

Appendix Table 1.

Table 1. Summary of natural enemies of bees. Bees are of particular concern because they are extremely diverse and are almost entirely pollinators. From Stephen et al. (1969).

Natural Enemies	Examples	Description
Viruses		Infect honey bee larvae
Bacteria	<i>Bacillus</i>	Infect bee brood and adults
Yeasts, molds		Consume honey and pollen
Protozoans	<i>Nosema apis</i> , <i>Entamoeba</i> , <i>Malpighamoeba</i> , <i>Leidyanna</i>	In intestinal tract of bees
Nematodes	<i>Sphaerularia bombi</i>	Renders queen bumble bees sterile
Arthropods		
Arachnids		
Spiders	Thomisidae (crab spiders)	Sit and wait predators on pollinators and non-pollinators
Mites	Various	Exploit stored food, eat bee larvae/pupae, live inside tracheae, hematophagy
Insects		
General insect predators	Dragonflies, mantids, tiger beetles, sphecids & vespine wasps, asilid flies, reduviid bugs,	Either seize prey at nest entrances or while bees are foraging
Predators (relatively specific to bees)	Ambush bugs (Phymatidae), reduviid bugs (<i>Apiomerus</i>), asilid flies (<i>Stenopogon</i>), sphecids wasps (<i>Philanthus</i> , <i>Cerceris</i>),	Largely capture bees while foraging
Parasites – internal	Stylopidae (strepsipterans)	Ingested from flowers by bees, regurgitated into pollen mass, penetrate egg, dispersed by adult foraging bee
	Conopidae (Diptera)	Female flies oviposit into foraging bees - offspring develop internally
	Sarcophagidae, Phoridae, Tachinidae, Braulidae, Bombyliidae (Diptera)	Oviposit or larviposit on adult bees, young flies develop internally in bees
Opportunistic scavengers in bee nests	Ants, dermestid beetles, moths	Free living natural enemies that enter nests and eat food, developing bees
Specific depredators in bee nests	Cleridae, Meloidae, Rhipiphoridae (Coleoptera)	These enemies lay eggs in bee nests or first instar larvae crawl into or are carried into cells by adult bees; very few lay eggs in bee nests directly
	Parasitic bees (various genera within Halictidae, Megachilidae, Apidae)	Adult parasitic bees enter bee nests, lay eggs in nest, and exit. Parasitic bee offspring eat stored food and host bee offspring
Vertebrates	Lizards, toads, birds, skunks, mice, man	Occasional, opportunistic bee predators

6 Appendix Table 2. Effect sizes for three pollinator visitation variables and one plant reproduction
7 variable in relation to experimental natural enemy pressure on pollinators. All natural enemies
8 are predators except that of reference (8, intestinal parasite of *Bombus*). Effect size is the log
9 response ratio, $\ln R = \bar{X}^P / \bar{X}^{NP}$; see text for explanation.

Natural Enemy	Pollinator	Plant	Effect Size				Ref. †
			Pollin- ator visit- ation rate	Proport- ion of flowers visited	Ovipos- itions per fruit	Plant reprodu- ctive success	
Crab spider	Bees	<i>Asclepias syriaca</i>	-0.06			0.0056	(1)
Crab spider	Various insects	<i>Leucanthemum vulgare</i>	-0.41			-0.18	(2)
Lizard	Various insects	<i>Chuquiraga oppositifolia</i>	-0.19			-0.25	(3)
Bird (flycatcher)	Various insects	<i>Chuquiraga oppositifolia</i>	-0.05			-0.08	(3)
Crab spider	Various insects	<i>Lepidium papilliferum</i>	-0.27			na	(4)
Predatory wasp	Bumblebees	<i>Rudbeckia occidentalis</i>	-1.91			na	(5)
Predatory wasp	Bumblebees	<i>Solidago</i> sp.	-1.78			na	(5)
Predatory wasp	Bumblebees	<i>Aconitum columbianum</i>	-0.59			-0.22	(5)
Bird (swallow)	Various insects	<i>Melilotus officinalis</i>	na			-0.66,- 0.64,- 0.61,- 0.52*	(6)
Dragonfly	Various insects	<i>Hypericum fasciculatum</i>	-0.72			-0.69	(7)
Dragonfly	Various insects	<i>Sagittaria latifolia</i>	-0.70			-0.10	(7)
Intestinal protozoan	Bumblebees	artificial flowers	-0.13				(8)
Crab spider	Honey bee	<i>Cistus ladanifer</i>		-0.12			(9)
Crab spider	Bee	<i>Cistus ladanifer</i>		-0.10			(9)
Ants	Moth	<i>Yucca glauca</i>			-0.48		(10)
Ants	Moth	<i>Yucca glauca</i>			0.10		(10)
Ants	Bee	<i>Nephilium lappaceum</i>	-1.93				(11)
Ants	Butterfly	<i>Rorippa indica</i>	-0.04				(12)
Crab spider	Honey bee	<i>Chrysanthemum frutescens</i>		0.45			(13)
Spider	Various insects	<i>Haplopappus venetus</i>				-0.41	(14)
Ants	Bees	<i>Cassia alata</i>	-0.41				(15)

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Ants	Bees	<i>Licuala grandis</i>	-0.18				(15)
Ants	Bees	<i>Wedelia trilobata</i>	-0.53				(15)

- 10 † (1) Dukas & Morse 2003, 2005; (2) Suttle 2003; (3) Muñoz & Arroyo 2004; (4) Robertson &
11 Maguire 2005; (5) Dukas 2005; (6) Meehan et al. 2005; (7) Knight et al. 2005; (8) Otterstatter et
12 al. 2005; (9) Reader et al. 2006; (10) Perry et al. 2004; (11) Tsuji et al. 2004; (12) Yano 1994;
13 (13) Heiling & Herberstein 2004; (14) Louda 1982; (15) Junker et al. 2006.
14 * Four separate populations or years examined in the study.