STABILITY OF RESISTANCE TO SELECTED INSECTICIDES IN WILD POPULATIONS OF THE HOUSE FLY, MUSCA DOMESTICA (L.) UNDER LABORATORY AND PRACTICAL CONDITIONS

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House flies belong probably among insects which are most frequently used in experimental studies of physiological, genetic and biochemical mechanisms of resistance. The development of resistance is an example of microevolution caused by artificially induced change in the frequency of some selection genes. In our experiments, we investigated the stability of resistance to selected insecticides expressed by the changes in values of resistance factors during 60 generations of flies breeding. The stability of resistance to insecticidal compounds azametiphos, dimethoate, pirimiphos-methyl, bendiocarb, cypermethrin, deltamethrin and permethrin was investigated under laboratory conditions during 4 years (60 generations) in multi-resistant population "KP". This population of flies was kept free of the insecticidal selection pressure. Of all substances investigated, the highest stability of resistance was detected for bendiocarb for which the first more marked decrease in lethal concentration (LC_{50}) was recorded as late as starting from the 35th laboratory housefly generation. The resistance to pyrethroids investigated persisted up to the 30th generation. An abrupt decrease in LC_{50} values in the wild population in comparison with the sensitive strain SRS/WHO was observed between generations 30 and 35, reaching the level of flies susceptible to permethrin. From the organophosphates tested, relatively most stable was the resistance to dimethoate. More marked decrease was observed from the 12th generation of houseflies. It was characterised by alternative decrease and increase in LC_{50} values, the so-called swing effect. The resistance to azamethiphos decreased significantly between generations 4 and 13. From generation 35 the level of LC_{50} was lower than that in the control strain SRS/WHO. The values of LC_{50} for pirimiphos-methyl reached the values of sensitive flies as soon as in the 5th generation and from generation 6 to 60 they were remained consistently below the level detected in the control strain SRS/WHO.

The knowledge obtained in laboratory experiments was considered important for the assessment of further development and stability of resistance under practical conditions. Apparently, the results of laboratory selection experiments during which the house fly populations were kept under invariably standard conditions and without the possibility of interbreeding of sensitive and resistant flies, such as in wild populations, should be verified by application of insecticides under practical conditions. The development of resistance to selected insecticides and its stability were observed on 4 pig farms during 5-7 years. The preparations Alfacron 50 WP, Actellic 25 EC, Coopex 25 WP and K-Othrine 25 flow were applied separately on individual farms for longer period of time. Intensive repeated application of the preparation containing the same active ingredient suggests the danger of rapid development of resistance in practice already during one season as the application of preparation Alfacron 50 WP resulted in a 50-fold increase in the resistance of houseflies when expressed by the resistance factor (FR) value (from low FR=2 to high FR>100). Similar results were obtained after intensive application of pyrethroids. On the other hand, after the interruption of selective pressure caused by preparation Actellic 25 EC and K-Othrine 25 flow, the resistance decreased abruptly. After 3-years pause and repeated use of pyrethroids under field conditions the values of resistance factor reached the previously observed level, i.e. FR>100, as soon as after 3 months. The presented results indicate that once the high resistance to the insecticide

Proceedings of the 3rd International Conference on Urban Pests.
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develops, the same active ingredient cannot be used repeatedly to control houseflies efficiently even after several years pause. The alternative use of insecticides based on different active ingredients results in the deceleration of the development of resistance and such an approach can be used to control houseflies with sufficient degree of success.

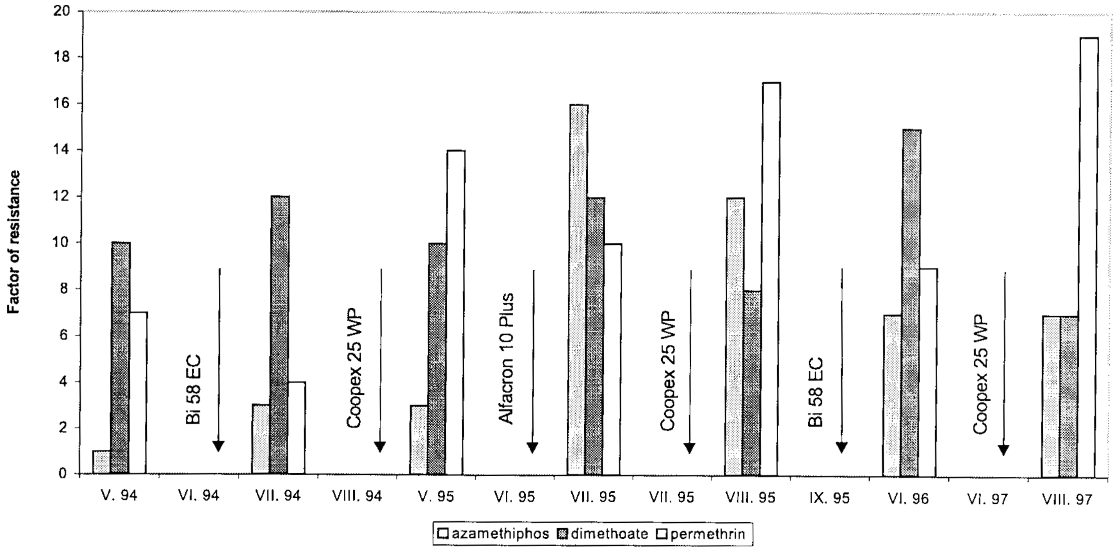

Figure 1. The development of resistance of *Musca domestica* (L.) following the practical application of preparations Bi 58 EC (dimethoate), ALFACRON 10 Plus (azamethiphos) and COOPEX 25 WP (permethrin) in animal production.

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Table 1. Mean values of the factors of resistance (FR) for LC_{50} in the wild strain of houseflies (*Musca domestica* L.) kept in an insectary during 4 years.

Generation	Azametiphos FR	Dimethoate FR	Pirimiphos-methyl FR	Bendiocarb FR	Cypermethrin FR	Deltamethrin FR	Permethrin FR
F_1	12,71	25,30	1,92	379,98	184,58	99,54	13,8
F_2	12,83	25,18	1,45	376,63	181,19	105,97	13,92
F_3	14,38	23,98	1,43	367,54	173,27	105,79	13,54
F_4	12,25	25,98	1,46	375,57	175,04	101,81	12,18
F_5	10,30	24,89	1,16	376,55	163,28	91,12	11,09
F_6	8,92	27,28	0,69	376,57	161,94	89,72	10,95
F_7	9,36	22,99	0,46	375,41	155,08	108,28	10,05
F_8	9,72	21,91	0,83	374,66	172,97	104,64	10,09
F_9	8,34	24,10	0,47	376,58	161,69	117,59	9,69
F_{10}	6,58	21,89	0,31	376,46	160,32	92,25	11,07
F_{11}	7,70	24,89	0,43	368,30	141,64	94,89	9,84
F_{12}	6,20	21,26	0,37	370,91	128,47	85,96	10,33
F_{13}	2,78	19,58	0,33	374,56	149,34	76,45	10,96
F_{14}	2,31	18,48	0,43	367,39	130,48	87,89	10,21
F_{15}	2,43	19,70	0,47	360,83	107,13	91,33	9,95
F_{20}	1,29	15,15	0,41	361,75	116,75	92,43	9,25
F_{25}	1,13	10,94	0,35	367,28	114,56	91,27	9,00
F_{30}	1,24	8,56	0,38	358,09	90,93	86,29	8,86
F_{35}	0,86	5,36	0,45	349,10	46,68	71,66	5,66
F_{40}	0,76	10,71	0,29	277,54	19,03	71,66	3,49
F_{45}	0,99	2,07	0,33	204,92	18,45	26,57	2,22
F_{50}	0,48	4,29	0,26	77,97	19,90	13,48	2,69
F_{55}	0,68	1,86	0,21	31,75	16,78	9,67	1,26
F_{60}	0,67	0,98	0,19	1,68	15,66	9,61	1,07

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