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RESEARCH ON SYRPHID FAUNA FROM DIFFERENT MAIZE HYBRIDS*

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ABSTRACT

We present the results from a field experiment in Borovce, Slovakia, during 2008 and 2009 with eight maize hybrids. Three genetically modified hybrids expressing *Bacillus thuringiensis* insecticidal proteins (MON 8903, MON 88017, and MON 8903 × MON 88017) were included. *Syrphidae* abundance was assessed using yellow sticky traps (Pherocone AM). A synecological analysis to reveal the role of each species was conducted, taking into account the abundance, constancy, dominance and ecological significance index. The species with the greatest value (W_5, edifying species), was *Sphaerophoria scripta* in 2009, but it was accompanying species (W_3), in 2008. Accompanying species in 2008 were *Chrystoxum cautum*, *Syrphus ribesi, Eupeodes corolae*, *Neoascia podagrica*, while in 2009 were *Chrystoxum cautum*, and *Melanostoma* sp., *Episyphus balteatus*, which increased from accessories species to accompanying species. Accessories species (W_2) were in 2008 *Melanostoma* sp., *Episyphus balteatus*, *Syrphid* sp. and in 2009 *Eupeodes corolae*, *Syrphus ribesi, Syrphid* sp., as well as three new registered species *Platycheirus* sp., *Sphaerophoria menthastri* and *Melangyna umbellatarum*. Other species, collected only in 2008, in 2009, or in both years could be considered as accidental species (W_1). There were no important differences in the structure and quantity of wildlife (*Syrphidae*) between analysed hybrids, regardless if they were genetically modified or not.

Key words: *Syrphidae* maize hybrid, ecological significance index, *Bt* maize.

INTRODUCTION

The past decades were characterized by chemical treatments against pests, diseases and weeds on large treated areas and with high quantities of pesticides. At the same time, public interest in environment conservation rose, which was reflected in joint actions, including those that changed country legislations (http://ec.europa.eu/environment/ legal/implementation_en.htm). These aspects lead also to increased interest for studies of effects of different agricultural pest and disease control technologies on the beneficial fauna in different agrocoenoses. Possible impact of pesticides and genetically modified (GM) crops on the trophic chains in agrocoenoses is of concern to farmers, policy makers and organizations and societies interested in environment conservation. Ideal pest management strategies should not harm organisms that are not intentionally targeted (non-target organisms), in particular beneficial organisms. To address potential risks of GM crops, numerous studies have been conducted around the world. Crops expressing insecticidal protein from the bacterium *Bacillus thuringiensis* (*Bt)* were in the focus of research and effects on all kinds of insects and other small animals have been studied in comparison with conventionally managed crops. In general, until now, the greatest effects on non-target organisms were observed in conventional crops, where the pests are controlled with chemical insecticides, (Naranjo, 2009). When new pesticides are evaluated, their impact on non-target organisms is taken into consideration. A similar evaluation takes place for genetically modified, insect-resistant plants. *Bt* toxins expressed in today's transgenic plants target corn borers (*Lepidoptera*) or corn rootworms (*Coleoptera: Chrysomelidae*). It is important to be ensured that other organisms, including

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predators such as *Coccinellidae*, *Syrphidae* and *Neuroptera*, are left unharmed. After seven years of GM crop production, no apparent adverse health effects on animals and humans, or environmental effects have emerged (Gewin, 2003). Members of the civil society nevertheless strongly debate whether health problems might emerge from consuming GMO products. The responsibility for assessing the safety of GM crops is with EFSA. The risk assessment procedure for new GMOs, however, can take five years or more, after which the European Commission makes a final decision on potential cultivation (Meissle et al., 2011).

This paper reports on a field experiment to study effects of *Bt* maize on *Syrphidae*.

MATERIAL AND METHODS

The experimental field was located in Borovce, Slovakia, during 2008 and 2009. Three GM maize hybrids were cultivated: Mon 89034 (*Lepidoptera*-resistant, expressing Cry1A.105 and Cry2Ab2), Mon 88017 (*Coleoptera*-resistant, expressing Cry3Bb1), and Mon 89034 × Mon 88017 (stacked hybrid expressing all 3 proteins).

Furthermore, the conventional DKC 5143 hybrid and 4 conventional reference hybrids (NK Cisko, NK Fortius, PR 36D79, and Meridian, which was replaced in 2009 by KWS 1393) were planted. Maize plots were 36 by 30 m with 75 cm inter-row spacing (46 rows with approximately 150 plants per row). Foliar non-target arthropod abundance was assessed with yellow sticky traps (Pherocone AM).

Three traps were installed per plot at row 18, 27, and 35. The traps were replaced weekly or biweekly, in 2008 on 10 and 22 June, 08, 22, and 29 July, 05 and 19 August, and 02 and 16 September, and in 2009 on 2, 16, and 30 June, 14, 21, and 28 July, 11 and 25 August, and 7 September. After collection, the traps were maintained at +4°C until analysis. *Coccinellidae, Syrphidae* and *Neuroptera* were taken out of the traps, counted under a stereomicroscope or with a loupe, registered, and identified.

The specimens were glued on paper sheets and stored in an envelope in a refrigerator till the final year of the research. Determination of the *Syrphidae* species was done using internet identification guides (http://www.syrphidae.de; http://bugguide.net/index.php?q=search&keys=syrphid&search=Search; http:// www.faunaeur.org) or literature (Trop, 1994; Bradescu, 1991).

The data were subjected to synecological analysis to demonstrate the role of each *Coccinellidae* species regarding abundance, constancy, dominance and ecological signify-cance index (Zamfirescu and Zamfirescu, 2008).

Abundance (A) expresses the number of individuals collected from a particular species. Species constancy (C_A) represents the percentage of samples in which a species is present according to the formula:

$$C_A = (N_pA/N_p) \times 100,$$

where: N_pA = number of samples in which the species A occurs; N_p = total number of samples.

There are four classes of constancy: C_1 – accidental species (1-25%), C_2 – accessory species (25-59%), C_3 – constant species (50-75%) and C_4 – euconstant species (75-100%).

Species dominance (D_A) represents the percentage of specimens of a certain species in relation to the registered total number of individuals, according to the formula:

$$D_A = (N_A/N_1) \times 100,$$

where: N_A = total number of individuals of species A; N_1 = total number of all individuals. Dominance has five classes, D_1 – subrecedent (below 0-1%), D_2 – recedent (1-2%), D_3 – subdominant (2-5%), D_4 – dominant (5-10%), D_5 – eudominant (over 10%). Ecological significance index of a species (W_A), taking into account both constancy and dominance. It is thus reflecting the real importance of a particular species in a community of species, according to the formula:

$$W_A = (C_A \times D_A) \times 100/10000,$$

where: C_A = constancy of species A, D_A = dominance of species A.

There are five classes, W_1 – accidental species (< 0.1%), W_2 – accessory species (0.1 to 1%), W_3 – accompanying species (1-5%), W_4 – constant species (5-10%), W_5 edifying species (over 10%).

RESULTS AND DISCUSSION

Many insect groups were captured on yellow sticky traps and comparison of their proportion, showed that the most numerous were in 2008 *Coccinellidae*, followed by Syrphid and finally Neuropterans, while in 2009 the most numerous were Syrphid, followed by *Coccinellidae* and finally Neuropterans.

Family *Syrphidae* or flower flies or syrphid flies, sometimes called hoverflies, are common insect and they are often seen feeding with flower's nectar pollen, while the larvae eat a wide range of foods, especially insectivores maggots are important predators of pests, such as aphids, scales, thrips, other plant-sucking insects, and caterpillars, and are rivalled only by lady-bird beetles and lacewings as predators useful for biological control. Syrphids are being recognized as important natural enemies of pests, and potential agents for use in biological control. There are about 6,000 species in 200 genera which have been described (http://en.wikipedia.org/wiki/Hoverfly).

In 2008, 12 Syrphid species and species belonging to *Melanostoma, Chamaesyrphus* genus and a group (difficult to be precisely identified) which was registered as Syrphid, were collected.

The total number of specimens registered was 1032, [*Sphaerophoria scripta* L. (226; 23%), *Syrphus ribesii* L. (174; 17%), *Chrysotoxum cautum* Harris (146; 14%), *Eupeodes corolae* Fab. (131; 13%), *Neoascia podagricus* Fab. (126; 12%), *Melanostoma* sp. (75; 7%), *Episyrphus balteatus* De Geer (73; 7%), Syrphid sp. (29; 3%), *Dasysyrphus albostriatus* Fall. (24; 2%), *Chamaesyrphus* sp. (20; 2%), *Eristalis tenax* L. (4; 0%), *Eristalis arbustorum* L. (1; 0%), *Meligramma guttata* Fall. (1; 0%), *Vollucella pellucens* L. (1; 0%), *Pyrophaena rosarum* Fab. (1; 0%)] (Table 1).

Table 1. Evolution of Syrphid species collected in 2008 on yellow sticky traps

Species	10 VI	22 VI	08 VII	22 VII	29 VII	05 VIII	19 VIII	02 IX	19 IX	∑=Sum
Sphaerophoria scripta	12	19	21	66	47	14	10	16	21	226
Chrystoxum cautum	0	41	19	10	43	13	5	3	12	146
Episyphus balteatus	4	4	7	40	9	3	2	0	4	73
Melanostoma sp	8	3	0	1	49	10	2	1	1	75
Syrphus ribesii	36	7	4	63	26	3	0	4	31	174
Chamaesyrphus sp.	1	0	0	0	0	8	3	3	5	20
Dasysyphus albostriatus	0	16	2	2	1	1	0	1	1	24
Eristalis arbustorum	0	0	0	0	1	0	0	0	0	1
Eristalis tenax	0	0	0	0	1	1	1	1	0	4
Eupeodes corolae	17	0	12	10	52	12	5	7	16	131
Meligramma guttata	0	0	0	0	0	0	0	0	1	1
Neoascia podagrica	0	0	0	0	53	11	2	22	38	126
Pyrophaena rosarum	0	0	0	0	0	0	0	0	1	1
Vollucella pellucens	0	0	0	0	0	1	0	0	0	1
Syrphid sp.	14	3	2	0	0	2	0	2	6	29
∑=Sum	92	93	67	192	282	79	30	60	137	*1032*

In 2009, 16 Syrphid species and species belonging to *Melanostoma, Platycheirus, Didea* genus as well as a group (difficult to be precisely identified) which was registered as Syrphid, were collected. The total number of specimens registered was 2279 [*Sphaerophoria scripta* L. (707; 31%), *Chrysotoxum cautum* Harris (427; 20%), *Platycheirus* sp. (196; 9%), *Eupeodes corolae* Fab. (160; 7%), *Melanostoma* sp. (189; 8%), *Syrphus ribesii* L. (126; 6%), *Episyrphus balteatus* De Geer (119; 5%), *Sphaerophoria menthastri* (L.) sensu Vockeroth (103; 5%), Syrphid sp. (84; 4%), *Melangyna* *umbellatarum* Fab. (64; 3%), *Meligramma guttata* Fall. (27; 1%), *Dasysyrphus albostriatus* Fall. (14; 1%), *Neoascia podagricus* Fab. (13; 1%), *Metasyrphus latifasciatus* Macquart (2; 0%), *Eristalis tenax* L. (4; 0%), *Syritta pipiens* L. (4; 0%), *Didea* sp. (4; 0%), *Eristalis arbustorum* L. (3; 0%), *Scaeva selenitica* Meigen (2; 0%), *Metasyrphus latifasciatus* Macquart (2; 0%), *Syrphus torvus* Osten Sacken (1; 0%)] (Table 2).

The most common was *Sphaerophoria scripta* L., 23%, in 2008 and 31%, in 2009, followed by *Syrphus ribesii* L., 17% in 2008, or *Chrystoxum cautum* Harris, 20%, and some common species.

From the data obtained, it is noted that *Syrphidae* populations have evolved in maize agro ecosystems during the entire period tracked, however the maximum period of whole *Syrphidae* population varies from year to year, so during 22-29 July 2008 was captured 45.9% of all Syrphids captured in that year respectively in 2009 during 30 June - 14 July was captured 59.1% of all Syrphids (Tables 1 and 2).

Table 2. Evolution of Syrphid species collected in 2009 on yellow sticky traps

Species	02 VI	16 VI	30 VI	14 VII	21 VII	28 VII	11 VIII	26 VIII	07 IX	∑=Sum
Sphaerophoria scripta	5	90	308	169	69	35	9	5	17	707
Chrystoxum cautum	0	5	168	44	159	74	2	4	1	457
Platycheirus sp.	0	0	181	0	6	9	0	0	0	196
Melanostoma sp.	0	8	9	95	44	13	9	3	8	189
Eupeodes corolae	0	17	3	98	16	12	5	7	2	160
Syrphus ribesii	5	36	32	37	1	10	0	1	4	126
Episyphus balteatus	0	4	2	59	9	33	0	3	9	*119*
Sphaerophoria menthastri	0	0	0	75	0	0	2	14	12	103
Syrphid sp.	0	4	15	31	16	6	1	5	6	84
Melangyna umbellatarum	0	0	0	0	55	9	0	0	0	64
Meligramma guttata	0	0	0	4	0	0	7	1	15	27
Dasysyrphus albostriatus	1	3	5	2	1	1	0	0	1	14
Neoascia podagrica	2	5	5	0	1	0	0	0	0	13
Eristalis tenax	0	1	0	2	1	0	0	0	0	4
Syritta pipiens	0	0	0	0	4	0	0	0	0	4
Didea sp.	0	0	0	0	0	0	0	2	2	4
Eristalis arbustorum	0	1	2	0	0	0	0	0	0	3
Metasyrphus latifasciatus	0	0	0	0	0	0	0	0	2	2
Scaeva selenitica	0	0	0	2	0	0	0	0	0	2
Syrphus torvus	0	0	0	0	0	0	0	1	0	1
∑=Sum	13	174	730	618	382	202	35	46	79	*2279*

Referring to specific composition, it was noted that the most common species in maize agroecosystem in those 8 maize hybrids cultivated [3 modified corn hybrids (Mon 89034 x Mon 88017, Mon 89034, Mon 88017), 1 Check parental DKC 5143 and 4 reference hybrids (NK Cisko, NK Fortius, PR 36D79 and Meridian which was replaced in 2009 by KWS 1393)] are *Coccinellidae, Syrphidae* and Neuropterans, remarked the evolution of a population of each species depending on year and the analyzed period. In 2008 from the 15 species caught in yellow sticky traps, the first 7th species make up 92.15% of all specimens captured, in 2009 from those 20 species; first 10th species make up 96.75%. Taking into account *Syrphidae* populations depending on hybrid corn, it is found that in 2008, analyzing average of total number of *Syrphidae* and number of exemplars of the seven main species caught, it is possible to observe that compared to all three average's Syrphids population from hybrids genetically modified population is more numerous than Syrphids population from conventional hybrids, it may be noted that parental hybrid of hybrids genetically engineered has the largest population of

Syrphidae. There were no important differences in the structure and quantity of wildlife (*Syrphidae*) between analyzed hybrids, neither in 2008 (Figure 1 and Table 3) nor in 2009 (Figure 1 and Table 4).

In 2008, the average number of Syrphids captured in plots cultivated with GMO hybrids varied between 7.38 and 10.31, with an average per all GMO hybrids of 8.88 (Figure 1).

The average of Syrphids populations from plots cultivated with GMO hybrids (8.88) was with 2.0 lower than that found in plots cultivated with the parental hybrid DKC 5143 (10.88), but with 0.82 higher than average number of *Syrphids* captured in all cultivated plots (8.06). The average number of S*yrphids* captured from plots cultivated with conventional hybrids varied between 6.0 and 7.13, with an average/conventional hybrid of 6.76. The *Syrphids* populations averaged for plots cultivated with conventional hybrids (6.75) was with 1.31 lower than average number of Syrphids captured in all cultivated plots (8.06).

Deviations larger than the overall standard deviation were found in the Syrphids populations collected from plots, planted with genetically engineered hybrid MON 89034 x MON 88017 (positive deviation) and in plots planted with conventional hybrid NK Fortius (negative deviation) (Figure 1).

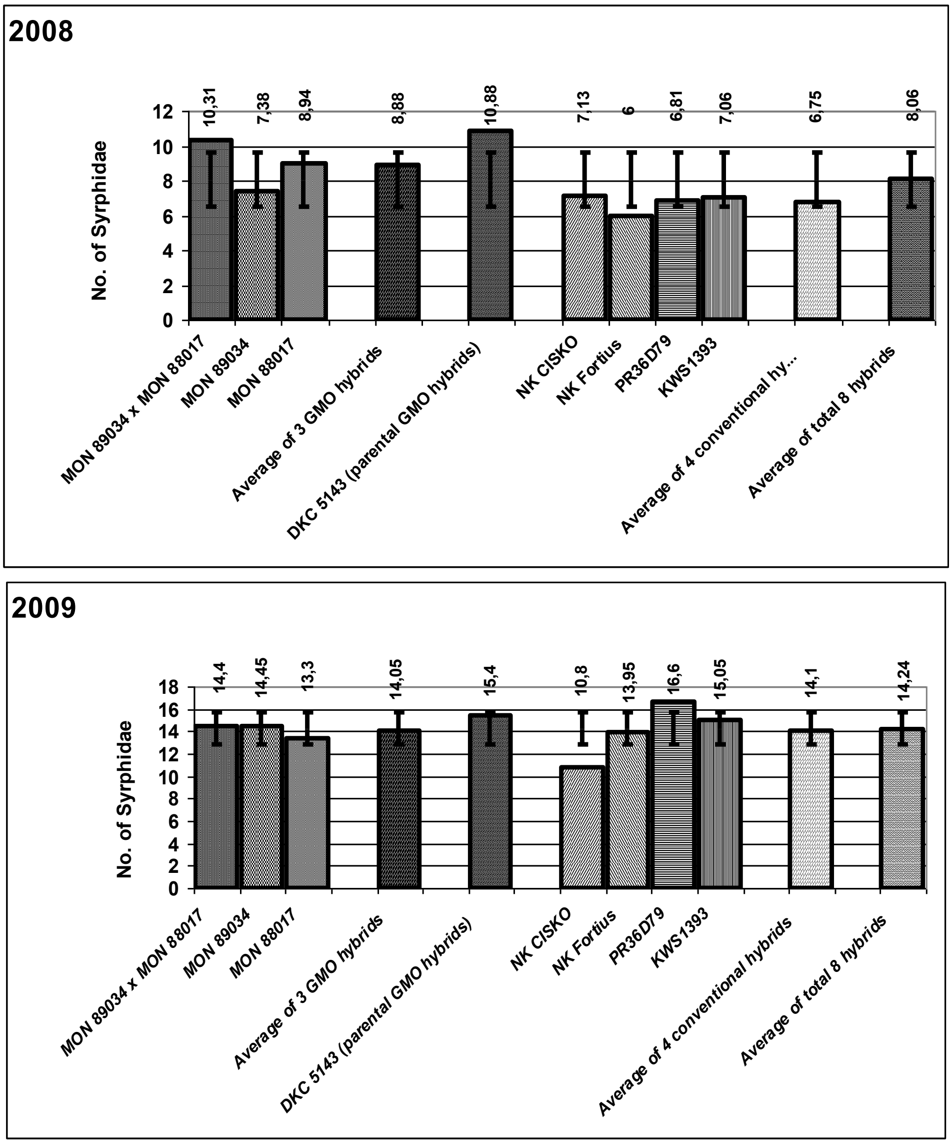

Figure 1. Average number of Syrphids captured in plots cultivated with different hybrids in 2008 and 2009

Table 3. Syrphid species collected from plots with different hybrids (2008)

Hybrid	*Sphaerophoria scripta*	*Syrphus ribesii*	*Chrystoxum cautum*	*Eupeodes corolae*	*Neoascia podagrica*	*Melanostoma sp.*	*Episyphus Balteatus*	Syrphid *sp.*	*Dasysyphus albostriatus*	*Chamaesyrphus sp.*	*Eristalis tenax*	*Eristalis arbustorum*	*Meligramma guttata*	*Pyrophaena rosarum*	*Vollucella pellucens*	∑=Sum	X=Average	
MON 89034 x MON 88017	30	40	11	21	21	15	11	6	8	1	0	0	0	0	1	165	11.0	Average of 3 GMO hybrids = 142
MON 89034	24	20	23	19	19	3	2	4	3	1	0	0	0	0	0	118	7.9	
MON 88017	41	22	21	14	11	9	13	4	1	5	2	0	0	0	0	143	9.5	
DKC 5143	34	24	21	19	37	13	7	6	6	6	0	0	1	0	0	174	11.6	Check parental = 174
NK CISKO	19	24	15	11	17	12	10	4	1	1	0	0	0	0	0	114	7.6	Average of 4 conventional hybrids = 108
NK Fortius	16	6	20	24	8	9	7	0	1	2	1	1	0	1	0	96	6.4	
PR36D79	22	17	23	12	9	9	11	2	2	1	1	0	0	0	0	109	7.3	
Meridian	40	21	12	11	4	5	12	3	2	3	0	0	0	0	0	113	7.5	
∑=Sum	226	174	146	131	126	75	73	29	24	20	4	1	1	1	1	*1032*	68.8	

Table 4. Syrphid species collected from plots with different hybrids (2009)

Hybrid	*Sphaerophoria scripta*	*Chrystoxum cautum*	*Platycheirus* sp.	*Melanostoma* sp.	*Eupeodes corolae*	*Syrphus ribesii*	*Episyphus alteatus*	*Sphaerophoria menthastri*	Syrphid sp.	*Melangyna umbellatarum*	*Meligramma guttata*	*Dasysyrphus albostriatus*	*Neoascia podagrica*	*Eristalis tenax*	*Syritta pipiens*	*Didea* sp.	*Eristalis arbustorum*	*Metasyrphus latifasciatus*	*Scaeva selenitica*	*Syrphus torvus*	∑=Sum	X=Average	
MON89034 x MON 8017	98	57	14	20	26	20	16	10	9	6	4	2	1	2	2	0	1	0	0	0	288	14.4	Average of 3 GMO hybrids = 281
MON 89034	87	57	16	20	27	10	20	19	10	14	3	1	2	0	0	1	0	0	2	0	289	14.5	
MON 88017	73	50	30	27	18	19	10	14	8	5	4	4	2	0	0	1	0	0	0	1	266	13.3	
DKC 5143	84	75	33	30	17	8	21	15	9	9	2	1	2	0	1	0	0	1	0	0	308	15.4	Check parental = 308
NK CISKO	76	48	27	19	5	9	6	2	9	8	2	2	1	1	0	0	1	0	0	0	216	10.8	Average of 4 conventional hybrids = 282
NK Fortius	90	53	27	19	19	25	13	9	11	4	6	2	1	0	0	0	0	0	0	0	279	14.0	
PR36D79	115	50	19	26	27	17	19	19	17	10	3	2	4	1	1	1	1	0	0	0	332	16.6	
KWS1393	84	67	30	28	21	18	14	15	11	8	3	0	0	0	0	1	0	1	0	0	301	15.0	
∑=Sum	707	457	196	189	160	126	119	103	84	64	27	14	13	4	4	4	3	2	2	1	*2279*	114.0	

Table 5. Synecological analysis of Neuropteran species collected in 2008-2009 on yellow sticky traps in maize agroecosystem

Species	2008			2009		
	Constancy (C)	Dominance (D)	Ecological significance index (W)	Constancy (C)	Dominance (D)	Ecological significance index (W)
Sphaerophoria scripta	17.592 (C_1)	18.674 (D_5)	3.285 (W_3)	36.458 (C_2)	29.458 (D_5)	10.739 (W_5)
Syrphus ribesii	11.805 (C_1)	13.538 (D_5)	1.598 (W_3)	9.490 (C_1)	5.25 (D_4)	0.498 (W_2)
Melanostoma sp.	5.208 (C_1)	7.002 (D_4)	0.364 (W_2)	14.699 (C_1)	7.875 (D_4)	1.157 (W_3)
Eupeodes corolae	11.458 (C_1)	12.511 (D_5)	1.433 (W_3)	10.648 (C_1)	6.666 (D_4)	0.709 (W_2)
Episyrphus balteatus	5.902 (C_1)	6.816 (D_4)	0.402 (W_2)	13.310 (C_1)	9.791 (D_4)	1.303 (W_3)
Chrystoxum cautum	14.236 (C_1)	14.005 (D_5)	1.993 (W_3)	26.157 (C_2)	19.041 (D_5)	4.980 (W_3)
Dasysyphus albostriatus	2.430 (C_1)	2.334 (D_3)	0.056 (W_1)	1.504 (C_1)	0.625 (D_1)	0.009 (W_1)
Eristalis arbustorum	0.115 (C_1)	0.093 (D_1)	0.000 (W_1)	0.347 (C_1)	0.125 (D_1)	0.000 (W_1)
Neoascia podagrica	9.490 (C_1)	11.764 (D_5)	1.116 (W_3)	1.273 (C_1)	0.541 (D_1)	0.007 (W_1)
Eristalis tenax	0.462 (C_1)	0.373 (D_1)	0.002 (W_1)	0.462 (C_1)	0.166 (D_1)	0.001 (W_1)
Chamaesyrphus sp.	1.851 (C_1)	1.867 (D_2)	0.034 (W_1)	-	-	-
Syrphid sp.	7.060 (C_1)	10.737 (D_5)	0.758 (W_2)	8.912 (C_1)	3.5 (D_3)	0.311 (W_2)
Volucella pellucens	0.115 (C_1)	0.093 (D_1)	0.000 (W_1)	-	-	-
Meligramma guttata	0.115 (C_1)	0.093 (D_1)	0.000 (W_1)	2.777 (C_1)	1.125 (D_2)	0.031 (W_1)
Pyrophaena rosarum	0.115 (C_1)	0.093 (D_1)	0.000 (W_1)	-	-	-
Platycheirus sp.	-	-	-	9.027 (C_1)	8.166 (D_4)	0.737 (W_2)
Syritta pipiens	-	-	-	0.694 (C_1)	0.333 (D_1)	0.002 (W_1)
Scaeva selenitica	-	-	-	0.115 (C_1)	0.083 (D_1)	0.000 (W_1)
Sphaerophoria menthastri	-	-	-	7.175 (C_1)	4.291 (D_3)	0.307 (W_2)
Melangyna umbellatarum	-	-	-	4.745 (C_1)	2.666 (D_3)	0.126 (W_2)
Syrphus torvus	-	-	-	0.115 (C_1)	0.041 (D_1)	0.000 (W_1)
Didea sp.	-	-	-	0.462 (C_1)	0.166 (D_1)	0.001 (W_1)
Metasyrphus latifasciatus	-	-	-	0.231 (C_1)	0.083 (D_1)	0.000 (W_1)

In 2009, the average number of Syrphids captured in plots cultivated with GMO hybrids varied between 13.3 and 14.45, with an average per all GMO hybrids of 14.05. Average of Syrphids populations from plots cultivated with GMO hybrids (14.05) was with 1.35 lower than that found in plots cultivated with parental hybrid DKC 5143 (15.4), but with 0.19 lower than average number of Syrphids captured in all cultivated plots (14.24). The average number of Syrphids captured from plots cultivated with conventional hybrids varied between 0.8 and 16.6, with an average per all conventional hybrids of 14.1. The average of Syrphids populations from plots cultivated with conventional hybrids (14.1) was with 0.13 less than average number of Syrphids captured in all cultivated plots (14.24). Negative deviation larger than the overall standard deviation was found in the Syrphids populations collected from plots planted with conventional hybrid NK Cisko) (Figure 1).

A synecological analysis for presentation of the role of each species from this complex was performed. In table 5, species are presented depending on their Constancy (C), Dominance (D) and Ecological significance index (W), in 2008 and 2009.

Among the synthetic indices presented, the ecological significance index (Dzuba) is the most important, as it reflects in the best manner the elements in the biocenoses. The edifying species with the greatest value (W5), were *Sphaerophoria scripta* (10.74 in 2009) but it was accompanying species (W3) in 2008 (3.285%). Accompanying species (W3) in 2008 were *Chrystoxum cautum* (1.993), *Syrphus ribesii* (1.598), *Eupeodes corolae* (1.433), and *Neoascia podagrica* (1.116). In 2009 accompanying species was *Chrystoxum cautum* (4.980), and also *Melanostoma* sp. (1.157), *Episyphus balteatus* (1.303), which increased from accessories species to accompanying species. Accessories species (W2) were in 2008 *Melanostoma* sp. (0.364), *Episyphus balteatus* (0.402), Syrphid sp. (0.758) and in 2009 *Eupeodes corolae* (0.709), *Syrphus ribesi* (0.498), *Syrphid* sp. (0.311), as well as three new registered species *Platycheirus* sp. (0.737), *Sphaerophoria menthastri* (0.307) and *Melangyna umbellatarum* (0.126). Finally other species, collected only in 2008, only in 2009, or in both years could be considered as accidental species (W_1) (less than 0).

CONCLUSIONS

The evolution of a population of each Syrphid species depends on year and on the analysed period.

Among the synthetic indices presented, the ecological significance index (Dzuba) is the most important, as it reflects in the best manner the elements in the biocenoses. In this respect the edifying species with the greatest value (W_5), was *Sphaerophoria scripta* in 2009, but it was accompanying species (W_3), in 2008. Accompanying species (W_3) in 2008 were *Chrystoxum cautum*, *Syrphus ribesii, Eupeodes corolae*, *Neoascia podagrica*. In 2009 accompanying species was *Chrystoxum cautum*, and also *Melanostoma* sp., *Episyphus balteatus,* which increased from accessories species to accompanying species. Accessories species (W_2) were in 2008 *Melanostoma* sp., *Episyphus balteatus*, *Syrphid* sp. and in 2009 *Eupeodes corolae*, *Syrphus ribesii, Syrphid* sp., and three new registered species *Platycheirus* sp., *Sphaerophoria menthastri* and *Melangyna umbellatarum*. Finally other species, collected only in 2008, in 2009, or in both years could be considered as accidental species (W_1).

There were no important differences on the structure and quantity of wildlife (*Syrphidae*) between analysed hybrids, neither in 2008, nor in 2009, regardless if they were genetically modified or not.

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