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Abstract

small earthen cells. The adults emerge during spring and live for up to a month, feeding on a wide range of host plant leaves and fruits, including those of apple trees (Lysaght 1930; Miller 1971; Rogers et al. 2006). Bronze beetle was a major orchard pest during the early 20th century (Miller 1926), but became rare after the introduction of organo-chlorine and other broad spectrum insecticides in fruit production (Clearwater & Richards 1984).

Bronze beetle damage has been shown to vary greatly between and within organic apple orchards in Hawke's B0(w)ithismp Bhei Barinaion Bas Bnot a trinut ab2(lea)-10to rchard ermntrdtici11(e)sr asierhsaicalhardter -71(ins)-3(icis)30()-1624mnd opulaion)-1(ar)-21(ina)-3(io)3(n s)-1732rermane -2(d)-8732rfaily ornsnsntees3(r)c2eats f bsr -721)-1(ar)-3(io)3(n)-182 be ntcng ronze eetle opulaion s

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datasets; χ^2 and P-values from type3 likelihood ratio analysis were used to compare the effects.

RESULTS

Both the sub-soil and surface-dwelling macroinvertebrate samples obtained by soil sampling and pitfall trapping, respectively, were numerically dominated by detritivores. Herbivores were the second largest group found in the sub-soil, whereas predators were second largest group in the surfacedwelling macro-invertebrate community.

Bronze beetles

The density of bronze beetles (cumulative total of larvae, pupae and adults) in soil samples varied

DISCUSSION

Previous		Predators	itors			Bronze beetle	beetle			Other h	Other herbivores			Detr	Detritivores	
history	Oct	Nov	Dec	Dec Jan	Oct	Nov	Dec	Jan	Oct	Nov	Dec	Oct Nov Dec Jan Oct Nov Dec Jan		Nov	Oct Nov Dec Jan	Jan
High bronze beetle 274.7		106.5	185.2 120.4	120.4	592.6	265.4	34.0	12.3	561.7	402.8	592.6 265.4 34.0 12.3 561.7 402.8 188.3 216.0	216.0	899.7	409.0	899.7 409.0 696.0 478.4	478.4
Low bronze beetle 142.0 66.4	142.0	66.4	29.3	37.0	66.4	24.7	24.7 4.6 1.5	1.5	242.3	242.3 189.8	104.9	57.1	935.2	935.2 429.0	521.6	273.1
χ^2 value	27.88	6.09	81.8	30.1	313.0	151.18 16.31	16.31	6.2	84.56	50.72	15.56	63.88	0.44	0.44 0.31 16.24	16.24	36.79
P-value	<.0001	.014	<.0001	<.0001	<.0001	<.0001	<.0001	.013	<.0001	<.0001	<.0001	<.0001 <.0001 <.0001 <.0001 <.0001 .013 <.0001 <.0001 <.0001 <.0001		.577	.505 .577 <.0001 <.0001	<.0001

Table 2 Surface-dwelling macro-invertebrates (mean number/trap) caught over the preceding month in pitfall traps in orchards with a history

			,													
Previous		Predators	tors			Bronze beetle	beetle		-	Other herbivores	bivores			Dei	Detritivores	
history	Nov Dec	Dec	Jan	Feb	Nov	Nov Dec Jan Feb	Jan	Feb	Nov	Nov Dec Jan Feb	Jan	Feb	Nov	Dec	Nov Dec Jan	Feb
High bronze beetle 23.79		35.35	66.60	35.45	0	0.95	0.1	0	4.1	3.15	2.55	1.85	83.79	9 56.6	137.35 71.15	71.15
Low bronze beetle 40.75	40.75	44.85	84.68	45.55	0	0.15	0	0	4.6	3.25	2.84	1.80	114.75	97.85	221.37	125.4
χ^2 value	87.69	22.56	42.27	25.25		12.97			0.51	0.03	0.31	0.01	94.34	223.04	387.85	303.4
P-value	<.0001	<.0001 <.0001 <.0001	<.0001	<.0001		.0003			.46	.86	.58	.91	<.0001	<.0001	<.0001 <.0001 <.0001 <.0001 <.0001	<.0001

Table 3 Abundance of different surface-dwelling generalist predator taxa (mean total number/trap) in orchards with a history of high and low bronze beetle damage. month of January are responsible for containing the population growth of bronze beetle populations in Low BB orchards needs more research. Observation of specific predation by spiders on bronze beetles emerging from the ground is needed to add support this hypothesis. The current findings could not explain conclusively why some orchards have more spiders than others.

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