rosa fasciventris</i>	Through contact with 3rd instar larvae and pupae	A bacterial Agent: <i>Beauveria bassiana</i>	A facultative pathogen attacking larvae, pupae and deferred mortality of emerging adults through soil inoculation (Ekesi, et al., 2002)
	Through contact with the pupa	A fungal Agent: <i>Metarhizium anisopliae</i> var. <i>anisopliae</i>	A fungal agent attacking larvae, pupae and deferred mortality of emerging adults through soil inoculation (Ekesi, et al., 2002)
<i>Dacus destillatoria</i>	Through adult contact	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> , inducing cytoplasmic incompatibility, thelytokous parthenogenesis, male-killing or feminization.	In field collected adults from Thailand (Jamnongluk, et al, 2002)
<i>Rhagoletis cerasi</i>	Maternally Inherited	An Endosymbiotic bacteria of the genus <i>Wolbachia</i> , inducing cytoplasmic incompatibility.	Europe. Suggested introduction of cytoplasmically incompatible males to an invading population of <i>R. cerasi</i> (Riegler, 2002).
<i>Rhagoletis cingulata</i>	<i>Saccharopolyspora siniosa</i> , a soil bacterium.	Success Agent: Spinosyn A Spinosyn B	Treat at .062-.125 lb/acre ai at a rate of 4-8 fl oz/acre or 1-2 fl oz/100 gal of dilute spray. For Stone Fruit in California (Dow AgroSciences, 1999)

Species	Biological Mode	Product	Specifics
<i>Rhagoletis completa</i>	<i>Paratransgenesis in which genes and proteins of selected species of the microbial fauna of fruit fly guts are altered, and fed to adults.</i>	Stability of pZeoEGFP, a plasmid. <i>Enterobacter agglomerans</i> , a symbiotic bacterium in the gut, through adult consumption.	Stability suggests that derivatives of this plasmid could serve to introduce heterologous genes and proteins, that, when ingested by adults, such proteins/products would be delivered directly to the gut of host flies. If toxic, this would serve to control fly populations. If nutrition is enhanced, they could improve vigor of colony flies for SIT (Peloquin, et al., 2000)
	<i>Paratransgenesis in which genes and proteins of selected species of the microbial fauna of fruit fly guts are altered, and fed to adults.</i>	Stability of pZeoEGFP, a plasmid. <i>Klebsiella pneumoniae</i> , a symbiotic bacterium in the gut, through adult consumption.	Stability suggests that derivatives of this plasmid could serve to introduce heterologous genes and proteins, that, when ingested by adults, such proteins/products would be delivered directly to the gut of host flies. If toxic, this would serve to control fly populations. If nutrition is enhanced, they could improve vigor of colony flies for SIT (Peloquin, et al., 2000)
<i>Rhagoletis indifferens</i>	<i>Saccharopolyspora siniosa</i> , a soil bacterium.	Success Agent: Spinosyn A Spinosyn B	Treat at 0.062-.125 lb/acre ai at a rate of 4-8 fl oz/acre or 1-2 fl oz/100 gal of dilute spray. For Stone Fruit in California (Dow Agro Sciences, 1999)

Parasites and Predators - TABLE 2

Biological control of fruit flies has not always been regarded as successful when measured by economic returns, partly because the economic threshold for fly damage is very low. In addition, a lack of information on the nontarget impact of parasites has drawn concern from environmentalists and conservation biologists (Duan & Messing, 1977). For these reasons, classical biological control for fruit flies seemingly suffers from a commonly encountered set of biological difficulties; especially:

1. low fecundity of parasitoids compared to fruit flies,
2. poor tracking of fly populations by parasitoids, due either to relatively ineffectual foraging at low host densities or poor survival through periods when fruit and hosts are absent, and
3. Host refuge from parasitoid attack by fly larvae in large/thick-skinned fruit or under dense litter for pupation. (Sivinski, 1996)
4. Some species of parasites may exhibit diapause. If they are used for parasitoid mass rearing and release programs such species could complicate handling procedures and raise costs (Aluja, et al., 1998)

5. Impacts of introduced parasites on nontarget organisms (Duan & Messing, 1977)

The solution to the first two problems is comparatively simple: augment the numbers of parasitoids at critical times and places and use the technique in conjunction with other controls, notably sterile release. (Sivinski, 1996)

The third problem may be partly addressed by employing parasites, especially late instar or pupal parasites, which forage extensively over fallen/broken fruit or even enters damaged fruit crack and crawls through the pulp. Again, such parasites should be augmented. (Sivinski, 1996)

The fourth problem may be addressed by employing non-diapausing parasites or to avoid exposing parasites to stimuli eliciting diapause or selecting lines that reduce incidence of diapause. (Aluja, et al., 1998)

The fifth problem has been shown to be partly non-existent by Duan & Messing (1977, 2000), who demonstrated that in Hawaii, at least, such parasites had no harmful effect on flowerhead-infesting fruit flies and probably limited effect on gall-forming and other groups of tephritids.

The usefulness of certain particularly effective predators should also not be overlooked, especially if one can be obtained and released in large numbers.

In addition, certain newer techniques, such as augmentative releases of parasites, selected specific predators, and biopesticides, such as those listed in Table 1, may well bring the pest population down to noneconomic levels if carefully planned.

Table 2 lists the known parasites and predators of the fruit pest species of the Tephritidae. They are given under the Tephritid species involved, with such notes from the literature that are available. While an effort has been made to keep up with the literature regarding synonymous names, there is no guarantee that these names will still apply to the parasite or predator in question.

Limitations to this list include restrictions on the number of citations given for each parasite or predator, since a repeat of citations serve no useful purpose. Generally, a citation would have to add some useful information or fact about a given parasite or predator. Also, if parasitoid guilds were mentioned without the fruit fly host, this would lead to a painstaking task to determine the correct species/host relationship and this task has been avoided. Other, more specific references may fill in this gap.

In addition, due to time constraints, there is no guarantee that all parasites of the listed economic species are given here, although a reasonable effort has been made. Parasites of many noneconomic fruit flies were included in order to provide reasonable coverage of most of the known Tephritid parasites as an aid in program efforts.

The cross-introduction of many parasites from one area to another and their successes and failures in over a century of such attempts is barely mentioned, and only when such introductions were successful. One of the factors in successful or unsuccessful use of parasites deals with the fact that the rate of parasitization may vary with the types of hosts infested by fruit flies. That is, the attack response of the parasitoids may be highly discriminating among the different hosts of a particular fruit fly pest. For *Biosteres arisanus*, for example, certain fruit like banana or coffee are more preferred by this parasitoid than citrus for attack on fruit flies (Bautista & Harris, 1996).

Under NOTES, a very brief line or two may provide some information about the parasite or predator which may be useful if the species is to be considered for program purposes. In all cases, the references are cited in this column.

Some economic species are listed without any parasites or predators. This serves the purpose of highlighting that these species need further foreign exploration. No known noneconomic species are so listed.

A good background document on the use of parasites for control of fruit flies is "A Review of Mediterranean Fruit Fly Parasites with special Reference to Western Australia" (Hardie, 1982). This paper is much more than the title implies, as there is a lot of useful information and references to aid in any program dealing with release of parasites.

Wharton, 1989, gave a good summary of classical biological control efforts, pointed out some of the reasons for the many failures and gave suggestions for improving future efforts. These items are summarized below:

Early Failures of classical biological control of fruit flies

1. Transportation difficulties
2. Rearing difficulties
3. Emphasis on laboratory colonization
4. Exceptionally small numbers
5. Dropping species as a result of unsuccessful attempts
6. Study of the biology of natural enemies lacking

7. Failure to adequately document efforts, no prerelease surveys, lack of published records, and failure to properly evaluate releases

Improving future classical biological control efforts

1. Retesting, with improved rearing methods, those species which were unsuccessful in the past
2. Trying, with improved rearing methods to raise more difficult parasitoids that were avoided in favor of easily reared species
3. Make more direct releases for field evaluation, rather than emphasis on laboratory colonization
4. Complete studies on the biology of the natural enemies to be utilized
5. Collect data to document impact of these parasitoid releases in reducing the targeted fruit fly population densities

There has been a gradual shift from classical biological control to augmentative biological control with mass rearing and the inundative release approach (Wong, et al., 1991; Gingrich, 1993). This effort may address some of the perceived shortcomings of classical biological control in the context of a program effort for dealing with an invasive pest and it does seem to have its advantages in dealing with a massive pest population that is thriving in a new environment, by causing that population to diminish rapidly or even crash. The purpose of releasing such numbers is:

- A. To eradicate the invading population.
- B. To suppress the invading population over time and be self sustaining
- C. To control the invading population in as low numbers as is possible and to augment biological control with sterile releases of the fruit fly and/or releases of microorganisms.

For this purpose, Ashley and Chambers (1979) did a study on maximum rearing efficiency of *Biosteres longicaudatus*, on early *Anastrepha suspensa* 3rd instar larvae. They concluded that with ovipositional cages of size 24.5 cm³, maximum efficiency is reached at a parasite density of 125 pairs of this species per cage, producing 1,896 progeny per 24 hr. exposure period.

Other approaches such as the release of pupal parasites to attack any pupae of the target pest that survive other program efforts, such as sterile release, biopesticides or other biotactical measures and/or augmented parasitic releases of egg and/or larval parasites or multiparasitism have been discussed. (Wong, et al., 1992; Bautista &

Harris, 1997; Sivinski, et al., 1998). Augmented release follows this table. Biotactical control is presented in The New Pest Response Guidelines for the Economic Fruit Flies mentioned previously.

Parasites and Predators of the Tephritidae - Table 2

Species	Parasites/Predators	Notes
<i>Acidiella angustifascia</i>	<i>Bracon intercessor</i>	A Braconid parasite from Russia, China, Korea (Kandybina, 1977).
	<i>Opius Myolejae</i>	A Braconid parasite from Russia, China, Korea (Kandybina, 1977).
	<i>Opius Mariae</i>	A Braconid parasite from Russia, China, Korea (Kandybina, 1977).
<i>Acanthiophilus mui</i>	<i>Opius afreutretae</i>	A Braconid larval-pupal parasite from South Africa (Narayanan & Chawla (1962).
<i>Acidiella angustifascia</i>	<i>Bracon intercessor</i>	A Braconid parasite from Russia, China, Korea (Kandybina, 1977).
	<i>Opius myolejae</i> (?)	A Braconid parasite from Russia, China, Korea (Kandybina, 1977).
	<i>Opius mariae</i>	A Braconid parasite from Russia, China, Korea (Kandybina, 1977).
<i>Acidiella echinopanacis</i>	<i>Opius mariae</i>	A Braconid parasite from Russia, China, Korea (Kandybina, 1977).
<i>Anastrepha</i> spp.	<i>Biosteres longicaudatus</i>	A Braconid larval-pupal parasite introduced into Costa Rica (Wharton, et al., 1981); into Mexico Peru, and Bolivia (Rogg & Camacho, 2003).
	<i>Biosteres oophilus</i>	A Braconid egg-pupal parasite introduced into Costa Rica (Wharton, et al., 1981)
	<i>Dicerataspis flavipes</i>	An Eucoilid larval parasite from Brasil (Guimaraes, et al., 1999).
	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite from Costa Rica, Ecuador, Venezuela (Wharton, et al., 1981; Molineros, et al., 1992; Katiyar, et al., 1995).
	<i>Doryctobracon cereus</i>	A Braconid parasite from Peru and Bolivia
	<i>Doryctobracon crawfordi</i>	A Braconid larval-pupal parasite from Costa Rica to Ecuador; widespread, high parasitism (36+%) (Wharton, et al., 1981; Molineros, et al., 1992).
	<i>Doryctobracon zeteki</i>	A Braconid larval-pupal parasite from Costa Rica (Wharton, et al., 1981).
	<i>Opius anastrephae</i>	A Braconid larval-pupal parasite from Costa Rica (Wharton, et al., 1981).
	<i>Opius bellus</i>	A Braconid larval-pupal parasite from Costa Rica (Wharton, et al., 1981).
	<i>Ganaspis carvalhoi</i>	A Cynipid larval-pupal parasite from Costa Rica (Wharton, et al., 1981).
	<i>Odontosema anastrephae</i>	A Cynipid larval-pupal parasite from Costa Rica, Puerto Rico (Wharton, et al., 1981; Thompson, 1943). From Brasil (Guimaraes, et al., 1999).
	<i>Aceratoneuromyia indica</i>	A Eulophid larval-pupal parasite from Costa Rica (Wharton, et al., 1981)
	<i>Ganaspis</i> sp.	A Cynipid parasite from Puerto Rico.
	<i>Acari</i>	Unspecified mites from Mexico (Baker, et al., 1944).
	<i>Asobara anastrephae</i>	A solitary Alysiiid entoparasitoid from Brazil (Leonel, et al., 1995).
	<i>Opius</i> sp.	A Braconid solitary entoparasitoid from Brazil (Leonel, et al., 1995).
<i>Pachycrepoideus dubius</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).	
<i>Trichopria anastrephae</i>	A Diapriid parasite from Brazil (Narayanan & Chawla, 1962).	
<i>Aganapsis pelleranoi</i>	A Eucoilid parasite from Venezuela (Katiyar, et al., 1995). From Brasil (Guimaraes et al., 1999).	
<i>Lopheucoila anastrepha</i>	A larval-pupal Eucoilid parasite from Mexico, Central and South America (Gallardo & Diaz, 1999)	

Species	Parasites/Predators	Notes
<i>Anastrepha alveata</i>	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite of late instars from Mexico to Argentina (Sivinski, et al., 1997; Piedra, et al., 1993; Lopez, et al., 1999; Sivinski, et al., 2000; Aluja, et al., 2000).
	<i>Utetes anastrephae</i>	A Braconid larval-pupal parasite from Mexico (Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Opius hirtus</i>	A Braconid larval-pupal parasite from Mexico (Lopez, et al., 1999; Sivinski, et al., 2000)
<i>Anastrepha amita</i>	<i>Lopheucoila anastrepha</i>	A larval-pupal Eucoilid parasite from Mexico, Central and South America (Gallardo & Diaz, 1999; Guimaraes et al., 1999)
	<i>Aganaspis pelleranoi</i>	An Eucoilid parasite which seeks out larvae through fruit holes (Sivinski, et al., 1997). From Brasil (Guimaraes, et al., 1999).
	<i>Dicerataspis flavipes</i>	An Eucoilid larval parasite from Brasil (Guimaraes, et al., 1999).
	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite of late instars from Mexico to Argentina (Souza-Filho, M.F., et al., 1999)
<i>Anastrepha antunesi</i>		
<i>Anastrepha bahiensis</i>	<i>Aganaspis nordlanderi</i>	An Eucoilid larval parasite from Brazil (Guimaraes, et al., 1999).
	<i>Aganaspis pelleranoi</i>	An Eucoilid parasite which seeks out larvae through fruit holes (Sivinski, et al., 1997). From Brasil (Guimaraes, et al., 1999).
	<i>Doryctobracon areolatus</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995; Lopez, et al., 1999).
	<i>Nealiolus</i> sp.	A Braconid parasite from Mexico (Hernandez-Ortiz, 1994).
<i>Anastrepha benjamini</i>	<i>Doryctobracon areolatus</i>	A parasitic Braconid from N. and S. America, est. in Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978).
<i>Anastrepha bistrigata</i>	<i>Biosteres brasiliensis</i>	A parasitic Braconid from Brazil (Thompson, 1943).
	<i>Doryctobracon areolatus</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995).
<i>Anastrepha bezzi</i>	<i>Biosteres longicaudatus</i>	A Braconid parasite from Bolivia (Rogg & Camacho, 2003).
	<i>Pachycrepoideus vindemmiae</i>	A Pteromalid parasite from Bolivia
<i>Anastrepha consobrina</i>	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite of late instars from N. and S. America, est. in Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978).
<i>Anastrepha cordata</i>	<i>Opius hirtus</i>	A Braconid parasite from Mexico (Hernandez-Ortiz, 1994).
<i>Anastrepha crebra</i>	<i>Microcrasis</i> sp.	A Braconid parasite from Mexico (Hernandez-Ortiz, 1994).
	<i>Utetes anastrephae</i>	A Braconid parasite from Mexico (Hernandez-Ortiz, 1994).
	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite of late instars from Mexico (Hernandez-Ortiz, 1994).
	<i>Doryctobracon crawfordi</i>	A Braconid larval-pupal parasite, sensitive to heat and dryness, from Mexico to Northern S. America (Hernandez-Ortiz, 1994).
<i>Anastrepha distincta</i>	<i>Opius</i> sp.	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995).

Species	Parasites/Predators	Notes
	<i>Aganaspis pelleranoi</i>	A Eucolilid parasite from Venezuela (Katiyar, et al., 1995).
	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite of late instars from N. and S. America (Jiron & Mexzon, 1989; Aguiar-Menezes, et al., 2001).
	<i>Phaenocaroa</i> sp.	A Braconid parasite from Columbia (Carrejo & Gonzalez, 1999)
	<i>Phaenocarpa pericarpa</i>	A Braconid parasite from Columbia (Trostle, et al., 1999)
<i>Anastrepha fraterculus</i>	<i>Biosteres brasiliensis</i>	A Braconid larval parasite from Brasil (Silvestri, 1939; Thompson, 1943; Leonel, et al., 1995; Narayanan & Chawla 1962; Zucchi, et al., 1999).
	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite of late instars from Mexico to Argentina (Sivinski, et al., 1997; Wharton & Gilstrap, 1983; Wharton & Marsh, 1978; Leonel, et al., 1995; Narayanan & Chawla 1962; Katiyar, et al., 1995; Hernandez-Ortiz, 1994; Zucchi, et al., 1999; Lopez, et al., 1999; Aguiar-Menezes, et al., 2001; Aguiar-Menezes & Menezes, 2002; Sivinski, et al., 2000; Aluja, et al., 2000; Ovruski, 2002; Marchiori, et al., 2000; Menezes & Menezes, 2001).
	<i>Doryctobracon crawfordi</i>	A Braconid larval-pupal parasite, sensitive to heat and dryness, from Mexico to Northern S. America (Sivinski, et al., 1997; Katiyar, et al., 1995; (Hernandez-Ortiz, 1994; Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Doryctobracon trinidadensis</i>	A Braconid larval-pupal parasite from Peru, where it and <i>D. areolatus</i> exert 17% of the natural biological control (Cruz, 1998).
	<i>Biosteres</i> (= <i>Diachasmimorpha</i>) <i>longicaudata</i>	A widely distributed solitary Braconid late-instar larval parasite from the South Pacific now ranging from Mexico to C. and S. America (Sivinski, et al., 1997; Lopez, et al., 1999; Sivinski, et al., 2000; Rogg & Camacho, 2003).
	<i>Aganaspis pelleranoi</i>	An eucoilid parasite from Argentina, Venezuela which seeks out larvae through fruit holes (Sivinski, et al., 1997; Thompson, 1943; Narayanan & Chawla 1962; Katiyar, et al., 1995; Lopez, et al., 1999; Sivinski, et al., 2000; Aguiar-Menezes, et al., 2001; Ovruski, 2002) From Brazil (Guimaraes, et al., 1999; Marchiori, et al., 2000).
	<i>Bracnastrepha anastrephae</i> (= <i>Utetes anastrephae</i>)	A Braconid solitary larval-pupal parasite from S. and C. America, the Caribbean and Florida (Wharton & Gilstrap, 1983; Thompson, 1943; Leonel, et al., 1995; Zucchi, et al., 1999, Narayanan & Chawla 1962; Lopez, et al., 1999; Aguiar-Menezes, et al., 2001; Aguiar-Menezes & Menezes, 2002; Sivinski, et al., 2000; Menezes & Menezes, 2001).
	<i>Opius bellus</i>	A Braconid parasite from S. and C. America (Wharton & Gilstrap, 1983; Leonel, et al., 1995; Narayanan & Chawla 1962; Zucchi, et al., 1999; Aguiar-Menezes, et al., 2001; Aguiar-Menezes & Menezes, 2002; Menezes & Menezes, 2001).
	<i>Doryctobracon fluminensis</i>	A Braconid parasite in Brazil (Zucchi, et al., 1999; Leonel, et al., 1995).
	<i>Asobara</i> sp.	An Alysiid parasite in Brazil (Zucchi, et al., 1999).
	<i>Biosteres areolatus</i>	A Braconid parasite in Brazil (Thompson, 1943).
	<i>Bracnastrepha argentina</i>	A Braconid parasite from Argentina (Thompson, 1943; Narayanan & Chawla 1962).
	<i>Ganaspis carvalhoi</i>	A Cynipid parasite from Brazil (Thompson, 1943; (Narayanan & Chawla, 1962).)
	<i>Coeloides anastrephae</i>	A Braconid parasite from Argentina (Narayanan & Chawla 1962).

Species	Parasites/Predators	Notes
	<i>Pseudeucoila brasiliensis</i>	A Cynipid parasite(Narayanan & Chawla 1962).
	<i>Opius anastrephae</i>	A Braconid parasite from Venezuela (Katiyar,et al., 1995); from Mexico (Sivinski, et al., 2000).
	<i>Idiasta</i> sp.	A Braconid parasite from Venezuela (Katiyar, et al., 1995).
	<i>Lopheucoila</i> sp.	A Cynipid parasite from Mexico (Hernandez-Ortiz, 1994).
	<i>Lopheucoila anastrephae</i>	A larval-pupal Eucoilid parasite from Mexico, Central and South America (Gallardo & Diaz, 1999; Guimaraes, et al., 1999).
	<i>Odontosema anastrephae</i>	A Eucoilid larval-pupal parasite from Mexico, Brazil (Guimaraes, et al., 1999; Lopez, et al., 1999; Aguiar-Menezes & Menezes, 2002).
	<i>Odontosema</i> sp	A Eucoilid parasite from Mexico (Hernandez-Ortiz, 1994).
	<i>Dirhinus (=Coptera) haywardi</i>	A Diapriid pupal parasite from Argentina (Loiacono, 1981 (Lopez, et al., 1999); from Mexico (Sivinski, et al., 2000). In Bolivia (Rogg & Camacho, 2003).
	<i>Aceratoneuromyia indica</i>	A Eulophid larval-pupal parasite from Mexico (Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Spalangia endius</i>	A Pteromalid parasite from Brazil (Aguiar-Menezes & Menezes, 2002).
	<i>Pachycrepoideus vindemmiae</i>	A Pteromalid parasite from Brazil (Aguiar-Menezes & Menezes, 2002; Marchiori, et al., 2000); from Mexico (Sivinski, et al., 2000) In Argentina (Ovruski, 2002). In Bolivia (Rogg & Camacho, 2003).
	<i>Trichopria anastrephae</i>	A Diapriid parasite from Brazil (Aguiar-Menezes, et al., 2001)
<i>Anastrepha grandis</i>	<i>Biosteres longicaudatus</i>	A Braconid parasite recorded from Bolivia (Rogg & Camacho, 2003).
	<i>Pachycrepoideus vindemmiae</i>	A Pteromalid parasite in Bolivia (Rogg & Camacho, 2003).
<i>Anastrepha interrupta</i>	<i>Bracanastrepha anastrephae</i>	A Braconid larval parasite from Florida (Baranowski, et al., 1993).
	<i>Doryctobracon anastrephilum</i>	A Braconid larval parasite form Florida(Baranowski, et al., 1993; Wharton & Marsh, 1978).
<i>Anastrepha leptozona</i>	<i>Doryctobracon areolatus</i>	A solitary Braconid entoparasitoid from Brazil, Columbia (Leonel, et al., 1995; Carrejo & Gonzalez, 1999; Menezes & Menezes, 2001).
	<i>Opius</i> sp.	A solitary entoparasitoid from Brazil, Columbia (Leonel, et al., 1995; Carrejo & Gonzalez, 1999).
	<i>Opius bellus</i>	A solitary entoparasitoid from Brazil (Menezes & Menezes, 2001).
	<i>Doryctobracon zeteki</i>	A solitary entoparasitoid from Columbia (Carrejo & Gonzalez, 1999).
	<i>Aganaspis</i> sp.	An Eucoilid parasite from Columbia (Carrejo & Gonzalez, 1999).
	<i>Utetes anastrephae</i>	A solitary entoparasitoid from Brazil (Menezes & Menezes, 2001).
<i>Anastrepha ludens</i>	<i>Opius longicaudatus</i> var. <i>novocaledonicus</i>	ABraconid well adapted to this host (Clausen, 1956).
	<i>Coptera hayardi</i>	A Diapriid pupal endoparasite from Latin America (Sivinski, et al., 1998; Lopez, et al., 1999; Sivinski, et al., 1998).
	<i>Doryctabracon areolatus</i>	A Braconid larval-pupal parasite of late instars from Mexico to Argentina (Sivinski, et al., 1997; Wharton & Gilstrap, 1983; Aluja, et al., 1990; Lopez, et al., 1999; Sivinski, et al., 2000).

Species	Parasites/Predators	Notes
	<i>Doryctobracon crawfordi</i>	A Braconid larval-pupal parasite, sensitive to heat and dryness, from Mexico to Northern S. America (Sivinski, et al., 1997; Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla 1962; Hernandez-Ortiz, 1994; Aluja, et al., 1990; Gonzalez-Hernandez & Tejada, 1979; Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Pachycrepoideus vindemiae</i>	A Pteromalid pupal parasite from Mexico (Sivinski, et al., 2000).
	<i>Diachasmimorpha longicaudata</i>	A widely distributed solitary Braconid late-instar larval parasite from the South Pacific now ranging from Mexico to and S. America (Sivinski, et al., 1997; Aluja, et al., 1990; Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Aganaspis pelleranoi</i>	An Eucoidid parasite which seeks out larvae through fruit holes (Sivinski, et al., 1997; Lopez, et al., 1999).
	<i>Opius africanus</i>	A Braconid parasite from C. & S. America (Wharton & Gilstrap, 1983).
	<i>Solenopsis geminata</i>	An efficient Formicid predator (94%) of pupal, prepupal stages & teneral emergent flies in Texas (Thomas, 1995).
	<i>Chromocryptus mesorufus</i>	An Ichneumonid parasite from Mexico (Thompson, 1943; Narayanan & Chawla 1962).
	<i>Cratospila ridibunda</i>	A Braconid parasite from Mexico (Thompson, 1943).
	<i>Eucoila</i> sp.	A Cynipid possibly larval parasite from Mexico (Thompson, 1943; Baker, et al., 1944).
	<i>Galesus</i> sp.	A Diapriid possibly pupal parasite from Mexico (Thompson, 1943; Baker, et al., 1944).
	<i>Villa scylla</i>	A Bombyliid (Diptera) from Mexico (Thompson, 1943)
	<i>Peromyscus leucopus</i> (White-footed mouse)	A Cricetid mouse, a pupal predator, common in N.America, accounts for 34% of pupae with species following (Thomas, 1993).
	<i>Peromyscus boylii</i> (Brush mouse)	A Cricetid mouse, pupal predator in W. N. America (Thompson, 1993).
<i>Anastrepha ludens</i> (cont.)	<i>Opius cereus</i>	A Braconid parasite from Mexico; Narayanan & Chawla 1962; Gonzalez-Hernandez & Tejada, 1979).
	<i>Bracanastrepha anastrephae</i>	A Braconid parasite from Mexico (Aluja, et al., 1990).
	<i>Ganaspis carvalhoi</i>	A non-specific Cynipid parasite from Mexico (Aluja, et al., 1990).
	<i>Aceratoneuromyia indica</i>	A larval-pupal Eulophid parasite from Mexico (Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Homaeotarsus</i> sp.	A predaceous Staphylinid beetle (Thomas, 1995).
	<i>Xenopygus analis</i>	A predaceous Staphylinid beetle (Baker, et al., 1944).
	<i>Belomicjis rufipennis</i>	A predaceous Staphylinid beetle (Aluja, 1994).
<i>Anastrepha macrura</i>		
<i>Anastrepha manihoti</i>	Utetes anastrephae	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995).
<i>Anastrepha mombinpraeoptans</i>	Utetes anastrephae	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995).
<i>Anastrepha montei</i>	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite of late instars from N. and S. America, est. in Florida (Wharton & Gilstrap, 1983).

Species	Parasites/Predators	Notes
<i>Anastrepha montei</i> (cont.)	<i>Opius bellus</i>	A Braconid parasite from S. and C. America (Wharton & Gilstrap, 1983; Leonel, et al. 1995).
<i>Anastrepha obliqua</i>	<i>Spalangia philippinensis</i>	A Pteromalid pupal parasite (Clausen, 1956)
	<i>Spalangia endius</i>	A Pteromalid parasite from Brazil (Aguiar-Menezes & Menezes, 2002).
	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite of late instars from Mexico to Columbia to Argentina (Sivinski, et al., 1997; Wharton & Gilstrap, 1983; Leonel, et al., 1995; Katiyar, et al., 1995; Jiron & Mexzon, 1989; Hernandez-Ortiz, et al., 1994; Aluja, et al., 1990; Carrejo & Gonzalez, 1999; Lopez, et al., 1999; Aguiar-Menezes, et al., 2001; Aguiar-Menezes & Menezes, 2002; Sivinski, et al., 2000; Aluja, et al., 2000; Menezes & Menezes, 2001).
	<i>Doryctobracon crawfordi</i>	A Braconid pupal predator, common in N.America, accounts for 34% of pupae with species following (Thomas, 1993; Lopez, et al., 1999).
	<i>Diachasmimorpha longicaudata</i>	A widely distributed solitary Braconid late-instar larval parasite from the South Pacific now ranging from Mexico to S. America (Sivinski, et al., 1997; Aluja, et al., 1990; Lopez, et al., 1999; Sivinski, et al., 2000; Rogg & Camacho, 2003)).
	<i>Utetes anastrephae</i> (= <i>Brachanastrepha anastrephae</i>)	A solitary Braconid larval-pupal parasite from Florida to Argentina (Sivinski, et al., 1997; Wharton & Gilstrap, 1983; Leonel, et al., 1995; Hernandez-Ortiz, et al., 1994; Aluja, et al., 1990; Lopez, et al., 1999; Aguiar-Menezes, et al., 2001; Aguiar-Menezes & Menezes, 2002; Sivinski, et al., 2000; Menezes & Menezes, 2001).
	<i>Biosteres tryoni</i>	A Braconid egg-larval parasite from eastern Australia, est. Hawaii (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978).
	<i>Coptera haywardi</i>	A diapriid endoparasitoid pupal parasite (Sivinski, et al., 2000).
	<i>Opius bellus</i>	A Braconid parasite from S. and America (Wharton & Gilstrap, 1983; Leonel, et al., 1995; Katiyar, et a 1995; Aguiar-Menezes & Menezes, 2002; Menezes & Menezes, 2001).
	<i>Asobara anastrephae</i>	A solitary Alysinne Braconid entoparasitoid from Brazil (Leonel, et al., 1995).
	<i>Opius</i> sp.	A solitary Braconid entoparasitoid from Brazil, two species from Venezuela (Leonel, et al., 1995; Katiyar, et al., 1995).
	<i>Doryctibracon</i> sp.	A Braconid parasite from Venezuela (Katiyar, et al., 1995).
	<i>Opius anastrephae</i>	A Braconid parasite from Venezuela (Katiyar, et al., 1995),
	<i>Aganaspis pelleranoi</i>	A Eucilid parasite from Venezuela (Katiyar, et al., 1995; Lopez, et al., 1999), Brazil (Guimaraes et al., 1999; Aguiar-Menezes, et al., 2001; Aguiar-Menezes & Menezes, 2002).
	Eucoline cynipids	Three unidentified species of Eucoiline cynipids from Costa Rica (Jiron & Mexzon, 1989).
	<i>Aceratoneuromyia indica</i>	A Eulophid parasite from Costa Rica, Mexico (Jiron & Mexzon, 1989; Aluja, et al., 1990; Sivinski, et al., 2000).
	<i>Trichopria</i> sp.	A Diapriid parasite from Costa Rica; Jiron & Mexzon, 1989).
	<i>Opius hirtus</i>	A Braconid parasite from Mexico (Hernandez-Ortiz, et al., 1994).
	<i>Odontosema anastrephae</i>	A Figitid parasite from Brazil (Aguiar-Menezes & Menezes, 2002).
	<i>Pachycrepoideus vindemmiae</i>	A Pteromalid parasite from Brazil (Aguiar-Menezes & Menezes, 2002); from Mexico (Sivinski, et al., 2000). In Bolivia (Rogg & Camacho, 2003).

Species	Parasites/Predators	Notes
<i>Anastrepha ocesia</i>		
<i>Anastrepha ornata</i>		
<i>Anastrepha parallela</i>	<i>Doryctobracon fluminensis</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995).
<i>Anastrepha pickeli</i>	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite of late instars from N. and S. America, est. in Florida (Wharton & Gilstrap, 1983; Carrejo & Gonzalez, 1999).
	<i>Doryctobracon</i> sp.	A Braconid parasite from Venezuela (Katiyar, et al., 1995).
	Eucoilina cynipids	Three unidentified species of Eucoilina cynipids from Costa Rica (Jiron & Mexzon, 1989)
<i>Anastrepha pseudoparallela</i>	<i>Doryctobracon areolatus</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995).
	<i>Doryctobracon fluminensis</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995).
	<i>Lopheucoila anastrephae</i>	A larval-pupal Eucoilid parasite from Mexico, Central and South America (Gallardo & Diaz, 1999; Guimaraes, et al., 1999)
<i>Anastrepha serpentina</i>	<i>Biosteres (Doryctobracon) areolatus</i>	A larval parasite from Brasil (Silvestri, 1939). A Braconid larval-pupal parasite of late instars from N. and S. America, est. in Florida (Wharton & Gilstrap, 1983; Leonel, et al., 1995; Katiyar, et al., 1995; Aluja, et al., 1990; Sivinski, et al., 2000; Aguiar-Menezes, et al., 2001; Menezes & Menezes, 2001).
	<i>Coptera haywardi</i>	A Diapriid pupal parasite from Venezuela (Garcia & Montilla, 2001).
	<i>Opius anastrephae</i>	A Braconid larval parasite from Brasil, Mexico (Silvestri, 1939; Aluja, et al., 1990; Menezes & Menezes, 2001).
	<i>Opius cereus</i>	A Braconid parasite from Trinidad (Thompson, 1943; Narayanan & Chawla 1962).
	<i>Opius trinidadensis</i>	A Braconid parasite from Trinidad (Thompson, 1943; Narayanan & Chawla 1962).
	<i>Doryctobracon brasiliensis</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995).
	<i>Opius bellus</i>	A solitary entoparasitoid from Brazil, Venezuela (Leonel, et al., 1995; Katiyar, et al., 1995; Menezes & Menezes, 2001).
	<i>Ganaspis carvalhoi</i>	A Cynipid parasite from Brazil, Mexico (Narayanan & Chawla, 1962; Aluja, et al., 1990).
	<i>Trichopria anastrephae</i>	A Diapriid parasite from Brazil (Narayanan & Chawla 1962).
	<i>Anastrepha serpentina (Cont.)</i>	<i>Aceratoneuromyia indica</i>
<i>Aganaspis pellenaroi</i>		An Eucoilid larval parasitoid from Mexico (Sivinski, et al., 2000).
<i>Diachasmimorpha longicaudata</i>		A widely distributed solitary Braconid late-instar larval parasite from the South Pacific now ranging from Mexico to N. and S. America (Jiron & Mexzon, 1989; Aluja, et al., 1990; Sivinski, et al., 2000).
	<i>Doryctobracon crawfordi</i>	A Braconid pupal predator, common in N. America (Aluja, et al., 1990; Sivinski, et al., 2000).

Species	Parasites/Predators	Notes
	<i>Doryctobracon zeteki</i>	A solitary Braconid entoparasitoid from Columbia (Carrejo & Gonzalez, 1999).
	<i>Pachycrepoideus vindemiae</i>	A Pteromalid pupal parasite from Mexico (exotic) (Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Utetes anastrephae</i>	A solitary Braconid entoparasitoid from Mexico (Sivinski, et al., 2000).
<i>Anastrepha sororcula</i>	<i>Doryctobracon areolatus</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995; Aguiar-Menezes & Menezes, 1997; Aguiar-Menezes, et al., 2001; Aguiar-Menezes & Menezes, 2002; Menezes & Menezes, 2001).
	<i>Doryctobracon brasiliensis</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995).
	<i>Utetes anastrephae</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995; Aguiar-Menezes, et al., 2001; Aguiar-Menezes & Menezes, 1997; Menezes & Menezes, 2001).
	<i>Odontosema anastrephae</i>	A Figitid parasite from Brazil (Aguiar-Menezes & Menezes, 2002).
	<i>Opius bellus</i>	A Braconid parasite from Brazil (Aguiar-Menezes, et al., 2001; Menezes & Menezes, 2001)
	<i>Aganaspis pelleranoi</i>	A Figitid parasite from Brazil (Aguiar-Menezes, et al., 2001; Aguiar-Menezes & Menezes, 2002).
	<i>Pachycrepoideus vindemmiae</i>	A Pteromalid parasite from Brazil (Aguiar-Menezes & Menezes, 2002).
<i>Anastrepha spatulata</i>	<i>Doryctobracon areolatus</i>	A widely distributed solitary Braconid late-instar larval parasite from the South Pacific now ranging from Mexico to N. and S. America (Aluja, et al., 2000)
	<i>Doryctobracon toxotrypanae</i>	A larval-pupal host restricted Braconid parasite from Costa Rica, Mexico (Aluja, et al., 2000)
<i>Anastrepha striata</i>	<i>Doryctobracon areolatus</i>	A widely distributed solitary Braconid late-instar larval parasite from the South Pacific now ranging from Mexico to N. and S. America (Sivinski, et al., 1997; Wharton & Gilstrap, 1983; Jiron & Mexzon, 1989; Aluja, et al., 1990; Lopez, et al., 1999; Sivinski, et al., 2000; Aluja, et al., 2000).
	<i>Doryctobracon crawfordi</i>	A Braconid larval-pupal parasite, sensitive to heat and dryness, from Mexico to Northern S. America (Sivinski, et al., 1997; Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla 1962; Katiyar, et a; 1995; Jiron & Mexzon, 1989; Hernandez-Ortiz, 1994; Aluja, et al., 1990; Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Diachasmimorpha longicaudata</i> (= <i>Biosteres longicaudatus</i>)	A Braconid larval-pupal parasite of late instars from Mexico to Columbia to Argentina (Sivinski, et al., 1997; Leonel, et al., 1995; Katiyar, et al., 1995; Jiron & Mexzon, 1989; Hernandez-Ortiz, 1994; Carrejo & Gonzalez, 1999; Lopez, et al., 1999; Sivinski, et al., 2000; Rogg & Camacho, 2003).
	<i>Aganaspis nordlanderi</i>	An Eucoilid larval parasite from Brazil (Guimaraes, et al., 1999).
	<i>Aganaspis pelleranoi</i>	An Eucoilid parasite which seeks out larvae through fruit holes (Sivinski, et al., 1997). From Venezuela (Katiyar, et al., 1995;), Mexico (Lopez, et al., 1999; Sivinski, et al., 2000). From Brasil (Guimaraes, et al., 1999).
	<i>Fopius arisanus</i> (= <i>Biosteres arisanus</i>)	A Braconid larval-pupal parasite from Indo-Australia, now America, (Wharton & Gilstrap, 1983; Quimio & Walter, 2001)
	<i>Opius bellus</i>	A Braconid parasite from N. and S. America (Wharton & Gilstrap, 1983).

Species	Parasites/Predators	Notes
	<i>Chromocryptus mesorufus</i>	An Ichneumonid parasite from Mexico (Thompson, 1943; Narayanan & Chawla (1962).
	<i>Opius cereus</i>	A Braconid parasite from Trinidad (Thompson, 1943; (Narayanan & Chawla 1962).
	<i>Doryctobracon (=Opius) trinidadensis</i>	A Braconid parasite from Trinidad (Thompson, 1943; (Narayanan & Chawla 1962). In Peru and Bolivia (Rogg & Camacho, 2003).
	<i>Doryctobracon zeteki</i>	A Braconid parasite from Venezuela, Columbia (Katiyar, et al., 1995; Carrejo & Gonzalez, 1999).
	<i>Doryctobracon</i> sp.	A Braconid parasite from Venezuela (Katiyar, et al., 1995).
	<i>Idiasta</i> sp.	A Braconid parasite from Venezuela (Katiyar, et al., 1995).
	Eucoiline cynipids	Three unidentified species of Eucoiline cynipids from Costa Rica (Jiron & Mexzon, 1989).
	<i>Trichoptera</i> sp.	A Diapriid parasite from Costa Rica (Jiron & Mexzon, 1989; Lopez, et al., 1999).
	<i>Aceratoneuromyia indica</i>	A Eulophid parasite from Costa Rica (Jiron & Mexzon, 1989).
	<i>Lopheucoila</i> sp.	A Cynipid parasite from Mexico (Hernandez-Ortiz, 1994).
	<i>Odontosema</i> sp.	A Cynipid parasite from Mexico (Hernandez-Ortiz, 1994).
	<i>Utetes anastrephae</i>	A Braconid larval-pupal parasite from Mexico (Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Odontosema anastrephae</i>	A Braconid larval-pupal parasite from Mexico (Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Coptera haywardi</i>	A Diapriid pupal parasite from Venezuela (Garcia & Montilla, 2001).
	<i>Aceratoneuromyia indica</i>	A Braconid larval-pupal parasite from Mexico (Lopez, et al., 1999; Sivinski, et al., 2000).
	<i>Pachycrepoideus vindemiae</i>	A Pteromalid pupal parasite from Mexico (Sivinski, et al., 2000). In Bolivia (Rogg & Camacho, 2003).
<i>Anastrepha suspensa</i>	<i>Diachasmimorphia longicaudata</i> (= <i>Biosteres longicaudatus</i>)	A Braconid late instar larval-pupal parasite from SE Asia which introduces a virus and a new protein into the host, preventing encapsulation of the parasite. The result is a 95% cut in fly populations if mass released. (Adams, 1994; Investigator, 1999; Baranowski, et al., 1993; Wharton & Gilstrap, 1983; Wharton & Marsh, 1978; Baranowski, et al., 1993; Sivinski, et al., 1999).
	<i>Coptera haywardi</i>	A Diapriid pupal endoparasitoid from Latin America, but unable to develop on irradiated hosts or parasitized hosts (Menezes, et al., 1998; Sivinski, et al., 1998). Preference for this host
	<i>Spalangia cameroni</i>	A nonspecific Pteromalid larval parasite from Florida (Baranowski, et al., 1993).
	<i>Spalangia endius</i>	A nonspecific Pteromalid larval parasite from Florida (Baranowski, et al., 1993).
	<i>Pachycrepoideus vindemiae</i>	A nonspecific Pteromalid larval parasite from Florida (Baranowski, et al., 1993).
	<i>Cothonaspis</i> sp.	A nonspecific Eucoilid larval parasite from Florida (Baranowski, et al., 1993).
	<i>Trichopria</i> sp.	A nonspecific Diapriid larval parasite from Florida (Baranowski, et al., 1993).
	<i>Bracnastrepha anastrephae</i> (= <i>Utetes amastrephae</i>)	A Braconid solitary larval-pupal parasite from S. and N. America, the Caribbean and Florida (Baranowski, et al., 1993; Wharton & Gilstrap, 1983; Sivinski, et al, 1999).

Species	Parasites/Predators	Notes
	<i>Doryctibracin anastrephilus</i>	A Braconid larval parasite from Florida (Baranowski, et al., 1993; Wharton & Marsh, 1978).
<i>Anastrepha suspensa</i> (Cont.)	<i>Opius concolor</i>	A Braconid parasite from northern Africa, intr. through the Mediterranean (Wharton & Gilstrap, 1983).
		A Braconid parasite (Narayanan & Chawla 1962).
	<i>Iceratoneauromyia indicum</i>	A Eulophid larval parasite from Costa Rica (Baranowski, et al., 1993).
	<i>Biosteres vandenboschi</i>	A Braconid larval parasite from Hawaii (Baranowski, et al., 1993).
	<i>Diachasmimorpha tryoni</i>	A Braconid larval parasite from Hawaii Origin: Queensland (Baranowski, et al., 1993).
	<i>Doryctobracon areolatus</i>	A Braconid larval parasite from Trinidad with parasitic rates of 49% (Baranowski, et al., 1993). A Braconid larval-pupal parasite of late instars from Mexico to Argentina Imported to Florida (Sivinski, et al., 1997; Sivinski, et al., 1999).
	<i>Dirhinus himalayanus</i>	A Chalcid pupal parasite from Asia, also found on muscoid pupae (Sivinski, et al., 1998).
	<i>Spalangia gemina</i>	A Pteromalid pupal parasite from Asia, also S. America (Sivinski, et al., 1998).
	<i>Doryctobracon trinidadensis</i>	A Braconid larval parasite from Trinidad (Baranowski, et al., 1993).
	<i>Psytalia concolor</i>	A Braconid larval parasite from France (Baranowski, et al., 1993).
	<i>Psytalia incisi</i>	A Braconid larval parasite from Hawaii (Baranowski, et al., 1993).
	<i>Trybliographa daci</i>	An Eucilid larval parasite from France (Baranowski, et al., 1993).
	Formicidae	Four species of ants attacking larvae released on soil surface, causing up to 100% mortality in Florida (Hennessey, 1998).
	<i>Euborellia anulipes</i>	In Florida lab, this earwig (Carcinophoridae) was found eating larvae and pupae (Hennessey, 1998).
	<i>Fopius arisanus</i>	In lab, this Braconid egg parasite from the Indo-Australian Region completed normal development (Lawrence, et al., 2000)
<i>Anomoia permunda</i>	<i>Halticoptera laevigata</i>	A Pteromalid parasite from Russia, Europe, China, Japan (Kandybina, 1977).
<i>Bactrocera</i> spp	<i>Bathyaulax</i> sp.	A Braconid parasite from India (Thompson, 1943)
	<i>Bathyaulax trypaeniphaga</i>	A Braconid parasite from India (Thompson, 1943)
	<i>Diachasmimorpha albobalteata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius vandenboschi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia incisi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Utetes bianchii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera aberrans</i>	<i>Opius tryoni</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).

Species	Parasites/Predators	Notes
<i>Bactrocera albistrigata</i>	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Malaysia and Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Malaysia and Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius vandenboschi</i>	A Braconid parasite from Malaysia and Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera aquilonis</i>	<i>Dipterophagus daci</i>	A Dipterophagid (Strepsiptera) gregarious (2-6 per host) endoparasite from Australia which attacks the soft ternal adult stage,resulting in sterile hosts (Drew & Allwood, 1985).
<i>Bactrocera arecae</i>	<i>Diachasmiorpha longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera atrisetosa</i>		
<i>Bactrocera barringtoniae</i>	<i>Biosteres deeralensis</i>	A Braconid larval parasite from Australia & New Guinea (Wharton & Gilstrap, 1983; Cochereu, 1970).
	<i>Diachasmimorpha kraussii</i> (= <i>Biosteres kraussii</i>)	A Braconid larval parasite from Australia (Wharton & Gilstrap, 1983; Rungrojwanich & Walter, 2000).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983).
	<i>Fopius arisanus</i>	A Braconid egg-pupal parasite from the Australian Region (Quimio & Walter, 2001).
<i>Bactrocera cacuminata</i>	<i>Biosteres arisanus</i>	A Braconid egg parasite from the Indo-Australian Region (Wharton & Gilstrap, 1983).
<i>Bactrocera cacuminata</i> (Cont.)	<i>Diachasmimorpha kraussii</i> (= <i>Biosteres kraussii</i>)	A Braconid larval parasite from Australia (Wharton & Gilstrap, 1983; Snowball, 1966; Rungrojwanich & Walter, 2000).
	<i>Biosteres vandenboschi</i>	A Braconid 1st stage larval Parasite from SE Asia, est. in Hawaii (Wharton & Gilstrap, 1983).
	<i>Dipterophagus daci</i>	A Dipterophagid (Strepsiptera) gregarious (2-6 per host) endoparasite from Australia which attacks the soft ternal adult stage,resulting in sterile hosts (Drew & Allwood, 1985).
	<i>Opius perkinsi</i>	A Braconid larval parasite from Australia (Wharton & Gilstrap, 1983).
	<i>Opius longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, Australia, America, Carribean, Florida (Wharton & Gilstrap, 1983; Snowball, 1966).
	<i>Fopius arisanus</i>	A Braconid egg-pupal parasite from the Australian Region (Quimio & Walter, 2001).
	(= <i>Opius oophilus</i>)	
		A Braconid egg-larval parasite from SE Asia & dominant in Hawaii. Females also carry bacteria and fungi that destroy eggs (Bosch & Haramoto, 1951; Clausen, 1956; Snowball, 1966).

Species	Parasites/Predators	Notes
	<i>Opius tryoni</i>	An Australian Braconid larval parasite present in small numbers (Snowball, et al., 1962; May & Kleinschmidt, 1954), 6.2% (Allman, 1939). Has a wide host range (Clausen, 1956; Silvestri, 1914; Wharton & Gilstrap, 1983; Snowball, 1966).
<i>Bactrocera calophylli</i>	<i>Bracon</i> sp.	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Opius fletcheri</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
<i>Bactrocera carambolae</i>	<i>Diachasmimorpha longicaudata</i>	An internal solitary larval-pupal parasite from Malaysia (Ibrahim, et al., 1994). From Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i> (= <i>Opius oophilus</i>)	A Braconid egg-pupal parasite from the Australian Region (Quimio & Walter, 2001). From Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Fopius vandenboschi</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Psytalia incisi</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>fletcheri</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>makii</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
<i>Bactrocera carambolae</i> - <i>papayae</i>	The following parasites from (Vijaysegaran, 1984). It is not possible to identify the fruit fly host, which is likely to be <i>carambolae</i> , based on location, but could be <i>papayae</i> or perhaps both of these species.	
	<i>Biosteres persulcatus</i>	A Braconid larval parasite from Malaysia causing over 75% parasitism with the species below (Vijaysegaran, 1984).
	<i>Biosteres arisanus</i>	A Braconid larval parasite from Malaysia causing over 75% parasitism with the species above (Vijaysegaran, 1984).
	<i>Biosteres oophilus</i>	A Braconid larval parasite from Malaysia causing negligible parasitism (Vijaysegaran, 1984).
	<i>Biosteres longicaudatus</i>	A Braconid larval parasite from Malaysia causing 7.9% parasitism (Vijaysegaran, 1984).
	<i>Opius fletcheri</i>	A Braconid egg-larval parasite from Malaysia causing 20.7% parasitism (Vijaysegaran, 1984).
<i>Bactrocera caryeae</i>	<i>Opius manii</i>	A Braconid larval parasite from India (Fullaway, 1951; see White & Eston-Harris, 1992 for this and following entries).
<i>Bactrocera caryeae</i> (Cont.)	<i>Opius compensans</i>	A Braconid parasite from India (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Opius incisi</i>	A Braconid parasite from India (Thompson, 1943; Narayanan & Chawla, 1962).

Species	Parasites/Predators	Notes
	<i>Opius persulcatus</i>	A Braconid parasite from India (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Opius oophilus</i>	A Braconid parasite from India (Narayanan & Chawla, 1962).
	<i>Cothonaspis</i> sp.	A Braconid parasite from India (Narayanan & Chawla, 1962).
	<i>Pseudeucoila</i>	A Braconid parasite from India (Narayanan & Chawla, 1962).
	<i>Trybliographa daci</i>	A Braconid parasite from India (Narayanan & Chawla, 1962).
	<i>Dirhinus giffardii</i>	A Braconid parasite from India (Narayanan & Chawla, 1962).
	<i>Spalangia</i> spp.	A Pteromalid parasite from India (Narayanan & Chawla, 1962).
	<i>Syntomosphyrum indicum</i>	An Eulophid parasite from India (Narayanan & Chawla, 1962).
	<i>Trichopria</i> sp.	A Diapriid parasite from India (Narayanan & Chawla, 1962).
<i>Bactrocera caudata</i>		
<i>Bactrocera ciliatus</i>	<i>Dirhinus giffardii</i>	A Chalcid pupal parasite from Pakistan (Ahmad, et al., 1975)
	<i>Psytalia incisi</i>	A Braconid egg-larval parasite from India (Kapoor, 1993).
	<i>Galesus</i> sp.	A Diapriid parasite from India (Kapoor, 1993).
	<i>Pachycrepoideus vindemiae</i> (= <i>dubius</i>)	A Pteromalid parasite from India (Kapoor, 1993).
	<i>Spalangia endius</i> (= <i>philippinensis</i>)	A Spalangiid parasite from India (Kapoor, 1993).
<i>Bactrocera correcta</i>	<i>Dirhinus</i> sp.	A Chalcid larval-pupal parasite from India (Narayanan & Chawla, 1962).
	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius persulcatus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius vandenboschi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia incisi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Malaysia and Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Utetes bianchii</i>	A Braconid parasite from Malaysia and Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera cucumis</i>		

Species	Parasites/Predators	Notes
<i>Bactrocera cucurbitae</i>	<i>Psytallia fletcheri</i> = <i>Opius fletcheri</i>	Common Indian egg-larval Braconid parasite, in Hawaii restricted to Melon Fly. Also in the Philippines, Guam, India and int. to Ryukyu Is. (Clausen, 1956; Wharton & Gilstrap, 1983; Thompson, 1943; Cochereau, 1970). Narayanan & Chawla, 1962, state that in the fall, this parasite attacks up to 20% of full grown larvae leaving the host, and develop in the pupa. Note that <i>P. fletcheri</i> prefers wild hosts for parasitization (Liquido, 1991; Vargas et al., 2000; Vargas, 2002). From Thailand (Chinajariyawong, et al., 2000). In Peru and Bolivia (Rogg & Camacho, 2003).
	<i>Opius watersi</i>	Egg-larval Braconid parasite in North India & Ceylon (Clausen, 1956; Narayanan & Chawla, 1962).
	<i>Opius angaleti</i>	Egg-larval Braconid parasite in Borneo (Clausen, 1956; Narayanan & Chawla, 1962).
	<i>Biosteres angaleti</i>	A Braconid larval-pupal parasite from the Indo-Australian Region (Wharton & Gilstrap, 1983).
	<i>Diachasmimorpha</i> (= <i>Biosteres</i>) <i>dacusii</i>	A Braconid parasite from India (Wharton & Gilstrap, 1983). From Thailand (Chinajariyawong, et al., 2000)
	<i>Biosteres hageni</i>	A Braconid parasite from Fiji reared in lab (Wharton & Gilstrap, 1983).
	<i>Diachasmimorpha</i> (= <i>Biosteres</i>) <i>longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, Australia, America, Carribean, Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978). From Thailand (Chinajariyawong, et al., 2000).
	= <i>Psytallia incisi</i> (= <i>Opius incisi</i>)	A Braconid egg-larval parasite from SE Asia, est. in Hawaii, in lab (Wharton & Gilstrap, 1983). In India Kapoor, 1993).
	<i>Diachasma fullawayi</i>	A Braconid parasite from Hawaii (Thompson, 1943).
	<i>Diashasma tryoni</i>	A Braconid parasite from Hawaii (Thompson, 1943).
	<i>Dirhinus giffardii</i>	A Chalcid pupal parasite from Hawaii (Thompson, 1943) Intro. to Reunion (Etienne, 1973; Narayanan & Chawla, 1962). From India (Kapoor, 1993).
	<i>Fopius arisanus</i>	From Thailand and Malaysia (Chinajariyawong, et al., 2000).
<i>Bactrocera cucurbitae</i> (cont)	<i>Galeus silvestrii</i>	A Diapriid parasite from Hawaii (Thompson, 1943).
	<i>Ipobracon</i> sp.	A Braconid parasite from India (Thompson, 1943).
	<i>Opius</i> sp.	A Braconid parasite from Ceylon (Thompson, 1943).
	<i>Opius humilis</i>	A Braconid parasite from Hawaii (Thompson, 1943).
	<i>Pachycrepoideus dubius</i> = <i>vindemiae</i>	A Pteromalid parasite from Hawaii(Thompson, 1943; Narayanan & Chawla, 1962). From India (Kapoor, 1993).
	<i>Paranagrus osborni</i>	A Mymarid parasite from Hawaii(Thompson, 1943).
	<i>Splangia cameroni</i>	A Pteromalid parasite from Hawaii(Thompson, 1943).
	<i>Splangia hirta</i>	A Pteromalid parasite from Hawaii(Thompson, 1943).
	<i>Tetrastichus giffardianus</i>	A Eulophid parasite from Hawaii (Thompson, 1943).
	<i>Dirhinus anthracia</i> = <i>Dirhinus</i> sp. ?	A Chalcid parasite from S. India, imported to Ceylon, in Hawaii, Fiji. From Africa to Middle East, SE Asia, S. Pacific, Australia. Parasite of many fly families (Boucek & Narendran, 1981; Cochereau, 1970).
	<i>Spalangia nigra</i>	A Pteromalid, pro larval-pupal parasite from Europe, N. America, pro imported into Hawaii Many diverse hosts (Boucek, 1963).
	<i>Spalangia cameroni</i>	A Pteromalid, pro larval-pupal parasite from Europe, Africa, Asia, & S. America, imported to Pacific Is. Many diverse hosts (Boucek, 1963).

Species	Parasites/Predators	Notes
	<i>Pachyneuron vindemmiae</i>	A Pteromalid pupal parasite from Morocco (Thompson, 1943). Intro. Reunion (Etienne, 1973).
	<i>Fopius (=Opus) vandenboschi</i>	A Braconid parasite from SE Asia (Cochereau, 1970). From Thailand (Chinajariyawong, et al., 2000).
	<i>Spalangia</i> sp.	A Pteromalid parasite from SE Asia (Cochereau, 1970).
	<i>Syntomosphyrum indicum</i>	An Eulophid parasite from SE Asia (Cochereau, 1970).
	<i>Spalangia philippinensis (= endius)</i>	A Pteromalid pupal parasite from Hawaii (Narayanan & Chawla, 1962). From India (Kapoor, 1993).
	<i>Opus compensans</i>	A Braconid parasite from India with 10-12% parasitism (Narayanan & Chawla, 1962).
	<i>Dirhinus auratus</i>	A Chalcid parasite from Ceylon (Narayanan & Chawla, 1962).
	<i>Dirhinus luzonensis</i>	A Chalcid parasite from India (Narayanan & Chawla, 1962).
	<i>Spalangia afra</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia philippinensis</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia stomoxysiae</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Philonthus</i> sp.	A Staphylinid predator from South Chin (Narayanan & Chawla, 1962).
	<i>Opus</i> # 4	A Braconid parasite from Borneo which prefers large 3rd instar larva (Marucci, 1952).
	<i>Utetes bianchii</i>	From Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera curvipennis</i>	<i>Biosteres longicaudatus</i> var. <i>novocaledonicus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Carribean, Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978). From New Caledonia (Cochereau, 1970).
	<i>Opus fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983).
<i>Bactrocera decipiens</i>		
<i>Bactrocera decurtans</i>		
<i>Bactrocera depressa</i>		
<i>Bactrocera distincta</i>		
<i>Bactrocera diversa</i>	<i>Psytalia fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Utetes bianchii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera dorsalis</i>	<i>Diachasmimorpha (=Opus, =Biosteres) longicaudata</i>	An Indo-Australian Braconid 2-3rd stage larval parasite, now in Hawaii, Fiji, America, Carribean, Florida % parasitism 1.8% (Wharton & Gilstrap, 1983; Thompson, 1943; Wharton & Marsh, 1978; Fry, 1987; Narayanan & Chawla, 1962; Serit & Tan, 1990; Ooi, 1984; Serit, et al., 1986; Kapoor, 1993; Vargas et al., 2000; Chinajariyawong, et al., 2000).
	<i>Diachasmimorpha albobalteata</i>	A Braconid from Thailand (Chinajariyawong, et al., 2000).

Species	Parasites/Predators	Notes
	<i>Opius longicaudatus</i> var. <i>novocaledonicus</i>	A New Caledonian 2-3rd instar larval parasite ex. <i>Dacus</i> spp. in Hawaii (Clausen, 1956).
	var. <i>malaiensis</i>	A 2-3rd instar larval parasite from Malaya, Borneo, India in Hawaii (Clausen, 1956; Cochereau, 1970).
	var. <i>taiensis</i>	A 2-3rd instar larval parasite ex. <i>Dacus</i> spp. from Thailand in Hawaii (Clausen, 1956; Cochereau, 1970) Note: This species seems to attack older larvae in fruit on the ground (Bess, et al., 1950)
	var. <i>chocki</i>	From the Philippines (Cochereau, 1970).
	<i>Opius compensans</i>	An egg-larval Braconid parasite from India, in Hawaii (Clausen, 1956). Small numbers only (Narayanan & Chawla, 1962; Narayanan & Chawla, 1962).
	<i>Opius formosanus</i>	An egg-larval Braconid parasite from Formosa in Hawaii (Clausen, 1956; Narayanan & Chawla, 1962).
	<i>Psytalia fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> (= <i>Opius</i>) <i>incisi</i>	An egg-larval Braconid parasite from SE Asia in Hawaii (Clausen, 1956; Wharton & Gilstrap, 1983; Cochereau, 1970; Narayanan & Chawla, 1962; Ooi, 1984; Vargas et al., 2000). In Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Opius kraussi</i>	An egg-larval Braconid parasite from Australia in Hawaii (Clausen, 1956).
	<i>Fopius arisanus</i> (= <i>Opius oophilus</i>) (= <i>Biosteres arisanus</i>)	A Braconid egg/pupal parasite from Malaya in Hawaii, 4.7% parasitism; 24% in Malaysia (Clausen, 1956; Wharton & Gilstrap, 1983; Cochereau, 1970; Serit & Tan, 1990; Ooi, 1984; Serit, et al., 1986; Vargas et al., 2000). In Thailand (Chinajariyawong, et al., 2000). In Peru and Bolivia (Rogg & Camacho, 2003) A Braconid egg/pupal parasite which outcompetes other parasites (Wood, 1998; from the Indo-Australian Region (Wharton & Gilstrap, 1983; Fry, 1987; Serit, et al., 1986). egg parasitism 17.2% (Serit & Tan, 1990; Liquido, 1991) Replaced <i>Fopius vandenboschi</i> (Vargas, 2002).
		Synonyms of the above (Quimio & Walter, 2001)
<i>Bactrocera dorsalis</i> (Cont.)	<i>Fopius</i> (= <i>Opius</i> = <i>Biosteres</i>) <i>vandenboschi</i>	A Braconid 1st stage larval parasite from Malaya in Hawaii, 4.7% parasitism; 24% in Malaysia (Clausen, 1956; Wharton & Gilstrap, 1983; Cochereau, 1970; Serit & Tan, 1990; Ooi, 1984; Serit, et al., 1986; Vargas et al., 2000). In Thailand (Chinajariyawong, et al., 2000). Replaced by <i>Fopius arisanus</i> (Vargas, 2002).
	<i>Syntomosphyrum indicum</i>	An Eulophid parasite ex. <i>Dacus</i> spp. from Malaya in Hawaii (Clausen, 1956; Thompson, 1943). From SE Asia (Cochereau, 1970). In India at 66% total parasite pop., intr. Italy (Narayanan & Chawla, 1962). From India (Kapoor, 1993).
	<i>Tetrastichus dacicida</i>	An Eulophid pupal parasite ex. <i>Dacus</i> , <i>Pardalaspis</i> & <i>Pterandrus</i> spp. from Kenya in Hawaii (Clausen, 1956; Narayanan & Chawla, 1962)

Species	Parasites/Predators	Notes
	<i>Fopius (=Opus) persulcatus</i>	A primarily 1st to 2nd instar Braconid parasite from Malaya, India attacking larvae on fruit in trees (Bess, et al., 1950; Cochereau, 1970; Serit, et al., 1986). With <i>O. oophilus</i> , is 23% of parasite pop. (Narayanan & Chawla, 1962). In Thailand (Chinajariyawong, et al., 2000).
	<i>Biosteres deeralensis</i>	A Braconid larval parasite from Australia & New Guinea reared in Hawaii (Wharton & Gilstrap, 1983).
	<i>Biosteres hageni</i>	A Braconid parasite from Fiji reared in lab (Wharton & Gilstrap, 1983).
	<i>Diachasmimorpha kraussii (=Biosteres kraussii)</i>	An Australian Braconid larval parasite (Wharton & Gilstrap, 1983). <i>D. kraussii</i> cannot successfully reproduce in Hawaiian <i>B dorsalis</i> (Rungrojwanich & Walter, 2000).
	<i>Biosteres persulcatus</i>	A Braconid parasite from India, Malaysia parasitism .1% (Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla, 1962; Serit & Tan, 1990).
	<i>Biosteres skinneri</i>	A Braconid parasite from Malaysia, Philippines which more readily attacks Tephritids in cucurbits, reared in lab (Wharton & Gilstrap, 1983; Serit & Tan, 1990).
	<i>Biosteres tryoni</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, Australia, America, Caribbean, Florida (Wharton & Gilstrap, 1983; Thompson, 1943; Wharton & Marsh, 1978; Fry, 1987).
	<i>Opus fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific, in lab (Wharton & Gilstrap, 1983).
	<i>Opus makii</i>	A Braconid parasite from SE Asia (Wharton & Gilstrap, 1983; Thompson, 1943; Cochereau, 1970; Narayanan & Chawla, 1962).
	<i>Opus manii</i>	A Braconid parasite from India (Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962; Kapoor, 1993).
	<i>Opus mitis</i>	A Braconid parasite in Peru and Bolivia (Rogg & Camacho, 2003).
	<i>Biosteres javanus</i>	A Braconid parasite from Java (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Galesus</i> sp.	A Diapriid parasite from Malaya, India (Thompson, 1943; Narayanan & Chawla, 1962; Kapoor, 1993).
	<i>Opus fletcheri</i>	A Braconid parasite from Malaysia, India (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Spalangia</i> sp.	A Pteromalid parasite from Malaysia (Thompson, 1943; Cochereau, 1970; Narayanan & Chawla, 1962).
	<i>Tachinaephagus</i> sp.	An Encyrtid from Malaysia (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Tetrastichus</i> sp.	An Eulophid parasite from Malaysia (Thompson, 1943).
	<i>Spalangia endius</i>	A Pteromalid larval-pupal (?) parasite with many hosts, world-dist (Boucek, 1963).
	<i>Spalangia gemina</i>	A Pteromalid pupal parasite with a wide host range from Asia through S. America (Boucek, 1963).
	<i>Pachyneuron vindemmiae</i>	A Pteromalid parasite from SE Asia (Cochereau, 1970).
	<i>Dirhinus giffardii</i>	A Chalcidid pupal parasite (Narayanan & Chawla, 1962).
	<i>Cothonaspis</i> sp.	A Cynipid parasite (Narayanan & Chawla, 1962; Kapoor, 1993).
	<i>Trybliographa daci</i>	A Cynipid parasite (Narayanan & Chawla, 1962).
	<i>Pilinothrix</i> sp.	A Cynipid parasite from Malaya (Narayanan & Chawla, 1962).
	<i>Dirhinus luzonensis</i>	A Chalcid parasite from Malaya (Narayanan & Chawla, 1962).

Species	Parasites/Predators	Notes
	<i>Pachycrepoideus dubius = vindemiae</i>	A Cynipid pupal parasite from the Philippines (Narayanan & Chawla, 1962). From India (Kapoor, 1993).
	<i>Spalangiaaфра</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia grotiusi</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia philippinensis (=endius)</i>	A Pteromalid parasite (Narayanan & Chawla, 1962). From India (Kapoor, 1993).
	<i>Spalangia simplex</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia stomoxysia</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Trichopria</i> sp.	A Diapriid parasite from India (Narayanan & Chawla, 1962).
	<i>Thyrecephalus albertisi</i>	A Staphylinid predator from the Philippines (Narayanan & Chawla, 1962).
<i>Bactrocera dorsalis</i> (Cont.)	<i>Spalangia grotiusi</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia philippinensis (=endius)</i>	A Pteromalid parasite (Narayanan & Chawla, 1962). From India (Kapoor, 1993).
	<i>Spalangia simplex</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia stomoxysia</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Trichopria</i> sp.	A Diapriid parasite from India (Narayanan & Chawla, 1962).
	<i>Thyrecephalus albertisi</i>	A Staphylinid predator from the Philippines (Narayanan & Chawla, 1962).
	<i>Anisolabis eteronoma</i>	An earwig (Carcinophiridae) predator which feeds on larvae in fruit and soil (Narayanan & Chawla, 1962).
	<i>Sphingolabis hawaiiensis</i>	An earwig (Labiidae) predator which feeds on larvae (Narayanan & Chawla, 1962).
	<i>Dirhinus auratus</i>	A Chalcid parasite from India (Narayanan & Chawla, 1962; Kapoor, 1993).
	<i>Aceratoneuromyia indica</i>	An Eulophid parasite from Malaysia (Ooi, 1984).
	<i>Dirhinus anthracina</i>	A Chalcid parasite from India (Kapoor, 1993).
	<i>Pseudeucoila</i> sp.	A Cynipid parasite from India (Kapoor, 1993).
	<i>Syntomosphyrum aфра</i>	An Eulophid parasite from India (Kapoor, 1993).
	<i>Syntomosphyrum grotiusi</i>	An Eulophid parasite from India (Kapoor, 1993).
	<i>Syntomosphyrum stomyoxysine</i>	An Eulophid parasite from India (Kapoor, 1993).
	<i>Anisolabis eteronoma</i>	An earwig (Carcinophiridae) predator which feeds on larvae in fruit and soil (Narayanan & Chawla, 1962).
	<i>Coptera silvestrii</i>	A Psilinae parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Mozambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
	<i>Utetes bianchii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera endiandrae</i>	<i>Opius</i> sp. ? <i>africanus</i>	A Braconid larval parasite from Australia (?) (May & Kleinschmidt, 1954).
	<i>Opius deeralensis</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Opius fletcheri</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).

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	<i>Biosteres deerlensis</i>	A Braconid larval parasite from Australia & New Guinea (Wharton & Gilstrap, 1983).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983).
<i>Bactrocera facialis</i>		
<i>Bactrocera fagraea</i>	<i>Opius deeralensis</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954; Wharton & Gilstrap, 1983).
	<i>Opius fletcheri</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954)
	<i>Opius froggatti</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Opius perkinsi</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Opius fijiensi</i>	A Braconid egg-larvalparasite from Australia, S. Pacific (Wharton & Gilstrap, 1983).
<i>Bactrocera frauenfeldi</i>	<i>Biosteres deeralensis</i>	A Braconid larval parasite from Australia & New Guinea (Wharton & Gilstrap, 1983; Cochereau, 1970).
	<i>Biosteres longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Carribean, Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983; Cochereau, 1970).
<i>Bactrocera garciniae</i>	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius vandenboschi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera halfordiae</i>	<i>Opius tryoni</i>	An Australian Braconid larval parasite found in 52% of larvae in wild fruit (Gurney, 1910; May & Kleinschmidt, 1954).
<i>Bactrocera halfordiae</i> (Cont.)	<i>Opius fletcheri</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Opius kraussi</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Fopius schlingeri</i>	A egg-pupal Braconid parasite from Australia (Wharton, 1999)
<i>Bactrocera incisa</i>	<i>Biosteres longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Carribean, Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978).
	<i>Dirhinus luzonensis</i>	A Chalcid parasite from the Philippines (Narayanan & Chawla, 1962).
	<i>Pachycrepoideus dubius</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
<i>Bactrocera irvingiae</i>	<i>Diachasmimorpha longicaudata</i>	A Braconid larval parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera isolata</i>	<i>Diachasmimorpha longicaudata</i>	From Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	From Thailand (Chinajariyawong, et al., 2000)
	<i>Psytalia fletcheri</i>	From Thailand (Chinajariyawong, et al., 2000)
<i>Bactrocera jarvisi</i>	<i>Opius flecheri</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).

Species	Parasites/Predators	Notes
	<i>Diachasmimorpha kraussii</i> (= <i>Biosteres kraussii</i>) (= <i>Opius kraussii</i>)	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954; Wharton & Gilstrap, 1983; Cochereau, 1970; Rungrojwanich & Walter, 2000).
	<i>Biosteres deeralensis</i>	A Braconid larval parasite from Australia & New Guinea (Wharton & Gilstrap, 1983; Cochereau, 1970).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983).
	<i>Opius perkinsi</i>	A Braconid larval parasite from Australia (Wharton & Gilstrap, 1983; Cochereau, 1970).
	<i>Opius longicaudatus</i> (?)	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, Australia, America, Caribbean, Florida (Wharton & Gilstrap, 1983).
	<i>Fopius arisanus</i> (= <i>Opius oophilus</i>)	A Braconid parasite from SE Asia intr. to Australia (Cochereau, 1970).
		A Braconid egg-pupal parasite from the Australian Region (Quimio & Walter, 2001).
	<i>Spalangia</i> sp.	A Pteromalid parasite from Australia (Cochereau, 1970).
	<i>Trybliographa daci</i>	A parasite from Australia (Cochereau, 1970).
	<i>Opius tryoni</i>	A Braconid parasite from Australia (Jarvis, 1925).
<i>Bactrocera kanchanaburi</i>	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera kandiensis</i>		
<i>Bactrocera kirki</i>		
<i>Bactrocera kraussi</i>	<i>Opius deeralensis</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954; Wharton & Gilstrap, 1983).
	<i>Opius fletcheri</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Diachasmimorpha kraussii</i> (= <i>Biosteres kraussii</i>)	An Australian Braconid larval parasite. (Rungrojwanich & Walter, 2000; Wharton & Gilstrap, 1983; Cochereau, 1970).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983; Cochereau, 1970).
	<i>Opius froggatti</i>	A Braconid parasite from Australia, New Caledonia (Wharton & Gilstrap, 1983).
	<i>Opius perkinsi</i>	A Braconid larval parasite from Australia (Wharton & Gilstrap, 1983; Cochereau, 1970).
<i>Bactrocera kraussi</i> (Cont.)	<i>Fopius arisanus</i> (= <i>Opius oophilus</i>)	A Braconid parasite from SE Asia intr. to Australia (Cochereau, 1970)
		A Braconid egg-pupal parasite from the Australian Region (Quimio & Walter, 2001).

Species	Parasites/Predators	Notes
<i>Bactrocera lata</i>	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Malaysia (Chinajariyawong, et al., 2000).
<i>Bactrocera laticaudus</i>	<i>Opius perkinsi</i>	A Braconid larval parasite from Australia (Fullaway, 1950; May & Kleinschmidt, 1954; Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962).
	<i>Opius froggatti</i>	A Braconid larval parasite in Australia, New Caledonia described from numerous specimens (Fullaway, 1950; Wharton & Gilstrap, 1983; Cochereau, 1970; Narayanan & Chawla, 1962).
	<i>Opius fletcheri</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Biosteres deeralensis</i>	A Braconid larval parasite from Australia (Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983).
<i>Bactrocera latifrons</i>	<i>Biosteres arisanus</i>	A Braconid egg parasite from the Indo-Australian Region (Wharton & Gilstrap, 1983; Liquido, et al., 1994; Kapoor, 1993).
	<i>Diachasmimorpha (=Biosteres) longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Caribbean, Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978; Liquido, et al., 1994). In Thailand (Chinajariyawong, et al., 2000).
	<i>Biosteres persulcatus</i>	A Braconid parasite from India (Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962; Liquido, et al., 1994; Kapoor, 1993).
	<i>Fopius (=Biosteres) vandenboschi</i>	A Braconid 1st stage larval Parasite from SE Asia, est. in Hawaii (Wharton & Gilstrap, 1983; Liquido, et al., 1994). From Thailand (Chinajariyawong, et al., 2000).
	<i>Opius incisi</i>	A Braconid egg-larval parasite from SE Asia, est. in Hawaii (Wharton & Gilstrap, 1983; Liquido, et al., 1994; Kapoor, 1993).
	<i>Fopius arisanus (=Opius oophilus)</i>	A Braconid larval-pupal parasite from India (Narayanan & Chawla, 1962). From Thailand (Chinajariyawong, et al., 2000).
		A Braconid egg-pupal parasite from the Australian Region (Quimio & Walter, 2001).
	<i>Fopius deeralensis</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000)
	<i>Dirhinus giffardii</i>	A Chalcid parasite from India (Narayanan & Chawla, 1962; Liquido, et al., 1994).
	<i>Dirhinus luzonensis</i>	A Chalcid parasite from the Philippines, India (Narayanan & Chawla, 1962; Liquido, et al., 1994).
<i>Pachycrepoideus dubius</i>	A Pteromalid parasite from South China (Narayanan & Chawla, 1962; Liquido, et al., 1994).	
	<i>Psytalia fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia incisi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>fletcheri</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Dichasmimorpha kraussi</i>	An Opiine larval parasite from Australia, introduced to Hawaii for control (Duan & Messing, 2000; Messing, et al., 2000).
	<i>Utetes bianchii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).

Species	Parasites/Predators	Notes
<i>Bactrocera limbifera</i>	<i>Biosteres longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Caribbean, Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978; Hardy, 1974).
	<i>Biosteres skinneri</i>	A Braconid parasite from the Philippines which more readily attacks Tephritids in Cucurbits (Wharton & Gilstrap, 1983; Hardy, 1974).
	<i>Opius makii</i>	A SEAsian Braconid parasite from the Philippines (Cochereau, 1970).
	<i>Opius fletcheri</i>	A Braconid parasite from the Philippines (Hardy, 1974).
	<i>Pachycrepoideus dubius</i>	A Braconid parasite from the Philippines (Hardy, 1974).
	<i>Galesus</i> sp.	A Diapriid parasite from the Philippines (Hardy, 1974).
	<i>Spalangia</i> sp.	A Pteromalid parasite from the Philippines (Hardy, 1974).
<i>Bactrocera mayi</i>	<i>Dipterophagus daci</i>	A Dipterophagid (Strepsiptera) gregarious (2-6 per host) endoparasite from Australia which attacks the soft ternal adult stage, resulting in sterile hosts (Drew & Allwood, 1985).
<i>Bactrocera melanota</i>		
<i>Bactrocera melas</i>	<i>Opius fletcheri</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Opius kraussi</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Opius tryoni</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
<i>Bactrocera minax</i>	<i>Opius deeralensis</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954; Wharton & Gilstrap, 1983).
	<i>Diachasmimorpha fejeni</i>	A Braconid larval parasite from Bhutan (Van Achterberg, 1999)
<i>Bactrocera murrayi</i>	<i>Diachasmimorpha kraussii</i> (= <i>Opius kraussi</i> (= <i>Biosteres kraussii</i>))	An Australian Braconid larval parasite. (Rungrojwanich & Walter, 2000; May & Kleinschmidt, 1954; Wharton & Gilstrap, 1983).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983).
	<i>Opius deeralensis</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954; Wharton & Gilstrap, 1983).
<i>Bactrocera musae</i>	<i>Chelisoche morio</i>	An earwig (Chelisocheidae) predator from Papua New Guinea preying on larvae (Greve & Ismay, 1983). Adults readily attack and consume 2-3 larvae per day (Smith, 1977).
	<i>Biosteres deeralensis</i>	A Braconid larval parasite from Australia & New Guinea (Wharton & Gilstrap, 1983).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983).
	<i>Opius oophilus</i>	A Braconid egg parasite from SE Asia & dominant in Hawaii, est. in Australia. Females also carry bacteria and fungi that destroy eggs (Bosch & Haramoto, 1951; Clausen, 1956; Snowball, 1966).
	<i>Dipterophagus daci</i>	A Dipterophagid (Strepsiptera) gregaruiys (2-6 per host) endoparasite from Australia which attacks the soft ternal adult stage, resulting in sterile hosts (Drew & Allwood, 1985)
<i>Bactrocera mutabilis</i>	<i>Opius tryoni</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).

Species	Parasites/Predators	Notes
<i>Bactrocera neohumeralis</i>	<i>Opius fletcheri</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
	<i>Opius kraussi</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954; Snowball, 1966).
	<i>Opius tryoni</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954; Snowball, 1966).
	<i>Fopius schlingerii</i>	An egg-pupal Braconid parasite from Australia (Wharton, 1999)
	<i>Fopius arisanus</i> (= <i>Opius oophilus</i>)	A Braconid egg-pupal parasite from the Australian Region (Quimio & Walter, 2001).
	<i>Dipterophagus daci</i>	A Dipterophagid (Strepsiptera) gregarious (2-6 per host) endoparasite from Australia which attacks the soft ternal adult stage,resulting in sterile hosts (Drew & Allwood, 1985)..
<i>Bactrocera occipitalis</i>		
<i>Bactrocera oleae</i>	<i>Psytalia</i> (= <i>Opius</i>) <i>concolor</i>	A Braconid larval parasite with 30% parasitism from N. Africa, S. Europe (Silvestri, 1914; Clausen, 1956; Wharton & Gilstrap, 1983; Thompson, 1943; Fry, 1987; Narayanan & Chawla, 1962; Kapatos, et al., 1977; Nuenschwander, et al., 1983; Kimani-Nojou, et al., 2000; El-Heneidy, et al., 2001). Introduced to Italy in 1933 for olive fly control (Kimani-Nojou, et al., 2000). From Spain- In Peru and Bolivia (Rogg & Camacho, 2003).
	<i>Opius dacicida</i>	A Braconid larval parasite from Ethiopia, Italy, S. Africa (Silvestri, 1914; Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Opius lonsburyi</i>	A Braconid larval parasite from the Transvaal, Kenya (Silvestri, 1914; Wharton & Gilstrap, 1983).
	<i>Opius africanus</i>	A Braconid larval parasite from South Africa, also in Italy (Silvestri, 1914; Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Sigalphus daci</i>	A Braconid parasite from South Africa, Ethiopia (Silvestri, 1914; Thompson, 1943; Narayanan & Chawla, 1962).
<i>Bactrocera oleae</i> (Cont.)	<i>Bracon celer</i>	An important Braconid parasite from South Africa (Silvestri, 1914; Narayanan & Chawla, 1962).
	<i>Galesus silvestrii</i>	A Proctotrupid pupal parasite from Nigeria bred in lab (Silvestri, 1914; Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Biosteres longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Carribean, Florida (Wharton & Gilstrap, 1983).
	<i>Achrysocharis formosa erythrea</i>	An Eulophid parasite from Ethiopia (Thompson, 1943).
	<i>Achrysocharis formosa meridionalis</i>	An Eulophid parasite from S. Africa attacks small larvae (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Allocerellus inquirendus</i>	An Encyrtid parasite from Ethiopia (Thompson, 1943).
	<i>Euderus (Allomphale) cavasolae</i>	An Eulophid ectoparasite from Italy (Thompson, 1943).
	<i>Amblymerus modestus</i>	A Pteromalid parasite from Ethiopia (Thompson, 1943).
	<i>Atoposoma variegatum</i>	An Eulophid parasite from Ethiopia (Thompson, 1943).
	<i>Cratotrechus larvarum</i>	An Eulophid parasite from Italy (Thompson, 1943).

Species	Parasites/Predators	Notes
	<i>Dinarmus dacicida virescens</i>	A Miscogasterid parasite from Italy (Thompson, 1943).
	<i>Dirhinus giffardii</i>	A Chalcid parasite from Italy (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Ephialtes divinator</i>	A Ichneumonid from the Maritime Alps (Thompson, 1943).
	<i>Eulophus</i> sp.	An Eulophid parasite from Libya (Thompson, 1943).
	<i>Pnigalo (Eulophus) longulus</i>	An Eulophid parasite from France, Greece, Italy (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Fopius arisanus</i>	A Braconid egg-pupal parasite. In the lab in the Mediterranean it was successfully reared using olive fly eggs as a host (Calvitti, et al., 2002).
	<i>Macroneura</i> sp.	An Eupelmid parasite from Egypt (El-Heneidy, et al., 2001).
	<i>Eulophus pectinicornis</i>	An Eulophid parasite from France, Italy (Thompson, 1943).
	<i>Eupelmus</i> sp.	An Eupelmid parasite from Libya (Thompson, 1943) From Egypt (El-Heneidy, et al., 2001).
	<i>Eupelmus afer</i>	An Eupelmid parasite from Ethiopia (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Eupelmus degeeri</i>	An Eupelmid parasite from Italy (Thompson, 1943).
	<i>Eupelmus urozonus</i>	An Eupelmid parasite from Italy, France, Spain, Palestine (Thompson, 1943; Fry, 1987; Narayanan & Chawla, 1962; Nuenschwander, et al., 1983).
	<i>Eurytoma</i> sp.	A Eurytomid parasite from Libya (Thompson, 1943) From Egypt (El-Heneidy, et al., 2001).
	<i>Eurytoma aethiops</i>	A Eurytomid parasite from Italy (Thompson, 1943)
	<i>Eurytoma rosae</i>	An Eurytomid parasite from France, Greece (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Eurytoma rufipes</i>	An Eurytomid parasite from Italy (Thompson, 1943).
	<i>Metriocharis atrocyanea</i>	An Eurytomid parasite from Ethiopia (Thompson, 1943; Narayanan & Chawla, 1962).
<i>Bactrocera oleae (cont)</i>	<i>Metriocharis viridis</i>	An Eurytomid parasite from Ethiopia (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Microbracon celer</i>	A Braconid parasite from Italy, Ethiopia, S. Africa (Thompson, 1943).
	<i>Opius africanus orientalis</i>	A Braconid parasite from Ethiopia (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Dinarmus dacicida</i>	A Pteromalid parasite from Europe (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Opius ponerophagus</i>	A Braconid parasite from India (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Opius siculus</i>	A Braconid parasite from Sicily, 30% parasitism (Thompson, 1943; Narayanan & Chawla, 1962; Kapatatos, et al., 1977).
	<i>Pteromalus</i> sp.	A Pteromalid parasite from France (Thompson, 1943).
	<i>Teleopterus notandus</i>	A Eulophid egg-larval parasite from Ethiopia (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Tetrastichus gentilei</i>	A Eulophid parasite from Italy (Thompson, 1943).
	<i>Tetrastichus maculifer</i>	A Eulophid parasite from Ethiopia (Thompson, 1943).
	<i>Trichomalus spiracularis</i>	A Pteromalid parasite from Italy (Thompson, 1943).

Species	Parasites/Predators	Notes
	<i>Pnigalio agraulis</i>	A Eulopid parasite from Greece (Fry, 1987) From Egypt (El-Heneidy, et al., 2001).
	<i>Halticoptera daci</i>	A Pteromalid parasite from Africa (Narayanan & Chawla, 1962).
	Eurytoma (= <i>Eupelmus</i>) <i>martelli</i>	An Eupelmid parasite from North Africa (Narayanan & Chawla, 1962; Nuenschwander, et al., 1983) From Egypt (El-Heneidy, et al., 2001).
	<i>Pnigalo mediterraneus</i>	An Eulophid parasite from the Mediterranean area (Narayanan & Chawla, 1962; Nuenschwander, et al., 1983).
	<i>Lasioptera brevicornis</i>	A Cecidomyiid fly (Narayanan & Chawla, 1962).
	<i>Lasioptera (Prolasioptera) berlesiana</i>	A Cecidomyiid fly egg predator, associated with the fungus <i>Camarosporium</i> = <i>Macrophoma dalmatica</i> ; maximum mortality of eggs 30-50% (Narayanan & Chawla, 1962; Nuenschwander, et al., 1983).
	<i>Belonuchus rufipennis</i>	A Staphylinid larval predator intr. to Italy from Brazil (Narayanan & Chawla, 1962).
	<i>Carabus banoni</i>	A carabid whose larvae and adults are a larval-pupal predator in Crete (Nuenschwander, et al., 1983).
	<i>Poecilus cupreus</i>	A carabid whose larvae are a larval-pupal predator in Crete (Nuenschwander, et al., 1983).
	<i>Pterostichus creticus</i>	A carabid whose larvae are a larval-pupal predator in Crete (Nuenschwander, et al., 1983).
	<i>Ocypus fulvipennis</i>	A staphylinid whose adults are a larval-pupal predator in Crete (Nuenschwander, et al., 1983).
	<i>Ocypus olens</i>	A staphylinid whose adults are a larval-pupal predator in Crete (Nuenschwander, et al., 1983).
	<i>Aphaenogaster simonelli</i>	An ant (Formicidae), capable of destroying both larvae and adults of olive fly (Nuenschwander, et al., 1983).
	<i>Crematogaster sordidula</i>	An ant (Formicidae), capable of destroying both larvae and adults of olive fly (Nuenschwander, et al., 1983).
	<i>Tetramorium caespitum</i>	An ant (Formicidae), capable of destroying both larvae and adults of olive fly (Nuenschwander, et al., 1983).
	<i>Cyrtoptyx latipes</i>	A Pteromalid parasite from Crete (Nuenschwander, et al., 1983) from Egypt (El-Heneidy, et al., 2001).
	<i>Cyrtoptyx</i> sp.	A Pteromalid parasite from Egypt (El-Heneidy, et al., 2001).
	<i>Coptera silvestrii</i>	A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Mozambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
<i>Bactrocera osbeckiae</i>	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius persulcatus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius vandenboschi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera pallida</i>	<i>Biosteres deeralensis</i>	A Braconid larval parasite from Australia and New Guinea (Wharton & Gilstrap, 1983).
	<i>Diachasmimorpha kraussii</i> (= <i>Biosteres kraussii</i>)	An Australian Braconid larval parasite (Rungrojwanich & Walter, 2000; Wharton & Gilstrap, 1983).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983)

Species	Parasites/Predators	Notes
<i>Bactrocera papayae</i> - <i>carambolae</i>		The following parasites from (Vijaysegaran, 1984). It is not possible to identify the fruit fly hosts, which is either <i>papayae</i> or <i>carambolae</i> or perhaps both of these species.
	<i>Biosteres persulcatus</i>	A Braconid larval parasite from Malaysia causing over 75% parasitism with the species below (Vijaysegaran, 1984).
	<i>Biosteres arisanus</i>	A Braconid larval parasite from Malaysia causing over 75% parasitism with the species above (Vijaysegaran, 1984).
	<i>Biosteres oophilus</i>	A Braconid larval parasite from Malaysia causing negligible parasitism (Vijaysegaran, 1984)
	<i>Biosteres longicaudatus</i>	A Braconid larval parasite from Malaysia causing 7.9% parasitism (Vijaysegaran, 1984).
	<i>Opius fletcheri</i>	A Braconid egg-larval parasite from Malaysia causing 20.7% parasitism (Vijaysegaran, 1984).
	<i>Biosteres javanus</i>	A Braconid pupal parasite from Java (Dammerman, 1929).
<i>Bactrocera papayae</i>	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Fopius</i> (= <i>Opius</i>) <i>vandenboschi</i>	A Braconid egg-larval parasite from Malaysia (Chuan, et al., 1981). From Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i> (= <i>Opius oophilus</i>)	A Braconid egg-pupal parasite from the Australian Region (Quimio & Walter, 2001). From Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Psytalia incisi</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>fletcheri</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>makii</i>	A Braconid parasite from Thailand and Malaysia (Chinajariyawong, et al., 2000).
<i>Bactrocera passiflorae</i>	<i>Tetrastichus giffardianus</i>	A Eulophid pupal parasite, originally from West Africa, imported from India/Australia, in Fiji, Hawaii (Simmons, 1935; Clausen, 1956; Thompson, 1943; Cochereau, 1970).
	<i>Syntomosphyrum indicum</i>	An Eulophid pupal parasite from Fiji/Australia, in Samoa (Clausen, 1956). From SE Asia, intr. Fiji from Australia (Cochereau, 1970; Narayanan & Chawla, 1962).
	<i>Fopius arisanus</i> (= <i>Opius oophilus</i>) (= <i>Biosteres arisanus</i>)	A Braconid egg parasite from the Indo-Australian Region (Wharton & Gilstrap, 1983). A Braconid egg-pupal parasite from the Australian Region (Quimio & Walter, 2001).
		A Braconid larval parasite from SE Asia intr. to Australia, Fiji (Cochereau, 1970)
	<i>Biosteres hageni</i>	A Braconid parasite from Fiji (Wharton & Gilstrap, 1983; Thompson, 1943; Cochereau, 1970; Narayanan & Chawla, 1962).
	<i>Biosteres tryoni</i>	A Braconid egg-larval parasite from eastern Australia, est. Hawaii (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978; Narayanan & Chawla, 1962).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific; parasitism 12.5% (Wharton & Gilstrap, 1983; Thompson, 1943; Cochereau, 1970; Narayanan & Chawla, 1962).

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	<i>Opius humilus</i>	A Braconid larval parasite from South Africa, est. in Hawaii, Bermuda, Fiji (Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962; Narayanan & Chawla, 1962).
	<i>Opius longicaudatus</i> var. <i>malaiensis</i>	A Braconid larval parasite from SE Asia intr. to Fiji (Cochereau, 1970).
	<i>Spalangia endius</i>	A Pteromalid larval-pupal (?) parasite with many hosts, world-dist (Cochereau, 1970).
<i>Bactrocera</i> <i>passiflorae</i> (Cont.)	<i>Phaenocarpa leverii</i>	A Braconid parasite from Viti Levu and Taveuni Islands (Narayanan & Chawla, 1962).
	<i>Pachycrepoideus</i> <i>dubius</i>	A Pteromalid larval-pupal parasite from Fiji (Narayanan & Chawla, 1962).
	<i>Pachyneuron</i> sp.	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia cameroni</i>	A Pteromalid larval-pupal parasite (Narayanan & Chawla, 1962).
	<i>Spalangia</i> sp.	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Germalus pacificus</i>	A Lygaeid egg predator, most important in reducing populations (Narayanan & Chawla, 1962; Simmons, 1935).
	<i>Opius fletcheri</i>	A Braconid parasite (Narayanan & Chawla, 1962).
<i>Bactrocera</i> <i>pedestris</i>	<i>Biosteres</i> <i>longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Caribbean, Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978).
	<i>Biosteres skinneri</i>	A Braconid parasite from the Philippines which more readily attacks tephrids in Cucurbits (Wharton & Gilstrap, 1983).
	<i>Biosteres</i> <i>vandenboschi</i>	A Braconid 1st stage larval Parasite from SE Asia, est. in Hawaii (Wharton & Gilstrap, 1983).
<i>Bactrocera</i> <i>peninsularis</i>	<i>Fopius schlingeri</i>	A egg-pupal Braconid parasite from Australia (Wharton, 1999).
	<i>Dipterophagus daci</i>	A Dipterophagid (Strepsiptera) gregarious (2-6 per host) endoparasite from Australia which attacks the soft ternal adult stage, resulting in sterile hosts (Drew & Allwood, 1985).
<i>Bactrocera</i> <i>pendleburyi</i>	<i>Diachasmimorpha</i> <i>longicaudata</i>	A braconid parasite From Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera</i> <i>philippinensis</i>		
<i>Bactrocera</i> <i>propinqua</i>	<i>Diachasmimorpha</i> <i>longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera psidii</i>	<i>Biosteres</i> <i>longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Caribbean, Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978).
	var. <i>novocaledonicus</i>	From New Caledonia (Cochereau, 1970).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983; Cochereau, 1970).
	<i>Opius froggatti</i>	A Braconid parasite from Australia, New Caledonia (Wharton & Gilstrap, 1983; Cochereau, 1970).
	<i>Spalangia endius</i>	A Pteromalid larval-pupal (?) parasite with many hosts, world-dist (Cochereau, 1970).
<i>Bactrocera</i> <i>pyrifoliae</i>	<i>Diachasmimorpha</i> <i>longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).

Species	Parasites/Predators	Notes
	<i>Psytalia fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Utetes bianchii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera raiensis</i>	<i>Fopius vandenboschi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera rufofuscula</i>	<i>Fopius schlingeri</i>	A egg-pupal Braconid parasite from Australia (Wharton, 1999).
<i>Bactrocera scutellaris</i>	<i>Psytalia fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera scutellaris</i>	<i>Psytalia fletcheri</i>	A braconid parasite from Thailand (Chinajariyawong, et al., 2000)
<i>Bactrocera signatifera</i>	<i>Bracon</i> sp.	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954).
<i>Bactrocera strigifinis</i>	<i>Biosteres</i> sp.	A Braconid larval parasite from Papua New Guinea (Greve & Ismay, 1983).
<i>Bactrocera tau</i>	<i>Diachasmimorpha</i> (= <i>Biosteres</i>) <i>longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Caribbean, Florida (Wharton & Gilstrap, 1983; see also, White & Elston-Harris, 1992; Wharton & Marsh, 1978).
	<i>Diachasmimorpha albobalteata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius vandenboschi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> (= <i>Opius</i>) <i>fletcheri</i>	Common Indian egg-larval Braconid parasite, in Hawaii restricted to Melon Fly. Also in the Philippines, Guam and int. to Ryukyu Is. (Clausen, 1956; Wharton & Gilstrap, 1983). From Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> (= <i>Opius</i>) <i>makii</i>	A Braconid parasite from SE Asia (Wharton & Gilstrap, 1983). From Thailand (Chinajariyawong, et al., 2000).
	<i>Opius oophilus</i>	A Braconid parasite from SE Asia (Cochereau, 1970).
<i>Bactrocera tau</i> (Cont.)	<i>Opius angaleti</i>	A Braconid larval-pupal parasite from N. Borneo (Narayanan & Chawla, 1962).
	<i>Utetes bianchii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000)
<i>Bactrocera thailandica</i>	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera tenuifascia</i>	<i>Dipterophagus daci</i>	A Dipterophagid (Strepsiptera) gregarious (2-6 per host) endoparasite from Australia which attacks the soft ternal adult stage, resulting in sterile hosts (Drew & Allwood, 1985).
<i>Bactrocera trivialis</i>		
<i>Bactrocera tryoni</i>	<i>Opius tryoni</i> (= <i>Biosteres tryoni</i>)	An Australian Braconid larval parasite present in small numbers (Snowball, et al., 1962; May & Kleinschmidt, 1954), 6.2% (Allman, 1939). Has a wide host range (Clausen, 1956; Silvestri, 1914; Wharton & Gilstrap, 1983; Wharton & Marsh, 1978; Cochereau, 1970; Narayanan & Chawla, 1962)
	<i>Opius fijiensis</i>	An Australian, S. Pacific rare Braconid egg-larval parasite (Snowball, et al., 1962; Wharton & Gilstrap, 1983; Cochereau, 1970).
	<i>Opius deerlensis</i>	An Australian Braconid egg-larval parasite present in small numbers (Snowball, et al., 1962; Wharton & Gilstrap, 1983; Cochereau, 1970).

Species	Parasites/Predators	Notes
	<i>Opius</i> sp. ? <i>africanus</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954; Narayanan & Chawla, 1962).
	<i>Opius fletcheri</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954; Narayanan & Chawla, 1962).
	<i>Opius kraussi</i>	A Braconid larval parasite from Australia (May & Kleinschmidt, 1954; Cochereau, 1970; Narayanan & Chawla, 1962).
	<i>Fopius schlinger</i>	A egg-pupal Braconid parasite from Australia (Wharton, 1999)
	<i>Biosteres longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, Australia, America, Carribean, Florida (Wharton & Gilstrap, 1983; Snowball, 1966; Wharton & Marsh, 1978).
	<i>Biosteres vandenboschi</i>	A Braconid 1st stage larval Parasite from SE Asia, est. in Hawaii (Wharton & Gilstrap, 1983).
	<i>Opius perkinsi</i>	A Braconid larval parasite from Australia (Wharton & Gilstrap, 1983; Cochereau, 1970).
	<i>Fopius arisanus</i> (= <i>Opius oophilus</i>)	A Braconid egg/pupal parasite from SE Asia & dominant in Hawaii Females also carry bacteria and fungi that destroy eggs (Bosch & Haramoto, 1951; Clausen, 1956; Snowball, 1966). Intr. to Australia (Cochereau, 1970; Quimio & Walter, 2001).
	<i>Opius longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, Australia, America, Carribean, Florida (Wharton & Gilstrap, 1983; Snowball, 1966).
	var. <i>taiensis</i>	From SE Asia, intr. to Australia (Cochereau, 1970).
	<i>Dipterophagus daci</i>	A Dipterophagid (Strepsiptera) gregarious (2-6 per host) endoparasite from Australia which attacks the soft ternal adult stage, resulting in sterile hosts (Drew & Allwood, 1985).
	<i>Opius froggatti</i>	A Braconid larval parasite in Australia, New Caledonia described from numerous specimens (Cochereau, 1970).
	<i>Pachyneuron vindemmiae</i>	A Pteromalid parasite from SE Asia (Cochereau, 1970).
<i>Bactrocera tsuneonis</i>		
<i>Bactrocera tuberculata</i>	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia incisi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera umbrosa</i>	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius vandenboschi</i>	A Braconid parasite from Malaysia and Thailand (Chinajariyawong, et al., 2000).
	<i>Phaenocarpa bactrocerae</i>	A Braconid parasite from the Phillipines (Thompson, 1943; Narayanan & Chawla, 1962; Dammerman, 1929).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera verbascifoliae</i>	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).

Species	Parasites/Predators	Notes
	<i>Fopius vandenboschi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Bactrocera xanthodes</i>	<i>Biosteres tryoni</i>	A Braconid egg-larval parasite from eastern Australia, est. Hawaii (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978; Narayanan & Chawla, 1962).
	<i>Opius fijiensis</i>	A Braconid egg-larval parasite from Australia, S. Pacific (Wharton & Gilstrap, 1983; Thompson, 1943).
	<i>Tetrastichus giffardianus</i>	A Eulophid parasite from Hawaii-Fiji (Thompson, 1943; Simmons, 1935).
	<i>Opius hageni</i>	A Braconid parasite from Fiji (Cochereau, 1970).
	<i>Spalangia cameroni</i>	A Pteromalid larval-pupal parasite (Narayanan & Chawla, 1962).
	<i>Spalangia</i> sp.	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Syntomosphyrum indicum</i>	A Eulophid parasite intr. Fiji from New South Wales (Narayanan & Chawla, 1962).
	<i>Germalus pacificus</i>	A Lygaeid egg predator (Narayanan & Chawla, 1962).
	<i>Opius fletcheri</i>	A Braconid predator (Narayanan & Chawla, 1962).
<i>Bactrocera zonata</i>	<i>Diachasmimorpha</i> (= <i>Biosteres</i>) <i>longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Caribbean, Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978; Kapoor, 1993). Rate of parasitism 10% (Ghani, 1972). In Thailand (Chinajariyawong, et al., 2000).
	<i>Fopius</i> (= <i>Biosteres</i>) <i>persulcatus</i> (?)	A Braconid parasite from India (Wharton & Gilstrap, 1983).
	<i>Fopius vandenboschi</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Austroopius</i> sp.	A Braconid parasite from India (Thompson, 1943).
	<i>Opius</i> sp.	A Braconid parasite from India (Narayanan & Chawla, 1962).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Trybliographia daci</i>	A Cynipid larval-pupal parasite from Pakistan (Ahmad, et al., 1975). Rate of parasitism 45% (Ghani, 1972).
<i>Carpomya incompleta</i>	<i>Opius concolor</i>	A Braconid parasite from northern Africa, intr. through the Mediterranean (Wharton & Gilstrap, 1983; Thompson, 1943).
	<i>Eupelmus urozonus</i>	A Eupelmid from Italy (Thompson, 1943).
	<i>Tetrastichus</i> sp.	A Eupelmid from Eritrea (Thompson, 1943)
	<i>Opius</i> sp.	A Braconid parasite from Israel (Fry, 1987).
<i>Capparimyia savastani</i>	<i>Opius concolor</i>	A Braconid parasite from northern Africa, intr. through the Mediterranean (Wharton & Gilstrap, 1983; Soria & Yana, 1959).
<i>Carpomya schineri</i>	<i>Opius scrutator</i>	A Braconid parasite from Southern Europe, Central Asia (Kandybina, 1977).
	<i>Opius rhafoleticola</i>	A Braconid parasite from Southern Europe, Central Asia (Kandybina, 1977).
	<i>Habrocytus</i> sp.	A Pteromalid parasite from Southern Europe, Central Asia (Kandybina, 1977).
<i>Carpomya vesuviana</i>	<i>Opius bianchii</i>	A Braconid larval-pupal parasite from northern India. (Fullaway, 1951; Wharton & Gilstrap, 1983; Narayanan & Chawla 1962).

Species	Parasites/Predators	Notes
	<i>Fopius arisanus</i> (= <i>Biosteres arisanus</i>)	A Braconid egg-larval parasite from the Indo-Australian Region (Wharton & Gilstrap, 1983; Quimio & Walter, 2001; Chinajariyawong, et al., 2000).
	<i>Biosteres carpomyiae</i>	A Braconid larval parasite from India that attacks when the larvae respire at the fruit surface (Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla, 1962; Singh, 1989) introduced to Iran (Farrar & Chow, 2000).
	<i>Fopius</i> (= <i>Biosteres</i>) <i>vandenboschi</i>	A Braconid 1st stage larval parasite from SE Asia, est. in Hawaii (Wharton & Gilstrap, 1983; Kapoor, 1993). From the Indian desert (Singh, 1989). From Thailand (Chinajariyawong, et al., 2000).
	<i>Opius incisi</i>	A Braconid egg-larval parasite from SE Asia, est. in Hawaii (Wharton & Gilstrap, 1983).
	<i>Opius makii</i>	A Braconid parasite from SE Asia (Wharton & Gilstrap, 1983).
	<i>Microbracon fletcheri</i>	A Braconid larval parasite which pupates outside the fruit pulp, from India (Thompson, 1943; Narayanan & Chawla 1962; Singh, 1989).
	<i>Microbracon lefroyi</i>	A Braconid parasite from India (Thompson, 1943).
<i>Carpomya vesuviana</i> (Cont.)	<i>Omphale</i> sp.=	A Eulophid parasite from India (Narayanan & Chawla, 1962).
	<i>Diachasmimorpha longicaudata</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Psytalia</i> sp. nr <i>makii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
	<i>Utetes bianchii</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Carpophthoromyia tritea</i>	<i>Biosteres caudatus</i>	A Braconid parasite from Africa (Wharton & Gilstrap, 1983).
	<i>Biosteres fullawayi</i>	A Braconid parasite from Africa and widely spread to Hawaii, Spain, Puerto Rico, Australia (Wharton & Gilstrap, 1983).
	<i>Opius inconsuetus</i>	A Braconid parasite from Nigeria, est in Hawaii (?) (Wharton & Gilstrap, 1983).
<i>Ceratitis</i> spp.	<i>Biosteres</i> sp.	A Braconid parasite from Tanganyika (Thompson, 1943).
	<i>Dirhinus ehrhorni</i>	A Chalcid parasite from S. Nigeria (Thompson, 1943)
	<i>Dirhinus giffardii</i>	A Chalcid parasite from S. Nigeria (Thompson, 1943).
	<i>Eupelmus</i> sp.	An Eupelmid parasite from Tanganyika (Thompson, 1943).
	<i>Hedylus desideratus</i>	A Braconid parasite from Nigeria (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Isurgus</i> sp.	An Ichneumonid parasite from Tanganyika (Thompson, 1943).
	<i>Microbracon</i> sp.	A Braconid parasite from Tanganyika (Thompson, 1943).
	<i>Opius</i> sp.	A Braconid parasite from Tanganyika (Thompson, 1943).
	<i>Sphegigaster</i> sp.	A Pteromalid species from Tanganyika (Thompson, 1943).
	<i>Hedylus clypeatus</i>	A Braconid larval parasite (Narayanan & Chawla, 1962).
	<i>Pachycrepoides dubius</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia afra</i>	A Pteromalid parasite from East Africa (Narayanan & Chawla, 1962).
	<i>Pheidole megacephala</i>	A cosmopolitan Formicid predator (Narayanan & Chawla, 1962).

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<i>Ceratitis anonae</i>	<i>Biosteres caudatus</i>	A Braconid larval parasite from Nigeria, French Camerouns, Sierra Leone (Silvestri, 1914; Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962; Steck, et al., 1986).
	<i>Galesus silvestrii</i>	A Diapriid pupal parasite in small numbers from Nigeria. Also found on <i>Dirhinus giffardii</i> (Silvestri, 1914; Nixon, 1930).
	<i>Dirhinus giffardii</i> (= <i>Biosteres giffardii</i>)	A Braconid pupal parasite from Nigeria (Silvestri, 1914; Wharton & Gilstrap, 1983).
	<i>Spalangia afra</i>	A Pteromalid pupal parasite from Nigeria (Silvestri, 1914; Boucek, 1963).
	<i>Biosteres desideratus</i>	A Braconid parasite from Africa (Wharton & Gilstrap, 1983; Steck, at a, 1986).
	<i>Biosteres fullawayi</i>	A Braconid parasite from Africa and widely spread to Hawaii, Spain, Puerto Rico, Australia (Wharton & Gilstrap, 1983; Steck, et al., 1986).
	<i>Coptera silvestrii</i>	A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Monzambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
<i>Ceratitis antistictica</i>	<i>Tetrastichus giffardii</i>	A Eulophid egg-larval parasite from Dahomey, Nigeria, Victoria (Silvestri, 1914).
	<i>Biosteres caudatus</i>	A Braconid larval parasite from Nigeria (Silvestri, 1914; Wharton & Gilstrap, 1983).
<i>Ceratitis capitata</i>	<i>Diachasmimorpha</i> (= <i>Opius</i>) <i>tryoni</i>	An Australian Braconid egg-larval parasite from Queensland fruit fly now dominant on Medfly in Hawaii (Clausen, 1956; Adams, 1994; Wharton & Gilstrap, 1983; Thompson, 1943; Wharrton & Marsh, 1978; Cochereau, 1970; Fry, 1987; Narayanan & Chawla, 1962; Vargas, 2002; Duan & Messing, 2003; Ovruski, et al., 2000; Vargas et al., 2000).
	<i>Diachasmimorpha kraussii</i>	An Australian Braconid larval parasite. Unsuccessfully released in Hawaii against Medfly in 1947-52 (Rungrojwanich & Walter, 2000; Messing, et al., 2000).
	<i>Opius fullawayi</i> (= <i>Biosteres fullawayi</i>)	A West African Braconid egg-larval parasite from <i>Ceratitus</i> spp, effective on Medfly in Hawaii (Clausen, 1956; Wharton & Gilstrap, 1983). A Braconid parasite from Africa and widely spread to Hawaii, Spain, Puerto Rico, Australia (Wharton & Gilstrap, 1983; Thompson, 1943).
<i>Ceratitis capitata</i> (Cont.)	<i>Opius hirtus</i>	A Braconid parasite from Costa Rica (Ovruski, et al., 2000)
	<i>Opius humilis</i>	A South African Braconid larval parasite from Medfly effective on Medfly in Hawaii where it has since been displaced by <i>Diachasmimorpha</i> . Also in Bermuda (Clausen, 1956; Silvestri, 1914; Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla, 1962; Vargas, 2002).
	<i>Dirhinus ehrhorni</i>	A Chalcid parasite (?) from Nigeria (Silvestri, 1914).
	<i>Dirhinus giffardii</i>	A West African Chalcid pupal parasite, only occasionally found in Hawaii, also in Egypt & Brazil (Clausen, 1956; Silvestri, 1914; Thompson, 1943; Cochereau, 1970; Narayanan & Chawla, 1962). Intro. Reunion (Etienne, 1973).
	<i>Tetrastichus giffardianus</i>	A West African Eulophid pupal parasite, almost negligible, except in certain fruits. (Clausen, 1956; Thompson, 1943).Intro. Reunion, Hawaii (Etienne, 1973; Cochereau, 1970; Narayanan & Chawla, 1962).
	<i>Opius perproximus</i>	A West African Braconid larval parasite bred in lab (Silvestri, 1914; Wharton & Gilstrap, 1983).
	<i>Galesus silvestrii</i>	A Diapriid pupal parasite from Nigeria bred in lab (Silvestri, 1914; Thompson, 1943).

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	<i>Trichopria capensis</i>	A Diapriid pupal parasite from South Africa (Silvestri, 1914).
	<i>Syntomosphyrum indicum</i>	An Eulophid late instar larval parasite from India of strong potential. Also said to parasitize <i>Bactocera</i> & <i>Dacus</i> (Silvestri, 1914; Thompson, 1943). Intro. Reunion (Etienne, 1973).
	<i>Opius kraussii</i>	A Braconid larval parasite from Australia with decided preference for Medfly (Fullaway, 1951).
	<i>Fopius arisanus</i> (=Biosteres arisanus) (=Opius oophilus)	A Braconid egg/pupal parasite which outcompetes other parasites (Wood, 1998; Wharton & Gilstrap, 1983; Fry, 1987) in Costa Rica (Ovruski, et al., 2000).
		A Braconid egg/pupal parasite from SE Asia intr. to Hawaii (Cochereau, 1970).
		The above are synonyms (Quimio & Walter, 2001).
	<i>Bracon celer</i>	A Braconid larval parasite from Kenya (Wharton, et al., 2000).
	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite of late instars from N. and S. America, est. in Florida (Wharton & Gilstrap, 1983; Leonel, et al., 1995; Katiyar, et al., 1995) in Argentina, Venezuela, Brasil (Ovruski, et al., 2000)
	<i>Coptera haywardi</i>	A Diapriid pupal endoparasitoid from Latin America, but unable to develop on irradiated hosts (Menezes, et al., 1998; Sivinski, et al., 1998).
	<i>Coptera occidentalis</i>	A Diapriid pupal endoparasitoid from California, exported to Slovakia and reared in lab on Medfly (Kazimirova & Vallo, 1999)
	<i>Coptera robustior</i>	A Diapriid pupal endoparasitoid from Kenya (Wharton, et al., 2000; as <i>Coptera</i> sp.). Also in Guinea, Nigeria, South Africa (Yoder & Wharton, 2002).
	<i>Coptera silvestrii</i>	A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Monzambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
	<i>Aganaspis pelleranoi</i>	An Eucoilid parasite from Costa Rica & Argentina which seeks out late instar larvae through fruit holes (Sivinski, et al., 1997; Ovruski, 1994; Ovruski, et al., 2000; Ovruski, 2002)
	<i>Aganaspis nordlanderi</i>	A parasite from Costa Rica (Ovruski, et al., 2000)
	<i>Biosteres desideratus</i>	A Braconid parasite from Africa, reared in lab (Wharton & Gilstrap, 1983).
	<i>Odontosema anastrephae</i>	A non-specific Cynipid larval-pupal parasite from Costa Rica (Wharton, et al., 1981; Ovruski, et al., 2000)
<i>Ceratitis capitata</i> (Cont.)	<i>Lopheucoila anastrepha</i>	A larval-pupal Eucoilid parasite from Mexico, Central and South America (Gallardo & Diaz, 1999; Ovruski, et al., 2000))
	<i>Aceratoneuromyia indica</i>	A parasite from Argentina (Ovruski, et al., 2000). Mexico, Peru, Bolivia (Rogg & Camacho, 2003).
	<i>Trichopria anastrephae</i>	A parasite from Argentina (Ovruski, et al., 2000)
	<i>Utetes anastrephae</i>	A parasite from Argentina (Ovruski, et al., 2000)
	<i>Doryctobracon areolatus</i>	A Braconid larval-pupal parasite in Argentina (Ovruski, 2002) In Brazil (Marchiori, et al., 2000).
	<i>Chiracanthium mildei</i>	A sac spider which may be an important nocturnal predator of Medfly in Israel, as it is strongly attracted to the odor of medfly males (Kaspi, 2000).
	<i>Ganaspis carvalhoi</i>	A non-specific Cynipid larval-pupal parasite from Costa Rica (Wharton, et al., 1981)

Species	Parasites/Predators	Notes
	<i>Biosteres</i> (= <i>Diachasmimorpha</i>) <i>longicaudatus</i>	A Braconid larval-pupal parasite introduced into Costa Rica (Wharton, et al., 1981; Wharton & Gilstrap, 1983; Wharton & Marsh, 1978; Narayanan & Chawla, 1962). Intro. Reunion (Etienne, 1973; Fry, 1987) in Guatemala (Ovruski, et al., 2000) In Bolivia (Rogg & Camacho, 2003).
	<i>Biosteres oophilus</i>	A Braconid egg-pupal parasite introduced into Costa Rica (Wharton, et al., 1981; Wharton & Marsh, 1978).
	<i>Fopius ceratitivorus</i>	A larval-pupal Braconid parasite from Africa (Wharton, 1999); from Kenya (Wharton, et al., 2000).
	<i>Fopius caudatus</i>	A larval-pupal Braconid parasite From Kenya (Wharton, et al., 2000).
	<i>Biosteres angaleti</i>	A Braconid egg parasite from Indo-Australia (Wharton & Gilstrap, 1983).
	<i>Biosteres bevisi</i>	A Braconid parasite from the South African Region reared from Medfly in Hawaii (Wharton & Gilstrap, 1983).
	<i>Biosteres dacusii</i>	A Braconid parasite from India, reared from Medfly in Hawaii (Wharton & Gilstrap, 1983; Cochereau, 1970; Narayanan & Chawla, 1962).
	<i>Biosteres fullawayi</i>	A Braconid parasite from Africa and widely spread to Hawaii, Spain, Puerto Rico, Australia (Wharton & Gilstrap, 1983).
	<i>Biosteres hageni</i>	A Braconid parasite from Fiji reared in lab (Wharton & Gilstrap, 1983).
	<i>Biosteres vandenboschi</i>	A Braconid 1st stage larval Parasite from SE Asia, est. in Hawaii (Wharton & Gilstrap, 1983).
	<i>Opius bellus</i>	A Braconid parasite from S. and C. America, also Morocco where 28% parasitism exists (Wharton & Gilstrap, 1983; Leonel, et al., 1995; Cochereau, 1970; Narayanan & Chawla, 1962; Ovruski, et al., 2000).
	<i>Psytalia</i> (= <i>Opius</i>) <i>concolor</i>	A Braconid parasite from northern Africa, intr. throughout the Mediterranean (Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962; Kimani-Njogu, et al., 2000). Intro. Reunion (Etienne, 1973), in Costa Rica (Ovruski, et al., 2000)
	<i>Opius perproximus</i>	A Braconid larval parasite from West Africa, in lab (Wharton & Gilstrap, 1983).
	<i>Pachycrepoideus dubius</i>	A Pteromalid parasite in Hawaii (Thompson, 1943).
	<i>Pachycrepoideus</i> (= <i>Pachyneuron</i>) <i>vindemmiae</i>	A Pteromalid pupal parasite from Morocco (Thompson, 1943). Intro. Reunion (Etienne, 1973; Narayanan & Chawla, 1962). In Argentina (Ovruski, 2002). In Bolivia (Rogg & Camacho, 2003).
	<i>Pimpla pomorum</i>	An Ichneumonid parasite from Spain (Thompson, 1943).
	<i>Psytalia distinguenda</i>	A Braconid pupal parasite from Reunion, Mauritius, Madagascar (Wharton, et al., 1999).
	<i>Psytalia insignipennis</i>	A Braconid pupal parasite from Reunion Island (Wharton, et al., 1999).
	<i>Tetrastichus</i> sp.	An Eulophid parasite from Hawaii (Thompson, 1943).
	<i>Spalangia endius</i>	A Chalcid larval-pupal (?) parasite with many hosts, world-dist. (Boucek, 1963).
<i>Ceratitis capitata</i> (Cont.)	<i>Iridomyrmex humilis</i>	Predation by the Argentine ant (Formicidae) from 2.3, 38.5 to 50% of last stage larvae, pupae and ternal adults in Hawaii (Wong, et al., 1984).
	<i>Solenopsis geminata</i>	Predation by the fire ant (Formicidae) in Guatemala on falling larvae and pupae from 7-25% (Eskafi & Kolbe, 1990); in Hawaii, 73.4% (Wong & Wong, 1988).
	<i>Opius longicaudatus</i> var. <i>malaiensis</i>	A Braconid larval parasite from SE Asia intr. to Hawaii (Cochereau, 1970).

Species	Parasites/Predators	Notes
	<i>Eucoila</i> sp.	A Cynipid parasite from Mauritius (Orlan & Moutia, 1960).
	<i>Isurgus</i> sp.	An Ichneumonid parasite from Africa (Narayanan & Chawla, 1962).
	<i>Aphaereta minuta</i>	A Braconid larval-pupal parasite (Narayanan & Chawla, 1962).
	<i>Opius fletcheri</i>	A Braconid larval-pupal parasite (Narayanan & Chawla, 1962).
	<i>Trybliographa</i> sp.	A Cynipid entoparasitoid from Malaya (Narayanan & Chawla, 1962).
	<i>Trybliographa daci</i>	A Cynipid endoparasitoid from Pakistan, also parasitizing <i>Dacus dorsalis</i> (Cals-Usciat, et al., 1985)
	<i>Spalangia philippinensis</i>	A Pteromalid pupal parasite est. in Hawaii (Narayanan & Chawla, 1962).
	<i>Sphegigaster</i> sp.	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Belonuchus rufipennis</i>	A Staphylinid larval predator from Brazil, reared ex lab (in bitter orange) in Italy (Narayanan & Chawla, 1962).
	<i>Doryctobracon crawfordi</i>	A Braconid parasite from Venezuela (Katiyar, et al., 1995) from Guatemala (Ovruski, et al., 2000)
	<i>Opius incisi</i>	A Braconid larval parasite found ex Medfly in Hawaii (Clancy, 1952).
	<i>Pheidole megacephala</i>	An ant (Formicidae) predator, which kills large numbers of larvae (Kapoor, 1993).
	<i>Ectemnius timidovertris</i>	An adult Crabronine wasp predator which store the prey as food for the young (Kapoor, 1993).
	<i>Crabo unicolor</i>	An adult Crabronine wasp predator which store the prey as food for the young (Kapoor, 1993).
<i>Ceratitis catoirii</i>	<i>Psytalia insignipennis</i>	A Braconid parasite from Mauritius which apparently controls this pest (Orlan & Moutia, 1960; Wharton, et al., 1999).
<i>Ceratitis colae</i>	<i>Galesus silvestrii</i>	A Diapriid pupal parasite from Nigeria bred in lab (Silvestri, 1914)
	<i>Splangia afra</i>	A Pteromalid pupal parasite from Nigeria bred in lab (Silvestri, 1914; Boucek, 1963).
	<i>Tetrastichus giffardii</i>	A widely diffused Chalcid egg-larval parasite from Nigeria, Dahomey, Victoria, Tanganyika (Silvestri, 1914; Thompson, 1943). Introduced to Mexico, to Peru to Bolivia (Rogg & Camacho, 2003).
	<i>Aeromyrma vorax</i>	An ant (Formicidae) predator of pupae (Silvestri, 1914).
	<i>Opius perproximus</i>	A Braconid larval parasite from West Africa (Wharton & Gilstrap, 1983).
	<i>Coptera silvestrii</i>	A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Monzambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
<i>Ceratitis contramedia</i>	<i>Biosteres giffardii</i>	A Braconid parasite from Africa (Wharton & Gilstrap, 1983).
	<i>Coptera silvestrii</i>	A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Monzambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
<i>Ceratitis cosyra</i>	<i>Opius cosyrae</i>	A Braconid parasite from northern Africa, intr. through the Mediterranean (Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Opius perproximus</i>	A Braconid larval parasite from West Africa (Silvestri, 1914; Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962; Steck, et al., 1986).
	<i>Biosteres fullawayi</i>	A Braconid parasite from the Cameroons (Steck, et al., 1986).
<i>Ceratitis cosyra</i> (Cont.)	<i>Coptera silvestrii</i>	A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Monzambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).

Species	Parasites/Predators	Notes
<i>Ceratitis ditissima</i>	<i>Biosteres caudatus</i>	A Braconid larval parasite from Africa (Wharton & Gilstrap, 1983).
	<i>Biosteres giffardii</i>	A Braconid parasite from Africa (Wharton & Gilstrap, 1983).
<i>Ceratitis flexuosa</i>	<i>Opius perproximus</i>	A Braconid parasite from the Cameroons (Steck, et al., 1986).
<i>Ceratitis griffardi</i>	<i>Dirhinus erhorni</i>	A possible Chalcid pupal parasite from Nigeria (Silvestri, 1914).
	<i>Splangia afra</i>	A Pteromalid pupal parasite bred in lab (Silvestri, 1914; Boucek, 1963).
	<i>Opius perproximus</i>	A Braconid larval parasite from West Africa (Silvestri, 1914; Wharton & Gilstrap, 1983).
	<i>Diachasma fullawayi</i> (= <i>Biosteres fullawayi</i>)	A Braconid pupal parasite from French Guinea (Silvestri, 1914).1983).A Braconid parasite from Africa and widely spread to Hawaii, Spain, Puerto Rico, Australia (Wharton & Gilstrap, 1983).
	<i>Hedylus giffardii</i> (= <i>Biosteres giffardii</i>)	A Braconid larval parasite from French Guinea (Silvestri, 1914; Wharton & Gilstrap, 1983).
	<i>Opius perproximus</i> var. <i>modestior</i>	A Braconid parasite from Nigeria (Silvestri, 1914).
	<i>Biosteres caudatus</i>	A widely diffused Braconid larval parasite from Victoria (Silvestri, 1914; Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962).
	<i>Tetrastichus giffardii</i>	A widely diffused Eulophid egg-larval parasite from Nigeria, Dahomey, Victoria (Silvestri,1914; Thompson, 1943).
	<i>Galesus silvestrii</i>	A Diapriid pupal parasite from Nigeria (Silvestri, 1914; Nixon, 1930).
<i>Ceratitis malgassa</i>		
<i>Ceratitis pedestris</i>	<i>Opius perproximus</i>	A Braconid larval parasite from West Africa (Wharton & Gilstrap, 1983).
<i>Ceratitis punctata</i>	<i>Coptera robustior</i> = (<i>Galesus silvestrii</i> var. <i>robustior</i>)	A Psiline pupal parasite from Kenya, Guinea, Nigeria, South Africa (Yoder & Wharton, 2002). A Diapriid pupal parasite from French Guinea (Silvestri, 1914; Nixon, 1930).
	<i>Hedylus giffardii</i> (= <i>Biosteres giffardii</i>)	A French Guinean Braconid larval (?) parasite (Silvestri, 1914; Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962).
	<i>Diachasma fullawayi</i> var. <i>robustum</i> = <i>Biosteres fullawayi</i>)	A Braconid pupal parasite from French Guinea (Silvestri, 1914; Wharton & Gilstrap.1983). A Braconid parasite from Africa and widely spread to Hawaii, Spain, Puerto Rico, Australia (Wharton & Gilstrap, 1983).
	<i>Dorylus (Anomma) nigricans</i> var. <i>hybrida</i>	A Formicid predator of pupae from West Africa (Silvestri, 1914).
	<i>Opius perproximus</i>	A Braconid larval parasite from West Africa, Cameroons. (Wharton & Gilstrap, 1983; Steck, et al., 1986).
<i>Ceratitis quinaria</i>		
<i>Ceratitis rosa</i>	<i>Fopius ceratitivorus</i>	A larval-pupal Braconid parasite from Africa (Wharton, 1999)
	<i>Opius africanus</i>	A Braconid larval parasite from South Africa (Silvestri, 1914; Wharton & Gilstrap, 1983).
	<i>Pachyneuron vindemmiae</i>	A Pteromalid pupal parasite from Morocco (Thompson, 1943).Intro. Reunion (Etienne, 1973).
	<i>Dirhinus giffardii</i>	A West African Chalcid pupal parasite, only occasionally found in Hawaii, also in Egypt & Brazil (Clausen, 1956; Silvestri, 1914; Thompson, 1943). Intro. Reunion (Etienne, 1973).

Species	Parasites/Predators	Notes
	<i>Isurgus</i> sp.	An Ichneumonid parasite from Africa (Narayanan & Chawla, 1962).
<i>Ceratitis rosa</i> (Cont.)	<i>Sphegigaster</i> sp.	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Coptera silvestrii</i>	A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Monzambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
<i>Ceratitis rubivora</i>		
<i>Ceratitis simi</i>	<i>Coptera silvestrii</i>	A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Monzambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
<i>Ceratitis stictica</i>	<i>Tetrastichus giffardii</i>	An Eulophid parasite from W. Africa (Thompson, 1943).
<i>Ceratitis tritea</i>	<i>Tetrastichus oxyurus</i>	A Eulophid pupal (?) parasite from Nigeria (Silvestri, 1914).
	<i>Opius inconsuetus</i>	A Braconid parasite from Nigeria (Silvestri, 1914).
	<i>Diachasma fullawayi</i>	A pupal parasite from Nigeria (Silvestri, 1914).
	<i>Biosteres caudatus</i>	A larval parasite from Nigeria (Silvestri, 1914).
<i>Dacus</i> spp.	<i>Biosteres desideratus</i>	A Braconid parasite from Africa (Wharton & Gilstrap, 1983; Bridwell, 1918; Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Biosteres ottotomoanus</i>	A Braconid parasite from Cameroon (Wharton & Gilstrap, 1983).
	<i>Bathyaulax</i> sp.	A Braconid parasite from India (Thompson, 1943).
	<i>Biosteres formosanus</i>	A Braconid parasite from Formosa (Thompson, 1943).
	<i>Tetrastichus giffardianus</i>	A Eulophid parasite from the S. Pacific & Australia (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Dirhinus auratus</i>	A Chacid pupal parasite from Pakistan, SE Asia, Mauritius (Narayanan & Chawla, 1962).
	<i>Spalangia cameroni</i>	A Chalcid, pro larval-pupal parasite from Europe, Africa, Asia, & S. America, pro imported to Pacific Is. Many diverse hosts (Boucek, 1963; (Narayanan & Chawla, 1962).
	<i>Opius fletcheri</i>	A Braconid parasite (Narayanan & Chawla, 1962).
	<i>Opius skinneri</i>	A Braconid larval-pupal parasite from the Phillipines (Narayanan & Chawla, 1962).
	<i>Opius tryoni</i>	A Braconid parasite (Narayanan & Chawla, 1962).
	<i>Opius watersi</i>	A Braconid parasite (Narayanan & Chawla, 1962).
	<i>Phaenocarpa leveri</i>	A Braconid parasite from Fiji (Narayanan & Chawla, 1962).
	<i>Opius angaleti</i>	A Braconid from North Borneo (Narayanan & Chawla, 1962).
	<i>Dirhinus giffardii</i>	A Chalcid parasite intr. to Fiji (Narayanan & Chawla, 1962).
	<i>Trichopria capensis</i>	A Diapriid parasite (Narayanan & Chawla, 1962).
	<i>Opius fullawayi</i>	An Ichneumonid parasite from Africa (Narayanan & Chawla, 1962).
	<i>Opius perproximus</i>	A Braconid parasite (Narayanan & Chawla, 1962).
	<i>Coptera silvestrii</i>	A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Monzambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
<i>Dacus axanus</i>		
<i>Dacus bellulus</i>	<i>Dipterophagus daci</i>	A Dipterophagid (Strepsiptera) gregarious (2-6 per host) endoparasite from Australia which attacks the soft ternal adult stage, resulting in sterile hosts (Drew & Allwood, 1985).

Species	Parasites/Predators	Notes
<i>Dacus bivittatus</i>	<i>Diachasma fullawayi</i> var. <i>robustum</i>	A pupal parasite from French Guinea (Silvestri, 1914).
	<i>Biosteres caudatus</i>	A widely diffused Braconid larval parasite from Nigeria (Silvestri, 1914; Steck, et al., 1986).
	<i>Coptera silvestrii</i> (= <i>Galesus silvestrii</i>)	A Diapriid pupal parasite from Nigeria bred in lab (Silvestri, 1914). A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Monzambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
	<i>Tetrastichus giffardii</i> (= <i>Biosteres giffardii</i>)	A widely diffused Braconid egg-larval parasite from Victoria (Silvestri, 1914; Wharton & Gilstrap, 1983; Thompson, 1943).
	<i>Tetrastichus dacicida</i>	A Eulophid from the Cameroons (Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Spalangia afra</i>	A Pteromalid (pupal?) parasite from Africa (Boucek, 1963; Narayanan & Chawla, 1962).
	<i>Dirhinus</i> sp.	A Chacid parasite from Africa (Narayanan & Chawla, 1962).
	<i>Biosteres desideratus</i>	A Braconid parasite from the Cameroons (Steck, et al., 1986).
	<i>Opius perproximus</i>	A Braconid parasite from the Cameroons (Steck, et al., 1986).
<i>Dacus ciliatus</i>	<i>Opius perproximus</i>	A Braconid larval parasite from West Africa (Silvestri, 1914; Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Biosteres caudatus</i>	A widely diffused Braconid larval parasite from Dahomey (Silvestri, 1914; Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Biosteres giffardii</i>	An African Braconid larval parasite (Wharton & Gilstrap, 1983; Narayanan & Chawla, 1962; Ghani, 1972).
	<i>Biosteres longicaudatus</i>	An Indo-Australian Braconid larval parasite, now in Hawaii, Fiji, America, Caribbean, Florida (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978).
	<i>Opius concolor</i>	A Braconid parasite from northern Africa, intr. through the Mediterranean (Wharton & Gilstrap, 1983).
	<i>Opius fletcheri</i>	Common Indian Braconid egg-larval parasite, in Hawaii restricted to Melon Fly. Also in the Philippines, Guam and intro. to Ryukyu Is. (Clausen, 1956; Wharton & Gilstrap, 1983).
	<i>Opius phaeostigma</i>	A Braconid parasite from South Africa (Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Sarcophaga flagellata</i>	A Sarcophagid parasite (Diptera) from the Italian Somaliland (Thompson, 1943).
	<i>Diachasma brevistyli</i>	A Braconid parasite from the Italian Somaliland (Thompson, 1943).
	<i>Spalangia afra</i>	A Chalcid (pupal?) parasite from Africa (Boucek, 1963; Narayanan & Chawla, 1962).
	<i>Opius brevistyli</i>	A Braconid parasite from Africa (Narayanan & Chawla, 1962).
	<i>Opius incisi</i>	A Braconid parasite from India (Narayanan & Chawla, 1962).
	<i>Dirhinus luzonensis</i>	The most abundant Chalcid parasite from India (Narayanan & Chawla, 1962).
	<i>Pachycrepoideus dubius</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia grotiusi</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Spalangia philippinensis</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).

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	<i>Spalangia stomoxysiae</i>	A Pteromalid parasite (Narayanan & Chawla, 1962).
	<i>Galesus</i> sp.	A Diapriid parasite from India (Narayanan & Chawla, 1962).
	<i>Sarcophaga flagellata</i>	A dipterous Sarcophagid parasite (Narayanan & Chawla, 1962).
	<i>Opius compensans</i>	A Braconid larval-pupal parasite from India which parasitizes 10-12% of the host (Narayanan & Chawla, 1962).
	<i>Opius brevisi</i>	A braconid larval-pupal parasite from S. Africa which parasitizes 4-22% of the host (Daiber, 1966).
<i>Dacus demmerezi</i>	<i>Opius phaeostigma</i>	A Braconid parasite from South Africa (Wharton & Gilstrap, 1983; Thompson, 1943; Narayanan & Chawla, 1962).
	<i>Dirhinus giffardii</i>	A West African Chalcid pupal parasite, only occasionally found in Hawaii, also in Egypt & Brazil (Clausen, 1956; Silvestri, 1914; Thompson, 1943). Intro. Reunion (Etienne, 1973).
	<i>Pachyneuron vindemmiae</i>	A Pteromalid pupal parasite from Morocco (Thompson, 1943). Intro. Reunion (Etienne, 1973).
	<i>Biosteres longicaudatus</i>	A Braconid larval-pupal parasite introduced into Costa Rica (Wharton, et al., 1981; Wharton & Gilstrap, 1983; Wharton & Marsh, 1978). Intro. Reunion (Etienne, 1973).
	<i>Tetrastichus giffardianus</i>	A West African Eulophid pupal parasite, almost negligible, except in certain fruits. (Clausen, 1956; Thompson, 1943). Intro. Reunion (Etienne, 1973).
<i>Dacus frontalis</i>	<i>Biosteres longicaudatus</i>	A Braconid parasite from the Cape Verde Islands (Fry, 1987).
	<i>Opius concolor</i>	A Braconid parasite from the Cape Verde Islands (Fry, 1987).
	<i>Dirhinus ?giffardii</i>	A Chalcid parasite from the Cape Verde Islands (Fry, 1987).
<i>Dacus humeralis</i>	<i>Biosteres niger</i>	A Braconid parasite from Tanzania (Wharton & Gilstrap, 1983).
	<i>Opius caudatus</i>	A Braconid parasite from the French Cameroons (Narayanan & Chawla, 1962).
	<i>Opius</i> sp.	A Braconid parasite (Narayanan & Chawla, 1962).
	<i>Tetrastichus giffardii</i>	An Eulophid parasite from Tanganyika (Narayanan & Chawla, 1962).
<i>Dacus longicornis</i>	<i>Psytalia fletcheri</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Dacus longistylus</i>	<i>Dorylus affinis</i>	An ant (Formicidae) predator of fruit fly pupae from Africa (Silvestri, 1914)
	<i>Opius dexter</i>	A Braconid parasite from Senegal (Silvestri, 1914; Wharton & Gilstrap, 1983).
	<i>Austroopius</i> sp.	A Braconid parasite from India (Thompson, 1943).
<i>Dacus lounsburyi</i>		
<i>Dacus momordicae</i>	<i>Biosteres caudatus</i>	A Braconid parasite from Africa (Wharton & Gilstrap, 1983).
<i>Dacus punctatifrons</i>	<i>Tetrastichus giffardianus</i>	An Eulophid parasite (Narayanan & Chawla, 1962).
<i>Dacus smieroides</i>	<i>Opius angaleti</i>	A Braconid larval-pupal parasite from North Borneo (Narayanan & Chawla, 1962).
<i>Dacus solomonensis</i>		

Species	Parasites/Predators	Notes
<i>Dacus telfaireae</i>		
<i>Dacus vertebratus</i>		
<i>Dirioxa pornia</i>		
<i>Dirioxa confusa</i>	<i>Opius oophilus</i>	A Braconid egg parasite from SE Asia & dominant in Hawaii. Females also carry bacteria and fungi that destroy eggs (Bosch & Haramoto, 1951; Clausen, 1956; Snowball, 1966).
<i>Epochra canadensis</i>		
<i>Euphranta connexa</i>	<i>Opius testaceus</i>	A Braconid parasite from Europe, Russia (Kandybina, 1977).
<i>Euphranta turpiniae</i>	<i>Fopius arisanus</i>	A Braconid parasite from Thailand (Chinajariyawong, et al., 2000).
<i>Eurosta solidaginis</i>	<i>Mordellistena</i> sp.	A Coleopterous (Mordellidae) predator (parasite??) from the USA (Fry, 1987).
	<i>Eurytoma</i> sp.	A Eurytomid parasite from the USA (Fry, 1987).
<i>Eutreta xanthochaeta</i>	<i>Biosteres tryoni</i>	A Braconid egg-larval parasite from eastern Australia, est. Hawaii (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978.).
<i>Gonioglossum wiedemanni</i>	<i>Opius testaceus</i>	A Bracnoid parasite from Central, Southern Russia, Europe (Kandybina, 1977).
<i>Lonchaea pendus</i>	<i>Eucolia weldi</i>	A Cynipid parasite from Brazil (Narayanan & Chawla, 1962).
<i>Monacrosthcius citricola</i>		
<i>Myiopardalis pardalina</i>		
<i>Myoleja limata</i>	<i>Biosteres melleus</i>	A Braconid parasite from Minnesota and Nova Scotia to Florida (Wharton & Marsh, 1978).
<i>Myoleja lucida</i>	<i>Opius ragoleticola</i>	A Braconid parasite from Russia, Switzerland (Kandybina, 1977; Fry, 1987).
	<i>Halticoptera laevigata</i>	A Pteromalid parasite from Russia, Germany, Switzerland (Kandybina, 1977; Fry, 1987; Gienapp, 2000).
	<i>Habrocytus</i> sp.	A Pteromalid parasite from Siberia (Kandybina, 1977).
	<i>Phygadeuon elegans</i>	An Ichneumonid parasite from Switzerland (Fry, 1987).
	<i>Phygadeuon wiesmanni</i>	An Ichneumonid parasite from Austria, Germany, Switzerland (Fry, 1987).
	<i>Phygadeuon</i> sp.	An Ichneumonid parasite from Siberia (Kandybina, 1977).
	<i>Gelis</i> sp.	An Ichneumonid parasite from Siberia, Switzerland (Kandybina, 1977; Fry, 1987).
<i>Myoleja sinensis</i>	<i>Opius myolejae</i>	A Braconid parasite from Russia (Kandybina, 1977).
	<i>Halticoptera</i> sp.	A Pteromalid parasite from Russia (Kandybina, 1977).
<i>Nitrariomyia lukjanovitshi</i>	<i>Habrocytus</i> sp.	A Pteromalid pupal parasite from arid zones of Central Asia (Kandybina, 1977).
<i>Pardalaspis cyanescens</i>	<i>Spalangia gemina</i>	A Chalcid pupal parasite with a broad host range from Asia through S. America (Boucek, 1963).
<i>Procecidochares utilis</i>	<i>Biosteres tryoni</i>	A Braconid egg-larval parasite from eastern Australia, est. Hawaii (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978).

Species	Parasites/Predators	Notes
<i>Rhagoletis</i> sp.	<i>Salticus scenicus</i>	An Aranead predator from British Columbia (Fry, 1987).
<i>Rhagoletis alternata</i>	<i>Opius rosae</i>	A Braconid parasite (Kandybina, 1977).
	<i>Opius rhagoleticola</i>	A Braconid parasite (Kandybina, 1977).
	<i>Opius ophthalmicus</i>	A Braconid parasite from Far Eastern Russia (Kandybina, 1977).
	<i>Opius alternatae</i>	A Braconid parasite from Far Eastern Russia (Kandybina, 1977).
	<i>Opius</i> sp.	A Braconid parasite from Switzerland (Fry, 1987).
	<i>Halticoptera</i> sp.	A Pteromalid parasite (Kandybina, 1977).
	<i>Phygadeuon exiguus</i>	An Ichneumonid parasite from Germany, Switzerland (Fry, 1987).
	<i>Phygadenon</i> sp.	An Ichneumonid parasite from Western Siberia (Kandybina, 1977).
	<i>Gelis</i> sp.	An Ichneumonid parasite from Western Siberia (Kandybina, 1977).
<i>Rhagoletis basiola</i>	<i>Halticoptera rosae</i>	An Pteromalid egg-larval parasitoid from Europe (Hoffmeister, 2000)
<i>Rhagoletis batava</i>	<i>Opius rhagoleticola</i>	A Braconid parasite (Kandybina, 1977).
	<i>Thyridanthrax after</i>	A Bombyliid parasite (Kandybina, 1977).
	<i>Habrocytus</i> sp.	A Pteromalid parasite (Kandybina, 1977).
	<i>Phygadenon</i> sp.	An Ichneumonid parasite (Kandybina, 1977).
	<i>Gelis</i> sp.	An Ichneumonid parasite (Kandybina, 1977).
<i>Rhagoletis berberidis</i>	<i>Habrocytus</i> sp.	A Chalcid parasite from Europe, Russia (Kandybina, 1977).
	<i>Eurytoma</i> sp.	A Chalcid parasite from Europe, Russia (Kandybina, 1977).
	<i>Eupelmus</i> sp.	A Chalcid parasite from Europe, Russia (Kandybina, 1977).
	<i>Opius rhagoleticola</i>	A Braconid parasite from Europe, Russia - Rare (Kandybina, 1977).
<i>Rhagoletis boycei</i>	<i>Biosteres juglandis</i>	A Braconid parasite from Arizona, New Mexico (Wharton & Marsh, 1978).
<i>Rhagoletis caucasica</i>	<i>Opius scrutator</i> (?)	A probable Braconid parasite (Kandybina, 1977).
<i>Rhagoletis cerasi</i>	<i>Opius rhagoleticola</i>	A Braconid larval-pupal parasite from Siberia, Europe (Kandybina, 1977; Vogel, 1950; Fry, 1987; Narayanan & Chawla, 1962).
	<i>Opius testaceus</i>	A Braconid parasite (Kandybina, 1977).
	<i>Opius sayanicus</i>	A Braconid parasite (Kandybina, 1977).
	<i>Opius magnus</i>	A Braconid full-grown larval parasite (10-30% on wild cherry only) from Italy (Fry, 1987; Monaco, 1984).
	<i>Opius</i> sp.	A Braconid parasite from Switzerland (Fry, 1987).
	<i>Cremnodes articapillus</i>	An Ichneumonid parasite from Austria, Switzerland (Fry, 1987).
	<i>Habrocytus</i> sp.	A Pteromalid pupal parasite from Siberia (Kandybina, 1977)
	<i>Coptera occidentalis</i>	A Diapriid parasite from the Pacific Coast of the USA which overwinters in diapausing <i>R. cerasi</i> (Kazimirova & Vallo, 1999)
	<i>Halticoptera laevigata</i>	A Pteromalid parasite from Switzerland (Fry, 1987).
	<i>Halticoptera</i> sp.	A Pteromalid parasite (Kandybina, 1977).
	<i>Phygadeuon elegans</i>	An Ichneumonid parasite from Switzerland (Fry, 1987).

Species	Parasites/Predators	Notes
	<i>Phygadeuon scaposus</i>	An Ichneumonid parasite from Czechoslovakia (Fry, 1987).
	<i>Phygadeuon wiesmanni</i>	An Ichneumonid parasite from Austria, Germany, Switzerland which may attack larvae when entering ground to pupate; locally dominant @ 72.5% of pupae (Vogel, 1950; Fry, 1987; Narayanan & Chawla, 1962; Boller, 1966).
	<i>Phygadeuon</i> sp.	An Ichneumonid pupal parasite from Siberia (Kandybina, 1977).
	<i>Gelis</i> sp.	Ichneumonid pupal parasites from Siberia, Austria, Switzerland (Kandybina, 1977; Fry, 1987).
	<i>Gelis bremeri</i>	An Ichneumonid pupal parasite from Europe (Vogel, 1950; Narayanan & Chawla, 1962).
	<i>Polypeza forsteri</i>	A Diapriid parasite from Europe (Vogel, 1950; Narayanan & Chawla, 1962; Boller, 1966).
	<i>Belonuchus rufipennis</i>	A Staphylinid larval predator from Brazil reared in lab (in cherries) in Italy (Narayanan & Chawla, 1962).
	<i>Myrmica laevinodis</i>	A locally dominant ant (Formicidae) predator in Switzerland, with larval losses of 35-63% when migrating to the soil (Boller, 1966).
	<i>Anisodactylus binotatus</i>	A local carabid predator in Switzerland with larval and pupal predation (Boller, 1966).
	<i>Paedrus litoralis</i>	A local staphid predator in Switzerland with larval and pupal predation (Boller, 1996).
<i>Rhagoletis cingulata</i>	<i>Coptera cingulatae</i>	A Diapriid parasite from eastern USA, west to Kansas (Muesebeck, 1980).
	<i>Coptera occidentalis</i>	A Diapriid parasite from the Pacific Coast of the USA (Muesebeck, 1980).
	<i>Biosteres melleus</i>	A Braconid parasite from Minnesota and Nova Scotia to Florida (Wharton & Marsh, 1978).
	<i>Diachasma (Opus) ferrugineum</i>	A Braconid parasite from North America (Wharton & Marsh, 1978; Narayanan & Chawla, 1962).
<i>Rhagoletis completa</i>	<i>Biosteres tryoni</i>	A Braconid egg-larval parasite from eastern Australia, est. Hawaii (Wharton & Gilstrap, 1983; Wharton & Marsh, 1978).
	<i>Opus humilus</i>	A Braconid larval parasite from South Africa, est. in Hawaii, Bermuda (Wharton & Gilstrap, 1983).
	<i>Coptera evansi</i>	A Diapriid parasite from SW USA (Muesebeck, 1980).
	<i>Coptera occidentalis</i>	A Diapriid parasite from the Pacific Coast of the USA (Muesebeck, 1980).
<i>Rhagoletis completa</i> (Cont.)	<i>Biosteres sublaevis</i>	A Braconid parasite from Texas (Wharton & Marsh, 1978).
	<i>Tetrastichus giffardianus</i>	A Eulophid parasite (Narayanan & Chawla, 1962).
<i>Rhagoletis conversa</i>		
<i>Rhagoletis fausta</i>	<i>Coptera cingulatae</i>	A Diapriid parasite from eastern USA, west to Kansas (Muesebeck, 1980).
	<i>Coptera evansi</i>	A Diapriid parasite from SW USA (Muesebeck, 1980).
	<i>Diachasma ferrugineum</i>	A Braconid parasite from North America (Wharton & Marsh, 1978).
	<i>Eucoila</i> sp.	A Cynipid larval-pupal parasite (Narayanan & Chawla, 1962).

Species	Parasites/Predators	Notes
	<i>Pachycrepoideus dubius</i>	A Pteromalid larval-pupal parasite (Narayanan & Chawla, 1962).
	<i>Tetrastichus faustus</i>	A Eulophid parasite (Narayanan & Chawla, 1962).
	<i>Pachycrepoideus vindemiae</i>	A Pteromalid generalist ectoparasitoid pupal parasite from Africa and India, introduced into Hawaii, Mexico and Central America (Guillen, et al., 2002).
<i>Rhagoletis ferruginea</i>	<i>Opius bellus</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995; Ovruski, et al., 2000).
<i>Rhagoletis flavicincta</i>	<i>Opius rhagoleticola</i> (?)	A Braconid parasite (Kandybina, 1977).
	<i>Opius scrutator</i>	A Braconid parasite (Kandybina, 1977).
<i>Rhagoletis indifferens</i>	<i>Diachasma muliebre</i>	A Braconid parasite from Washington to California (Wharton & Marsh, 1978; Narayanan & Chawla, 1962).
	<i>Pachycrepoideus vindemiae</i>	A Pteromalid pupal parasite from Washington with a 20-37% parasitism rate (Burditt & White, 1987) A Pteromalid generalist ectoparasitoid pupal parasite from Africa and India, introduced into Hawaii, Mexico and Central America (Guillen, et al., 2002).
<i>Rhagoletis juglandis</i>	<i>Coptera evansi</i>	A Diapriid parasite from SW USA (Muesebeck, 1980).
	<i>Biosteres juglandis</i>	A Braconid parasite from Arizona, New Mexico (Wharton & Marsh, 1978).
	<i>Diachasmimorpha juglandis</i>	A Braconid larval parasite from Arizona (Henneman, et al., 2002)
<i>Rhagoletis kurentsovi</i>	<i>Opius kurentzov</i>	A Braconid parasite from Russia (Kandybina, 1977).
	<i>Halticoptera</i> sp.	A Pteromalid parasite from Russia (Kandybina, 1977).
<i>Rhagoletis lycopersella</i>	<i>Opius rhagoleticola</i>	A Braconid parasite (Kandybina, 1977).
<i>Rhagoletis magniterebra</i>		
<i>Rhagoletis meigeni</i>	<i>Phygadeuon wiesmanni</i>	An Ichneumonid parasite from Austria (Fry, 1987).
<i>Rhagoletis mendax</i>	<i>Biosteres (Opius) melleus</i>	A Braconid parasite from Minnesota and Nova Scotia to Florida. Said to be most effective parasite (Wharton & Marsh, 1978; Geddes, et al., 1987).
	<i>Opius richmondi</i>	A Braconid parasite from Eastern Canada (Geddes, et al., 1987).
	<i>Opius lectus</i>	A Braconid parasite from Eastern Canada (Geddes, et al., 1987).
<i>Rhagoletis nova</i>		
<i>Rhagoletis pastranai</i>	<i>Doryctobracon areolatus</i>	A parasite from Brasil (Ovruski, et al., 2000)
	<i>Doryctobracon brasiliensis</i>	A parasite from Brasil (Ovruski, et al., 2000)
	<i>Opius bellus</i>	A parasite from Brasil (Ovruski, et al., 2000)
<i>Rhagoletis pomonella</i>	<i>Opius melleus</i>	A Braconid parasite (Clausen, 1956; Narayanan & Chawla, 1962; Monteith, 1977).
	<i>Biosteres melleus</i>	A Braconid larval-pupal parasite from Minnesota and Nova Scotia to Florida (Baranowski, et al., 1993; Wharton & Marsh, 1978; Gut & Brunner, 1994).
	<i>Coptera cingulatae</i>	A Diapriid parasite from eastern USA, west to Kansas (Muesebeck, 1980).

Species	Parasites/Predators	Notes
	<i>Coptera pomonellae</i>	A Diapriid parasite from eastern USA, west to Kansas and Minnesota (Muesebeck, 1980).
	<i>Opius (Diachasma) alloeum = alloeus</i>	A Braconid parasite from North America. Parasitism is 30% with <i>O. canaliculatus</i> (Wharton & Marsh, 1978; AliNiazee, 1985; Narayanan & Chawla, 1962; Monteith, 1977).
	<i>Diachasma ferrugineum = Opius ferrugineus</i>	A Braconid parasite from North America (Wharton & Marsh, 1978; Narayanan & Chawla, 1962; Monteith, 1977).
	<i>Opius downesi</i>	A larval-pupal endoparasite from Washington ex 5% of pupae (AliNiazee, 1985; Gut & Brunner, 1994; Narayanan & Chawla, 1962).
	<i>Pteromalus</i> sp.	A larval ectoparasitoid from Washington (Gut & Brunner, 1994).
	<i>Tetrastichus</i> sp.	Several larval ectoparasitoid species from Washington (Gut & Brunner, 1994).
	<i>Opius lectoides</i>	A Braconid larval-pupal endoparasite from Washington ex 0.5% of pupae (AliNiazee, 1985; Narayanan & Chawla, 1962).
	<i>Opius canaliculatus</i>	A Braconid parasite from Quebec & New York which, with <i>O. alloeum</i> , has 30% early larval parasitism (AliNiazee, 1985).
	<i>Aphaereta muscae</i>	A Braconid parasite (Kandybina, 1977; Narayanan & Chawla, 1962).
	<i>Galesus</i> sp.	A Diapriid parasite (Kandybina, 1977; Narayanan & Chawla, 1962).
	<i>Opius lectus</i>	A Braconid parasite from North America (Narayanan & Chawla, 1962; Monteith, 1977).
	<i>Opius richmondi</i>	A Braconid parasite in North America (Narayanan & Chawla, 1962).
	<i>Patasson conotracheli</i>	A Mymarid egg parasite from Connecticut (Narayanan & Chawla, 1962).
<i>Rhagoletis reducta</i>	<i>Opius ussyruensus</i>	A Braconid parasite from Russia and China (Kandybina, 1977).
	<i>Chorebus</i> sp.	A Braconid parasite from Russia and China (Kandybina, 1977).
	<i>Halticoptera</i> sp.	A Pteromalid parasite from Russia and China (Kandybina, 1977).
<i>Rhagoletis ribicola</i>		
<i>Rhagoletis striatella</i>		
<i>Rhagoletis suavis</i>	<i>Coptera cingulatae</i>	A Diapriid parasite from eastern USA, west to Kansas (Muesebeck, 1980).
	<i>Coptera pomonellae</i>	A Diapriid parasite from the Pacific Coast of the USA (Muesebeck, 1980).
	<i>Biosteres melleus</i>	A Braconid parasite from Minnesota and Nova Scotia to Florida (Wharton & Marsh, 1978).
<i>Rhagoletis tabellaria</i>		
<i>Rhagoletis tomatitis</i>		
<i>Rhagoletis turpiniae</i>	<i>Aganaspis pelleranoi</i>	A parasite from Mexico (Ovruski, et al., 2000)
	<i>Biosteres near sublaevis</i>	A parasite from Mexico (Ovruski, et al., 2000)
	<i>Dicerataspis</i> spp.	A parasite from Mexico (Ovruski, et al., 2000)
	<i>Opius hirtus</i>	A parasite from Mexico (Ovruski, et al., 2000)

Species	Parasites/Predators	Notes
<i>Rhagoletis zephyria</i>	<i>Opius downesi</i>	A larval-pupal Braconid endoparasite from Washington ex 2% of pupae (AliNiasee, 1985).
<i>Rhagoletis zephyria</i> (Cont.)	<i>Opius lectoides</i>	A larval-pupal Braconid endoparasite from Washington ex 2% of pupae (AliNiasee, 1985).
<i>Rhagoletotrypeta astranai</i>	<i>Doryctobracon areolatus</i>	A solitary entoparasitoid from Brazil (Leonel, et al., 1995).
	<i>Doryctobracon brasiliensis</i>	A solitary entoparasitoid from Brazil (Leonel, et al., 1995).
	<i>Opius bellus</i>	A solitary entoparasitoid from Brazil (Leonel, et al., 1995).
	<i>Utetes anastrephae</i>	A solitary entoparasitoid from Brazil (Leonel, et al., 1995).
<i>Tephritidae</i> sp.	<i>Opius inquirendus</i>	A Braconid larval parasite from Victoria in an unknown host (Silvestri, 1914).
	<i>Opius longicaudatus</i>	A Braconid larval parasite from the Philippines, India, Thailand, New Caledonia, Marianas (Fullaway, 1951).
	<i>Opius formosanus</i>	A Braconid larval parasite from Formosa (Fullaway, 1951).
	<i>Opius compensans?</i>	A Braconid larval parasite from India (Fullaway, 1951).
	<i>Opius watersi</i>	A Braconid larval parasite from India (Fullaway, 1951).
	<i>Opius persulcatus</i>	A Braconid larval parasite from India, Philippines, Thailand (Fullaway, 1951).
	<i>Opius deeralensis</i>	A Braconid larval parasite from Australia (Fullaway, 1951).
	<i>Opius skinneri</i>	A Braconid larval parasite from the Philippines (Fullaway, 1951).
	<i>Opius carpomyiae</i>	A Braconid larval parasite from India (Fullaway, 1951).
	<i>Opius arisanus</i>	A Braconid larval parasite from India, Malaya, Thailand, Formosa (Fullaway, 1951).
	<i>Opius javanus</i>	A Braconid larval parasite from Thailand, Malaya (Fullaway, 1951).
	<i>Opius fletcheri</i>	A Braconid larval parasite from India, Java, Malaya, Philippines (Fullaway, 1951).
	<i>Opius incisi</i>	A Braconid larval parasite from India, Malaya (Fullaway, 1951).
	<i>Opius fijiensis</i>	A Braconid larval parasite from Australia, Fiji, New Caledonia (Fullaway, 1951).
	<i>Opius makii</i>	A Braconid larval parasite from Formosa (Fullaway, 1951).
	<i>Opius perkinsi</i>	A Braconid larval parasite from Australia (Fullaway, 1951).
	<i>Opius froggatti</i>	A larval parasite from Australia (Fullaway, 1951).
	<i>Opius manii</i>	A Braconid larval parasite from India, Malaya, Thailand (Fullaway, 1951).
<i>Terellia ruficauda</i>	<i>Pronotalia</i> sp.	An Eulophid parasite from Germany (Fry, 1987).
<i>Tomoplagia</i> sp.	<i>Opius itatiayensis</i>	A solitary entoparasitoid from Brazil (Leonel, et al., 1995).
<i>Tomoplagia rudolphi</i>	<i>Opius tomoplagiae</i>	A solitary Braconid entoparasitoid from Brazil (Leonel, et al., 1995).
<i>Toxotrypana curvicauda</i>	<i>Doryctobracon toxotrypanae</i>	A host specific larval-pupal Braconid parasite from Costa Rica, Mexico (Wharton, et al., 1981; Aluja, et al., 1990), El Salvador (Ovruski, et al., 2000), Venezuela (Martinez, et al., 1999).
	<i>Coptera haywardi</i>	A Diapriid pupal parasite from Latin America (Sivinski, et al., 1998).
	<i>Dihrinus giffardiii</i>	A Chalcid parasite intro. Puerto Rico (Narayanan & Chawla, 1962).
<i>Tririthrum coffeae</i>	<i>Fopius caudatus</i>	A dominant Braconid parasite from Kenya (Wharton, et al., 2000)

Species	Parasites/Predators	Notes
	<i>Fopius ceratitivorus</i>	A Braconid parasite from Africa and widely spread to Hawaii, Spain, Puerto Rico, Australia (Wharton & Gilstrap, 1983).
	<i>Biosteres caudatus</i>	A larval-pupal Braconid parasite from Africa (Wharton, 1999)
	<i>Biosteres fullawayi</i>	A Braconid larval parasite from Africa (Wharton & Gilstrap, 1983).
	<i>Opius</i> sp. nr. <i>desideratus</i>	A Braconid larval-pupal parasite from Uganda, in 7 to 23% of larvae (Greathead, 1972).
<i>Trirhithrum coffeae</i> (Cont.)	<i>Opius cosyrae</i>	A Braconid larval pupal parasite from Uganda, in 2-7% of larvae (Greathead, 1972).
	<i>Psilus</i> sp.	A Pteromalid pupal parasite from Uganda (Greathead, 1972).
	<i>Tetrastichus giffardii</i>	A Eulophid multiple pupal parasite with up to 12 parasites per pupa, from Uganda (Greathead, 1972).
	<i>Syntomosphyrum</i> sp.	An Eulophid pupal parasite from Uganda (Greathead, 1972).
	An Aleocharine	A Staphylinid predator from Uganda (Greathead, 1972).
	<i>Opius</i> sp.	A Braconid parasite from the Cameroons (Steck, et al., 1986).
<i>Trirhithromyia cyanescens</i>	<i>Diachasmimorpha tryoni</i>	An Australian Braconid egg-larval parasite in Reunion (Quilici, et al., 2000).
	<i>Dirhinus giffardii</i>	A West African Chalcid pupal parasite, only occasionally found in Hawaii, also in Egypt & Brazil (Clausen, 1956; Silvestri, 1914; Thompson, 1943). Intro. Reunion (Etienne, 1973).
	<i>Opius concolor</i>	A Braconid parasite from northern Africa, intr. through the Mediterranean (Wharton & Gilstrap, 1983). Intro. Reunion (Etienne, 1973).
	<i>Biosteres longicaudatus</i>	A Braconid larval-pupal parasite introduced into Costa Rica (Wharton, et al., 1981; Wharton & Gilstrap, 1983; Wharton & Marsh, 1978). Intro. Reunion (Etienne, 1973).
	<i>Pachyneuron vindemmiæ</i>	A Pteromalid pupal parasite from Morocco (Thompson, 1943). Intro. Reunion (Etienne, 1973).
	<i>Psytalia fletcheri</i>	Common Indian egg-larval Braconid parasite in Reunion (Quilici, et al., 2000).
	<i>Tetrastichus giffardianus</i>	A West African Eulophid pupal parasite, almost negligible, except in certain fruits. (Clausen, 1956; Thompson, 1943).Intro. Reunion (Etienne, 1973).
	<i>Syntomosphyrum indicum</i>	An Eulophid late instar larval parasite from India of strong potential. Also said to parasitize <i>Bactocera</i> & <i>Dacus</i> (Silvestri, 1914; Thompson, 1943). Intro. Reunion (Etienne, 1973).
	<i>Opius insignipennis</i>	A Braconid larval-pupal parasite from Madagascar, Reunion Island (Oran & Moutia, 1960; Wharton, et al., 1999).
<i>Trirhithrum inscriptum</i>	<i>Fopius okekai</i>	A Braconid pupal parasite from Kenya (Kimani-Njogu & Wharton, 2002).
<i>Trirhithrum nigerrimum</i>	<i>Opius perproximus</i> var. <i>modestior</i>	A Braconid parasite from Nigeria (Silvestri, 1914).
	<i>Biosteres caudatus</i>	A Braconid larval parasite from Victoria (Silvestri, 1914; Wharton & Gilstrap, 1983).
	<i>Galesus silvestrii</i>	A Diapriid pupal parasite from Nigeria (Silvestri, 1914; Nixon, 1930).
	<i>Opius perproximus</i>	A Braconid larval parasite from West Africa (Wharton & Gilstrap, 1983).
	<i>Isurgus</i> sp.	An Ichneumonid parasite from Africa (Narayanan & Chawla, 1962).
	<i>Microbracon celer</i>	A Braconid parasite from Kenya (Narayanan & Chawla, 1962).
	<i>Sphegigaster</i> sp.	A Pteromalid parasite (Narayanan & Chawla, 1962).

Species	Parasites/Predators	Notes
	<i>Coptera silvestrii</i>	A Psiline parasite from Africa (Benin, Ghana, Niger, Nigeria, Senegal, Kenya, Mozambique, Zululand), introduced to Hawaii (Yoder & Wharton, 2002).
<i>Trirhithrum nigrum</i>	<i>Fobius okekai</i>	A Braconid pupal parasite from Kenya (Kimani-Njobu & Wharton, 2002)
	<i>Opius perproximus</i>	A Braconid larval parasite from West Africa (Wharton & Gilstrap, 1983)
<i>Trirhithrum queritum</i>	<i>Biosteres bevisi</i>	A Braconid parasite from South Africa (Wharton & Gilstrap, 1983)
<i>Trirhithrum</i> sp.	<i>Rhynchosteres mandibularis</i>	A Braconid pupal parasite from Kenya (Kimani-Njogu & Wharton, 2002)
<i>Zonosemata electa</i>	<i>Biosteres sanguineus</i>	A Braconid parasite from Maryland to Florida to Missouri and Arizona (Wharton & Marsh, 1978).
<i>Zonosemata vittigera</i>	<i>Diachasmimorpha (=Biosteres) sanguinea</i>	A Braconid parasite from Minnesota and Nova Scotia to Florida (Wharton & Marsh, 1978; Ovruski, et al., 2000).

Conservation of Predators and Parasites

Natural predation, aside from micro-organisms, consist of birds, small animals and various invertebrates. While such predation is unlikely to influence outbreak populations of a fruit fly, there is some evidence that birds, ants, small mammals and other generalist predators are very important in suppressing fruit fly populations when the latter are already scarce and do act as a check under normal conditions (ie, Thomas, 1993).

Bird Predation

Should it develop that a resident bird population will effectively reduce the numbers of a targeted pest, then the bird population in question should be disturbed as little as possible. If it is felt desirable, the birds can be encouraged to increase in numbers through provision of food during winter months, the protection of nesting sites, and the discouragement of various bird predators or possibly, control of diseases.

Small Mammal Predation

Small mammals frequently prey on late instars and pupae and can remove large proportions of these individuals from a population. Pupae at or near ground level tend to suffer greater losses.

Small mammals which feed on fruit flies include the white-footed mouse (*Peromyscus leucopus*) and the brush mouse (*Peromyscus boylii*). (Thomas, 1993)

Small mammals which are known or observed to feed on fruit fly life stages can be protected by not destroying their habitat or reducing their numbers through hunting.

Insect Predation

There is apparently an inverse relationship between vertebrate and invertebrate predation levels. Pupal predation by vertebrates increases as small mammal density increases, but invertebrate predation decreases (Cook, et al., 1995).

See Thomas (1995), who stated that ants, rove beetles, and spiders were found to prey on Mexican fruit fly larvae which have left the host fruit and have not reached the shelter of a pupariation site. The predation rate was estimated to be 1-5%. Honey ants were recorded as being incidental predators. Rove beetles were deliberate predators during summer months.

However, pupae and emerging adults were subject to attack by salticid spiders, an insectivorous ant, *Pheidole* sp. and especially exotic fire ants, *Solenopsis invicta*, which were effective predators. Approximately 29.5% of the fruit fly population was destroyed (70.5% survival). This factor was most effective in the summer.

Ants may attack fruit fly last instar larvae on the ground as the latter look for a place to pupate. Ant numbers may be increased by spraying hosts with sucrose; by encouraging benign (to hosts), host dwelling honey-dew producing aphids; by providing food for ants during fruit fly off season periods, or even by transporting ant nests into an area on a small scale (Weseloh, 1994).

Similar results are known for other species of fruit fly. Ants (unspecified spp.) are responsible for 10% of the mortality of the soil-inhabiting stages of *Bactrocera tryoni* in Australia (Bateman, 1968). In Hawaii, *Pheidole megacephala* attacks *Bactrocera dorsalis* larvae in fallen fruit, causing 36% mortality (Newell and Haramoto, 1968).

The interaction of ant species and prey may be summarized by stating that ant species occurring in an area are important agents in the regulation of pests and the rate of control varies spatially (ground, bush, tree) and temporally (winter, spring, summer, fall) within that area, depending on which species of ant is dominant. The dominance pattern is typically a mosaic of territories, as ant colonies partition the area in accordance with habitat requirements and competitive abilities (generalized from Thomas, 1995). Ant colonies may be encouraged in commercial areas by as little use of insecticides as is possible and covering the soil in a grass sward (Bateman, 1968).

Spiders are another group of generalist predators that often consume the most abundant and most easily captured prey in their habitat.

Encouragement of spider populations at present consist of not disturbing them; or of observing which species may feed on the larvae and bringing in more of these spiders from elsewhere to feed on the target fruit flies.

Patch Complex

A variation of the above, involves the employment of patch complexes, in which a number of areas are set up inside the entire control area to promote certain ecological situations advantageous for control within the economic constraints of a program. Inside the patch (or area), a complex of increased natural diversity is encouraged. Methods include the introduction of understory trees or bushes to increase the provision of nesting sites for birds, the encouragement/introduction of ant colonies, and so forth.

Augmentation of Parasites/Predators - TABLE 3

Various efforts have been made to suppress fruit fly populations through augmentation of their parasites/predators. This technique is useful where more traditional methods such as insecticide-bait sprays and sterile male releases are impractical. The following table illustrates past procedures:

Parasite/Predator Augmentation by Species—Target Pest - TABLE 3

Species	PARASITE/ PREDATOR	RELEASE RATES	RESULTS
<i>Anastrepha</i> sp.	<i>Coptura haywardi</i>	?	Attacks pupae up to 5 cm deep. Suggested as a viable candidate to replace the environmentally unfriendly <i>P. vindemiae</i> (Guillen, et al., 2002)
	<i>Pachycrepoideus vindemiae</i>	?	Attacks pupae on surface only (Guillen, et al., 2002).
<i>Anastrepha ludens</i>	<i>Diachasmimorpha longicaudata</i>	200,000 adult parasites/ week over 100 ha in Mexico (Gingrich, 1993, citing unpublished data) 940 adult parasites/ week in test plot in Mexico.	Apparently successful in Mexico & Costa Rica (Aluja, 1994, citing unpublished data) Suppression achieved 70% population reduction (Montoya, et al., 2000).
<i>Anastrepha obliqua</i>	? ? <i>Diachasmimorpha longicaudata</i>	? ? 940 adult parasites/ week in test plot in Mexico.	Apparently successful in Mexico & Costa Rica (Aluja, 1994, citing unpublished data) Suppression achieved 70% population reduction (Montoya, et al., 2000).
<i>Anastrepha suspensa</i>	<i>Diachasmimorpha longicaudata</i>	60,000 adult parasitoids/km ² week by gallon buckets in hosts. NOTE: Fly larvae irradiated prior to parasitoid exposure to prevent a mixture of fertile flies/ parasites being release	Target populations down to 5-10%. A second introduced parasite, <i>Doryctobracon areolatus</i> , nearly eliminated from release sit (Sivinski, et al., 1996).
<i>Anastrepha suspensa</i> (Cont.)	<i>Diachasmimorpha longicaudata</i>	19,000-20,000 parasitoids were released biweekly in defined 2.6 or 5.2 km ² release areas over 104 km ² . Release sites relocated to coincide with host availability. Release sites added when enough parasites were available to provide continuous linear release	Target populations down to 4-21% (-95 & -79%) after augmented releases. (Burns, et al., 1996)

Parasite/Predator Augmentation by Species—Target Pest (continued)- TABLE 3

Species	PARASITE/ PREDATOR	RELEASE RATES	RESULTS
<i>Bactrocera dorsalis</i>	<i>Diachasmimorpha longicaudata</i>	1,694 o+ 212 o-> in 6 hectare guava grove in 1988 at the rate of 1-5 times each month and 25-90 o+ , 5-10 o-> each realease 22,578 puparia in a 100x140 meter open field or guava orchard by realease platforms	Target populations down by 6 to 7% (Yao, 1989) Not Stated (Messing, et al.,1993)
	<i>Diachasmimorpha tryoni</i>	10,700 puparia in a 100x140 meter open field or guava orchard by release platforms	Not Stated (Messing, et al.,1993)
<i>Bactrocera oleae</i>	<i>Opius concolor</i>	Approx. 300-400 adult parasites per tree. Lower number = higher parasitism in upper reaches of tree. Higher number = overall parasitism throughout. Limited to target trees in middle of mature olive groves. Totals of 2,500 and 4,000 O. concolor and 5,000 O. var. sculus released.	Parasitism rate of 3rd stage larvae over 30%. Parasites can locate fly larvae efficiently on tre (Kapatos, et al., 1977)
	<i>Opius concolor</i> var. <i>sculus</i>	In Spain, 600 parasites per tree from August to October.	Flies decreased from 6.3 to 0.9 per trap (Gingrich, 1993, citing pers. com.)

Parasite/Predator Augmentation by Species—Target Pest (continued)- TABLE 3

Species	PARASITE/ PREDATOR	RELEASE RATES	RESULTS
<i>Ceratitis capitata</i>	<i>Diachasmimorpha tryoni</i>	272,000 parasitized pupa/ week in 13 km ² area by gallon buckets in hosts in Hawaii. 387,748 parasitized pupa/week in 13 km ² area by gallon bucket in hosts plus 3 million sterile Medfly by both aerial/ground releases in Hawaii. 10,700 puparia in a 100x140 meter open field or guava orchard by reelease platforms in Hawaii. Aerial releases of chilled adults in mountainous territory at 286 to 846 parasites per hectare per week in Guatemala.	Target populations significantly lower, parasitism to 47% from 14.2%. No effect on parasitism of <i>Eutreta xanthochaet</i> (Wong, et al., 1991). Target populations much lower, down to 9.8 Medfly adults/kg of fruit than in parasitic releases alone at 92.6 adults/kg of fruit (Wong, et al., 1992) Not Stated (Messing, et al., 1993) At higher release rates, parasitism levels reached 84% (Sivinski, et al., 2000a).
	<i>Diachasmimorpha longicaudata</i>	22,578 puparia in a 100x140 meter open field or guava orchard by reelease platforms in Hawaii	Not Stated (Messing, et al., 1993)
<i>Ceratitis capitata</i> , <i>Bactocera dorsalis</i> , <i>Bactrocera cucurbitae</i> , <i>Bactrocera latifrons</i>	<i>Diachasmimorpha tryoni</i>	Releases of various specific parasites for each species at a time for eradication from Hawaii.	Pilot trial against <i>Ceratitis capitata</i> in a 13 km sq area in 1982. (Gingrich, 1993)
<i>Rhagoletis cerasi</i>	<i>Coptera occidentalis</i>	Thousands released per week under cherry trees in Czechosloviakia.	Parasitism ranged from 20-35% (Gingrich, 1993, citing personal com.)

Parasite Releases

Releases are either made aerielly or by static release stations on the ground.

Sivinski, et al. (2000a) demonstrated an aerial release method which relies on chilled adults in paper bags, these released from altitudes of 100 meters at airspeeds of 130 km/hr. This is highly efficient and suitable for almost any type of terrain.

Messing (1993) demonstrated a release platform that seems superior to the standard white plastic bucket release bucket of 3.5 or 4.5 liter capacity with escape holes just under the rim of the lid. The release platform is a circular release platform constructed to hold and protect the paper bags with parasitoids and allow the parasitoids to escape at any angle through a hardware cloth (see figure below). Use of the platform substantially reduced (by 29%) the mortality of parasitoids that died in the buckets.

Augmentative, even undulative releases may not always work because of little known or poorly understood ecosystem constraints. If the parasites are released in ecosystems inhabited by an abundant and competitively superior parasitoid, the result may be little or no impact on host numbers. The size of the fruit may prove to be a limiting factor, as may encapsulation of parasite eggs by the host fruit fly. Then, too there is the possibility that the more efficient parasite may have already attacked the host, making it more sluggish and thus more prone to subsequent attack by the released parasite. Such a competitive situation could result in attack by the older parasite. (Purcell, et al., 1998)

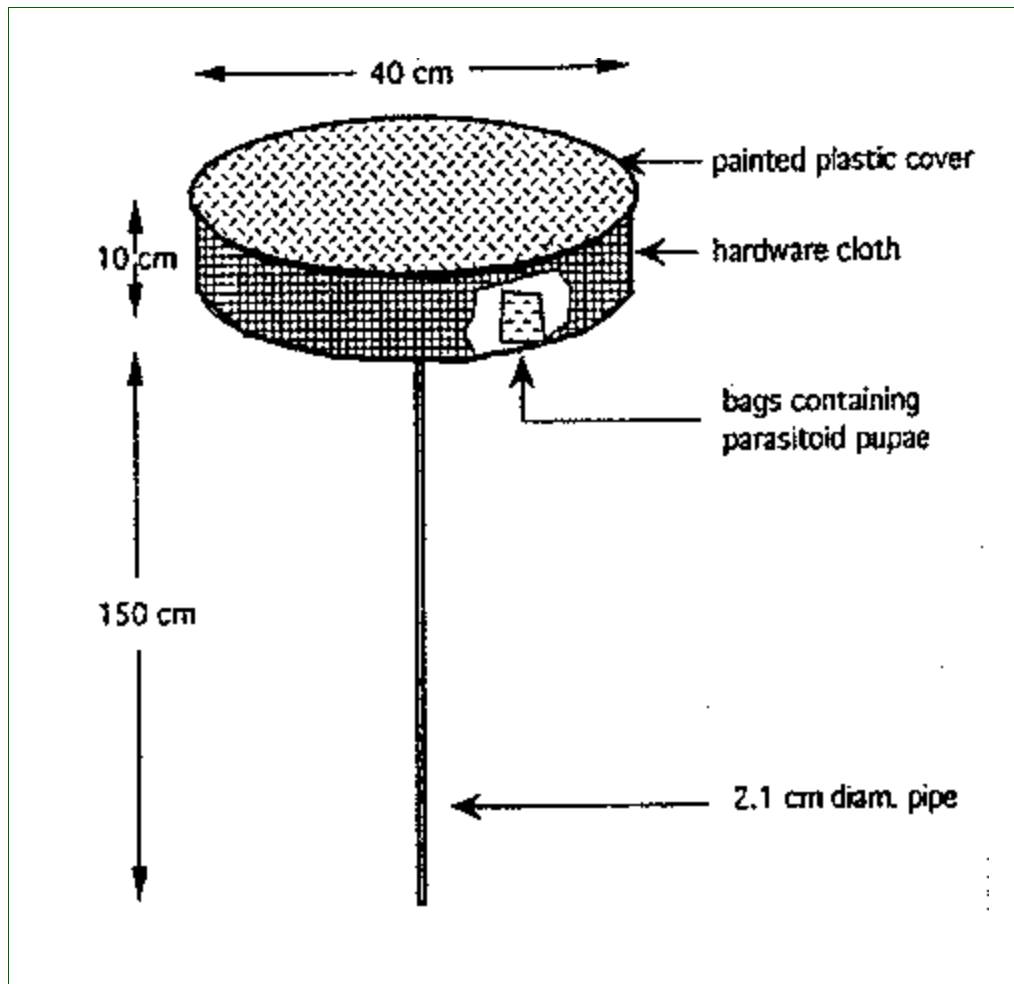


FIGURE 3-4-1: hardware cloth = 1.2 cm^2 openings, height 10 cm, circumference 105 cm Total escape area 1050 cm^2

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