insects

MDPI

Supplementary Materials: Positive and Negative Impacts of Non-Native Bee Species around the World

Laura Russo

Table S1. Selected references of potential negative impacts of *Apis* or *Bombus* species. Bold, underlined, and shaded text refers to citations with an empirical component while unbolded text refers to papers that refer to impacts only from a hypothetical standpoint. Light grey shading indicates species for which neither positive nor negative impacts have been recorded. "But see" refers to manuscripts that show evidence or describe the opposite of the effect and is capitalized when only contradictory studies could be found. Note that *Apis mellifera scutellata* (the "Africanized" honeybee), is treated separately given the abundance of research specifically studying that subspecies.

Non-native Species	Nesting Sites	Floral Resources	Pathoens/ Parasites	Invasive Weeds	Altering Pollination Webs	Introgression	Decrease Plant Fitness
Apis cerana	[1]	[2]	[1–3]			[4]	
Apis dorsata							
Apis florea		[5]	[5]				
Apis mellifera	But see [6,7]	**[8–19]** but see [6,20–22]	**[9,23–26]**	**[27–35]** but see [6]	[36–38] **[39–43]** but see **[44]**	[4]	**[37,45]** [38,46,47] **[48,49]** but see **[50]**
Apis mellifera scutellata		**[51]** but see **[52–54]**			**[55–57]**		
Bombus hortorum				**[58,59]**			
Bombus hypnorum	But see **[60]**	But see **[60]**	**[61]**				
Bombus impatiens	[62]	[62,63]	[26,64–66]			[62]	
Bombus lucorum							
Bombus ruderatus		[67,**68**]	[69,70]	**[28,58,59,69,71,72]**	[36,39]		[39] but see **[73]**
Bombus subterraneous				**[59]**			
Bombus terrestris	[74–76]	**[67,70,74,75,77–84]** but see **[85,86]**	**[25,26,70,76,87–90]**	**[29,58,72,91–95]** but see [96]	**[38,39,68,81,97,98]**	**[4,76,88,99,100]**	**[47,76,49,86,97,101–103]**

Table S2. Selected references for potential positive impacts of *Apis* or *Bombus* species. Bold, underlined, and shaded text refers to citations with an empirical component while unbolded text refers to papers that refer to impacts only from a hypothetical standpoint. Light grey shading indicates species for which neither positive nor negative impacts have been recorded. "But see" refers to manuscripts that show evidence or describe the opposite of the effect. Note that *Apis mellifera scutellata* (the "Africanized" honeybee), is treated separately given the abundance of research specifically studying that subspecies.

Non-native Species	Agricultural Pollination	Lab Reared Studies	Natural History	Rescue of Native Species	Resilience to Human Disturbance and Climate Change
Apis cerana	[**1,104,105**]			[**106**]	
Apis dorsata					
Apis florea	[**5,107**]				
Apis mellifera	[7,108–112] but see [**15,113,114**]	[**115–119**]		[9] [**6,106,120–122**]	[**123,124**]
Apis mellifera scutellata	[125,126]				[**127**]
Bombus hortorum	[128,129] *	[**130,131**]	[**132,133**]		
Bombus hypnorum	[134]				[**60**,135]
Bombus impatiens	[**136**]	[**137**]			[138]
Bombus lucorum					
Bombus ruderatus	[139,**140,141**] *	[**130,131**]	[**132,133, 140,141**]	[**122**]	
Bombus subterraneous	[128,129] *		[**132,133**]		
Bombus terrestris	[68,76,94,142] but see [128,129] * [143]	[**131,144,145**]	[**132,133**]	[**122**]	[**146**]

* Dissertation

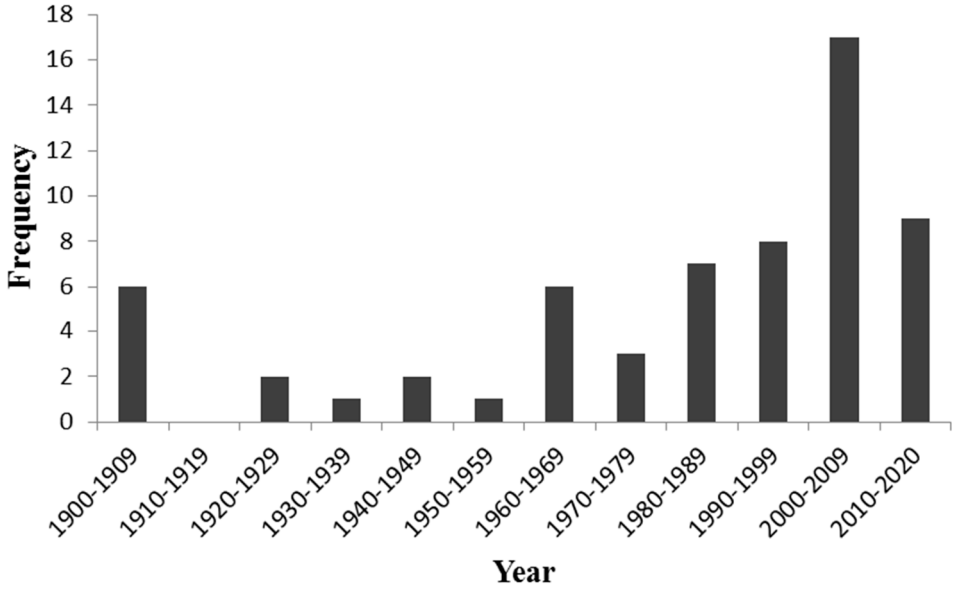

Figure S1. Frequency histogram of first collection records for introduced bee species. Note that dates of introduction are approximated and for most species have not been carefully studied.

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