

COSTELYTRA ZEALANDICA (WHITE) SEX ATTRACTION

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INTRODUCTION

The idea of testing attraction of male beetles towards females was suggested in 1956 when 67 males were found associated with one female in a heavily infested paddock; this is an unusually high number though two to three or even eleven per female had been noted previously.

METHOD

The females were reared in the laboratory, left unmated throughout the test period and fed each night. Only those individuals which emerged the night before first field emergence (9.11.57) were used in the test. The trial area was a paddock on three sides of which were cultivated fields containing no grass grubs (50 7-inch cube samples taken at 20-pace intervals, 10 in each of 5 parallel, equidistant rows per paddock), whereas the grass area had an average population in October of 11 and a range of 3-18 larvae and pupae per sample (50 samples as above). Female beetles were caged individually in 1" square, gauze-sided cells and placed on the ground surface in the cultivated, uninfested paddocks at sites ranging from 25-200 yards from the edge of the infested area, with 25 yard intervals between cells. Positions of the latter were reversed each night so that those cells furthest away on the first night were closest to infested land the next night and so on. Any males found on ground within an area 3' wide and 3' downwind and 1' upwind of cells were recorded as having been attracted to that cell. Positioning of cells on the four first test nights was arranged so that wind direction was from cells to the infested area. On the following three nights the wind changed round and no males were recorded at cells. Males and females were removed after flights were over from the immediate vicinity of the test cells each night and taken for determination of sex (i.e. from the 4ft. x 3ft. area round cells). Climatic conditions on the seven test nights were:

	Wind in m.p.h.	Rain during flights	Rain after flights were over	Grass temp. F°
1st night	..... 1	0	0.02	53.5°
2nd night	..... up to 2	0	0	52.4°
3rd night	..... up to 1.5	0	0.26	51.6°
4th night	..... up to 2.5	0	0	47.3°
5th night	..... 6.5 - 8	light	0.09	38.0°
6th night	..... 6.5	0	0	54.0°
7th night	..... 5 - 7	light	0.23	54.0°

ATTRACTION OF MALE ADULT TO FEMALE *C. ZEALANDICA*

1st Night			2nd Night		
Distance from infested area (yards)	Cage identity	No. males attracted	Distance from infested area (yards)	Cage identity	No. Males attracted
200	A	1	200	L	0
175	B	0	200	K	2
150	C	2	175	J	1
125	D	10	175	I	0
100	E	0	150	H	1
75	F	3	150	G	0
50	G	0	125	F	1
25	H	17	125	E	0
25	I	2	100	D	1
25	J	24	75	C	2
25	K	38	50	B	1
25	L	19	25	A	1
		116			10
3rd Night			4th Night		
Cage identity	No. males attracted	Cage identity	No. males attracted	Total males	
A	0	L	0	A	3
B	0	K	2	B	2
C	0	J	1	C	4
D	4	I	0	D	15
E	0	H	1	E	0
F	0	G	0	F	4
G	0	F	0	G	0
H	6 + 2 ♀	E	0	H	25
I	1	D	0	I	3
J	3	C	0	J	29
K	21	B	1	K	63
L	8	A	1	L	27
	43 + 2 ♀		6		175

RESULTS

Under conditions of these tests one female (K) appeared to have the ability to attract males from a distance of 200 yards, two (D and J) from 175 yards, one (H) from 150 yards, but the strongest attraction was from a distance of only 25 to 50 yards. Differences in individual ability to attract males were very marked and though unmated females still attracted males for 5 days after emergence, this attraction showed a distinct tendency to decrease over this period in most instances.

DISCUSSION

There is the possibility that some males (and females) moved closer to cells each night and so would not have to travel the full distance to cells from infested land on any one night. The only clear cut result therefore, may be that for the first record as no flights had occurred on any of the seven nights prior to 9th November in the test area. The occurrence of two female beetles at cell H on the third night illustrates the unreliability of field tests for this type of investigation, and the occurrence of both of them at the same cell was even more surprising. The fact that males were not recorded at cells on the 5th and 7th nights when wind changed round to blow from infested areas towards cells is not significant because climatic conditions on those two nights were not suitable for flights to occur (Kelsey, 1951), but on the 6th night there was a major flight when the breeze was still blowing from infested areas towards the cells and yet there were no males recorded at cells.

The inference from these tests are that female *C. zealandica* adults produce a wind-bourne sex pheromone and that males fly up wind under the influence of that attractant.

REFERENCE

- KELSEY, J. M., 1951: Grass grub and grass caterpillar control. **Bull. N.Z. Dep. Agr. No. 244**: 4.