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EFFECT OF NUTRITION ON THE SUSCEPTIBILITY OF *TRIBOLIUM* CASTANEUM HERBST TO THE TOX1C1TY OF DIFFERENT INSECTICIDES*

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It has been shown by many workers that the food influences the susceptibility of an insect to insecticides considerably. But the effect of various food components on the susceptibility of insects to insecticides has not been studied exhaustively (Panda, 1966, Vinson 1967). The present paper reports the results of investigations on the effect of some nutrients on the susceptibility of T. *castaneum* to various insecticides.

Materials and Methods

The eggs of T, *castaneum* required for the experiments were obtained from beetles reared in the laboratory on wheat flour media. Six different media containing vitamins A, B, C, yeast, sucrose and cholesterol at 2, 7, 0.25, 7, 15 and 0.15 percent respectively in the basic diet (wheat flour passed through 60 mesh sieve) were prepared. 50 grams each of the obove media was taken in a wide mouthed glass jar and closed with muslin cloth after releasing 200 eggs of T. *castaneum* into each jar. The jars were then kept in an oven maintained at $30 \pm 1^{\circ}C$. Beetles emerging between the 4th and 7th days after the first emergence were collected and used in the experiments.

Malathion, endrin, DDT and parathion (obtained from Bharat Pulvarising Mills (Pvt.) Ltd., Bombay) and carbaryl (obtained from Union Carbide India Ltd., Madras) were chosen for the trials. All the insecticides were used as emulsions prepared from technical materials. Sevin was dissolved in chloroform and the other insecticides in benzene. Triton X 100 was used as emulsifier. The solvent and emulsifier were maintained at 5 and 0.6 percent respectively in all final spray dilutions.

Beetles collected from different rearing media were transferred to clean petridishes (75 mm dia.) in lots of 15 numbers and each dish was sprayed with one ml. of the concerned emulsion under Potter's tower at a constant pressure of 24 cm mercury. Five concentrations each of the obove insecticides were used and three replications were maintained for each

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Summary

The effect of vitamins A, B, G, yeast, sucrose and cholesterol on the susceptibility of T. *castaneum* to malathion, endrin, DDT, parathion and sevin was studied. The different nutrients did not change the susceptibility of the insect to the various insecticides to the same extent or in the same manner. The extent of variation in susceptibility was highest in the case of malathion followed in the descending order by endrin, DDT, sevin and parathion.

Acknowledgements

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	Wheat Vitamin D	X = 0.187	Y = 2.0527X+2.0512	0.02732	0 022 0 033	1 71		
	Wheat Vitamin C	X = 0.118	Y = 1.8242X+2.0107	0.04413	0 03506 0 05552	1 07		
	Wheat Yeast	X 0.070	Y = 2.0999X+1.5728	0 04286	0 03486 0 05273	1 11		
	Wheat Sucrose	X = 0 09	Y = 1.7660X+2.0084	0.04941	0 039 0 0655	0.96		
	Wheat Cholesterol	X = 0 137	Y = 1.8895X+1.8104	0 04318	0 03470 0 05368	1 10		1 98
DDT	Wheat alone	X = 0 031	Y = 1 7723X+1.5843	0 08458	0 0322 1 132	1 00		
	Wheat Vitamin A	X = 0.083	Y = 2.3793X+0.3	0 17850	0 1488 0 2166	0		
	Wheat Vitamin B	X = 0 093	Y 1.6576X+1.6656	0.09 9	0 0748 0 1332	0.84		
	Wheat+Vitamin C	X 0 (5	Y 1.52 X+1.6236	0.10793	0 08656 0 1248	0 78		
	Wheat+Yeast	X = 1 371	Y = 1.9873X+0 5270	0 17811	0 14371 0 23082	0 47		
	Wheat Sucrose	X = 1 158	Y = 1.7670X+1.0001	0 16189	0 12860 0 20391	1.52		
	Yeast+Cholesterol	X 0 573	Y 1.6596X+1.8812	0.08881	0 0441 0 1092	0 84		0 53

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dose. Insects in three dishes sprayed with solvent and emulsion alone in water served as control. The sprayed dishes containing the insects were dried for about 5 minutes under an electric fan. Treated insects were then transferred to clean specimen tubes containing the respective rearing media. The tubes were covered at the top with small pieces of muslin cloth held in position with rubber bands and kept at 30±1°C. Results were assessed by counting the dead insects, at the end of 48 hours after treatment. The moribund ones were also counted as dead. The mortality percentages thus obtained were corrected with Abbots formula (1928) and the data were subjected to probit analysis (Finney, 1952).

Results and Discussion

Results presented in Table 1 will show that susceptibility of T. *castaneum* to some of the insecticides varied considerably depending on the nutrients added to the basic diet. In the case of malathion maximum susceptibility was observed in beetles reared on medium containing vitamin B closely followed by those reared in media with vitamin A. Vitamin C also increased the susceptibility considerably. The susceptibility was conspicuously lowered in the case of beetles reared in media enriched with sucrose as well as yeast. But cholesterol did not change the susceptibility significantly. In the case of endrin, parathion and sevin the addition of various nutrients to the basic diet did not affect the susceptibility to any significant level. However, as in the case of malathion, beetles reared in media enriched with vitamin B showed maximum susceptibility. But vitamin A in the diet made the beetles more resistant to endrin. There was a tendency of components like vitamin B and proteins making the beetles more susceptible to parathion. It is interesting to note that all the nutrients made the insect increasingly resistant to the action of DDT. Gorden (1961) reported that an increase in the fat content of the diet made insects more resistant to DDT. In the present studies T. *castaneum* showed resistance in the following descending order, yeast > vitamin A > sucrose > cholesterol > vitamin B > vitamin C.

The greatest variation in susceptibility of T. *castaneum* to insecticides due to variations in the nutrient content of the rearing media was observed in the case of malathion followed by endrin and DDT. The variations were least with sevin and parathion. It is also seen that the different nutrients did not change the susceptibility of the insect to the different insecticides in the same manner or magnitude, even in the case of those insecticides with similar modes of action.