

1998 Results of Monitoring *Diabrotica virgifera virgifera* LeConte in Romania

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This paper presents the main actions concerning the occurrence and dissemination of the adult *Diabrotica virgifera virgifera* LeConte species, and the results obtained in the third year of the FAO project TCP/RER/6712(A) "Development and Implementation of Containment of the Western Corn Rootworm in Europe". A comparative analysis of the monitoring results in 1997 and 1998 is also included.

Keywords: *Diabrotica virgifera virgifera* LeConte, monitoring, Romania, Csalomon pheromone and Multigard traps, *Zea mays*.

Results of WCR monitoring in Romania (from the first record to 1997 monitoring results) has already been published (Vonica, 1998d). The present work relates to the activity and results WCR monitoring in 1998 in Romania within the framework of the FAO project TCP/RER/6712(A) "Development and Implementation of Containment of the Western Corn Rootworm in Europe". As regards the additional literature, see Vonica and Vilson (1996a; Vonica 1996b, 1997, 1998a, b, c), Vonica et al. (1999), Edwards et al. (1998a, b), Edwards et al. (1999), Berger (1998).

Materials and Methods

Visual inspection of corn plants, especially corn fields in west and southwest part of Romania, began on 25 June and continued until October. Visual inspection of international and internal transportation from countries and counties infested with *Diabrotica* began in July and ended in October.

Monitoring for WCR was conducted using 2,000 Hungarian Csalomon pheromone traps and 1,800 Multigard yellow sticky traps. As in 1997, traps were established in 11 counties. Traps were placed between 5 km and 30 km apart. Two hundred and seven pairs of traps (one pheromone trap and one Multigard trap), placed 5–30 m apart. One hundred and eighty traps were considered flexible traps, in which the number and site location can be different from one year to the next. Twenty-seven pairs of traps were considered permanent trap locations, which were established in 1997. To impede the distribution of WCR adults, traps were organized into filters made up of 3–4 lines of traps located perpendicularly to internal river valleys in Romania, as well as on the left side of the Danube river. The pheromone traps were checked at one-month intervals, whereas the Multigard traps

were checked at two-week intervals. However, Multigard traps were checked daily until the first adult beetle was captured. Technical staff of the Plant protection and quarantine territorial and border net conducted the monitoring of the WCR adults.

Results

In 1998, the distribution of adult WCR expanded in 4 counties that contained a WCR infestation in 1997: Arad, Timis, Caras-Severin and Mehedinți. WCR distribution was minimal in the counties of Bihor (3 adults in Avram Iancu) and Hunedoara (2 adults in Zam and 1 adult in Gurasada) (Fig. 1 and Table 1). In Fig. 1 monitoring counties, installed trap nets and traps with captured WCR adults are shown. In Table 1 trapping counties, dates, number of installed traps and number of WCR adults collected during the trapping period are presented. It is noted that traps increased from 207 in June to 240 in August. The total number of captured adults was 26,440 [21,788 on the pheromone taps and 4,652 on Multigard traps (5:1)]. In 1997, the efficacy report indicated a ratio of 9:1, respectively. Peak capture occurred during August.

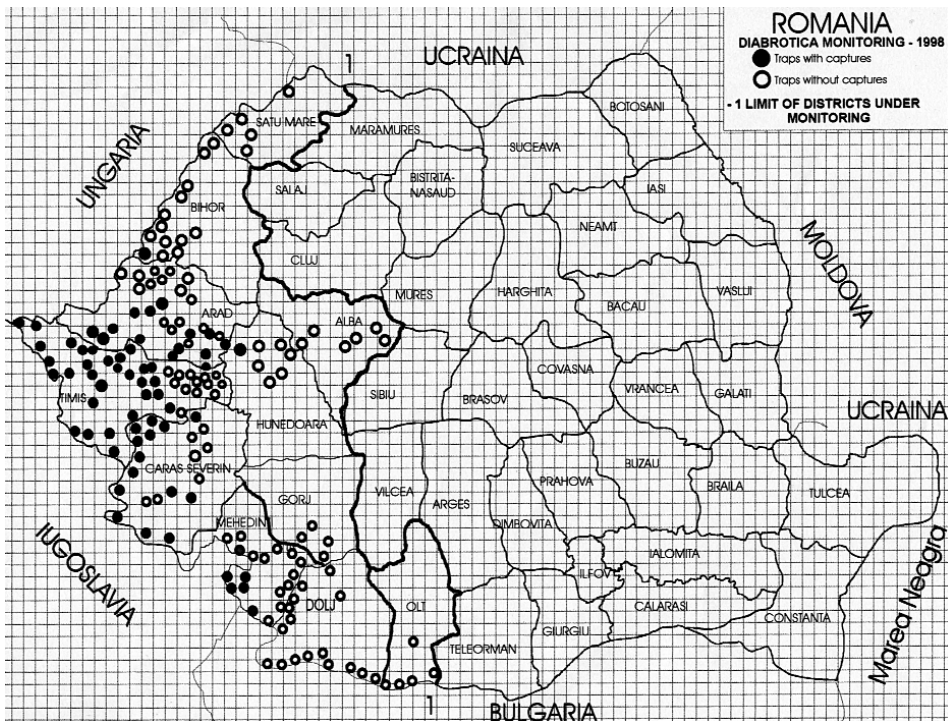


Fig. 1. Results of *D. virgifera virgifera* monitoring in Romania in 1998

- Traps with captures
- Traps without captures

Table 1
Summary of WCR monitoring in Romania in 1998

No.	County	Number of installed traps / Number of captures												Total captured adults by trap type			Total
		25-30 June		July		August		September		F	M	Total	F	M	Total		
		F	M	F	M	F	M	F	M								
1.	ALBA	8/0	8/0	8/0	8/0	8/0	8/0	8/0	8/0	8/0	8/0	0	0	0	0	0	
2.	ARAD	45/2	45/0	46/181	46/100	50/1552	50/911	50/191	50/120	1924	1131	3055	1924	1131	3055	3	
3.	BIHOR	15/0	15/0	15/0	15/3	15/0	15/0	15/0	15/0	0	3	3	0	3	3	3	
4.	CARAS-SEVERIN	20/2	20/0	20/2903	20/938	22/3826	22/896	23/1539	23/438	8268	2272	10540	8268	2272	10540	0	
5.	DOLJ	23/0	23/0	23/0	23/0	23/0	23/0	23/0	23/0	0	0	0	0	0	0	0	
6.	GORJ	4/0	4/0	4/0	4/0	4/0	4/0	4/0	4/0	0	0	0	0	0	0	0	
7.	HUNEDOARA	10/0	10/0	10/2	10/1	20/0	20/0	20/0	20/0	2	1	3	2	1	3	3	
8.	MEHEDINTI	26/0	26/0	28/62	28/11	28/3551	28/118	18/75	18/0	3688	129	3817	3688	129	3817	0	
9.	OLT	5/0	5/0	5/0	5/0	5/0	5/0	5/0	5/0	0	0	0	0	0	0	0	
10.	SATU-MARE	5/0	5/0	5/0	5/0	5/0	5/0	5/0	5/0	0	0	0	0	0	0	0	
11.	TIMIS	46/0	46/0	51/1855	51/323	60/3708	60/579	60/2343	60/214	7906	1116	9022	7906	1116	9022	0	
	TOTAL	207/4	207/0	215/5003	215/1376	240/12637	240/2504	231/4148	231/772	21788	4652	26440	21788	4652	26440	0	

F – Pheromone traps

M – Multigard yellow sticky traps

In Table 2 out of the 161 traps installed in the 4 counties that contained a WCR infestation in 1997, 109 (66.5%) captured adults. The highest percent (85%) was registered in Timis county, and the lowest percent (50%) was noted in Arad county. Average number of captured adults to installed traps was 135.3 in the case of pheromone traps, and 28.8 for Multigard traps. The highest average (359.4) of adults captured by installed pheromone traps was recorded in Caras-Severin county, and the lowest average (38.5) of captured adults was recorded in Arad county. Average number of captured adults to traps with a capture was 199.9 for the pheromone traps and 42.6 for the Multigard traps. The highest average (459.4) of captured adults by traps with a capture was recorded in Caras-Severin county, and the lowest average (76.96) of captured adults was recorded in Arad county.

The number of WCR adults in 1998, as compared to 1997, is presented in Table 3. Pheromone trap catches were only shown as a comparison between the two years. In 1997, 343 total traps were used in Arad, Caras-Severin, Mehedinti and Timis, as compared to 161 total traps in 1998. Thus, 182 (53%) less traps were used in 1998. From the total number of traps installed in the 4 counties, captures were recorded on 200 traps (58.3%) in 1997 and on 109 traps (67.7%) in 1998. The total number of captured adults in the 4 counties was 36,161 in 1997 and 21,786 in 1998. The average number of captured adults by the installed traps in the 4 counties was 105.4 in 1997 and 135.3 in 1998. Similarly, the result



Fig. 2. Results of *D. virgifera virgifera* permanent trap catches in Romania in 1998

- Traps with captures
- Traps without captures

Table 2

WCR monitoring in selected counties in Romania in 1998

No. County	Number traps				Number of captures				Average number of captured adults				First collected adults		
	Installed		With captures		Total		Out of which		By installed trap		By trap with captures		F	M	
	Total	Out of which fixed	F	M	N°	%	F	M	F	M	F	M			
													N°	%	
1. ARAD	50	5	25	50.0	25	50.0	3055	1924	1131	38.5	22.6	76.96	45.2	29VI	13VII
2. CARAS-SEVERIN	23	5	18	78.2	18	78.2	10540	8268	2272	359.4	98.7	459.4	126.2	30VI	2VII
3. MEHEDINTI	28	2	15	53.5	15	53.5	3817	3688	129	131.7	4.6	245.8	8.6	5VII	13VII
4. TIMIS	60	7	51	85.0	51	85.0	9022	7906	1116	131.7	18.6	155.0	21.8	2VII	18VII
TOTAL/AVERAGE	161	19	109	67.7	109	67.7	26434	21786	4648	135.3	28.8	199.9	42.6		

F – Pheromone traps

M – Multigard yellow sticky traps

Table 3

Diabrotica monitoring – comparative results in Romania 1997–1998

No. County	Number of pheromone traps				Total captured adults				Average number of captured adults			
	Installed		With captures		1997		1998		By installed traps		By trap with captures	
	1997	1998	No	%	1997	1998	No	%	1997	1998	1997	1998
1. ARAD	141	50	72	51.0	25	50.0	1751	1924	12.4	38.5	24.3	76.96
2. CARAS-SEVERIN	54	23	42	77.7	18	78.2	21106	8268	390.8	359.4	502.5	459.4
3. MEHEDINTI	24	28	10	41.6	15	53.5	136	3688	5.6	131.7	13.6	245.8
4. TIMIS	124	60	76	61.2	51	85.0	13168	7906	106.2	131.7	173.3	155.0
TOTAL/AVERAGE	343	161	200	58.3	109	67.7	36161	21786	105.4	135.3	180.8	199.9

by trap with captures was 180.8 in 1997 and 199.9 in 1998. The highest total of captured adults was recorded in Caras-Severin county; 21,106 in 1997 and 8,268 in 1998, with an average of 390.8 beetles/installed trap in 1997 and 359.4 beetles/installed trap in 1998. In 1997, an average of 502.5 beetles/trap with captures only was recorded. In 1998, an average of 459.4 beetles/trap with captures only was recorded. Beetle numbers have increased in Timis, Mehedinti and Arad counties where the highest increase occurred in Mehedinti county. Results indicate beetle numbers from 5.6 in 1997 to 131.7 in 1998 (installed traps) and from 13.6 in 1997 to 245.8 in 1998 (traps with captures).

The net of the 27 permanent traps is shown in *Fig. 2*. The number of adults captured in 1997 and 1998 by the permanent traps are shown in *Table 4*. It is obvious that a large number of beetles were captures on the pheromone traps in 1997 and 1998. Furthermore, an increase in beetle numbers was noted from 1997 to 1998. During 1998, pheromone traps captured more beetles than did the Multigard traps, as was in the case in *Table 1*.

Table 4The network of fixed traps for *Diabrotica* in Romania in 1997–1998

No.	District	Location	Number of captured adults			
			1997		1998	
			F	F	M	Total
1.	ALBA	1. VINTUL DE JOS	0	0	0	0
2.		2. SEBES	0	0	0	0
3.	ARAD	1. NADLAC VAMA	486	371	63	434
4.		2. FANTANELE - ARAD	17	3	7	10
5.		3. CURTICI	5	3	2	5
6.		4. GHIOROC	0	0	0	0
7.		5. CHISINEU CRIS	0	0	0	0
8.	BIHOR	1. SALONTA VAMA	0	0	0	0
9.		2. AVRAM IANCU	0	0	3	3
10.	CARAS- SEVERIN	1. IAM	783	786	157	943
11.		2. NAIDAS VAMA	1681	801	155	956
12.		3. CAMPPIA	948	1311	549	1860
13.		4. MOLDOVA NOUA	568	1371	554	1925
14.		5. BERZEASCA	420	1462	397	1859
15.	DOLJ	1. CETATE	0	0	0	0
16.		2. CALAFAT	0	0	0	0
17.	HUNEDOARA	1. SOIMUS	0	0	0	0
18.		2. ZAM	0	2	0	2
19.	MEHEDINTI	1. OSTROVUL CORBULUI	9	28	0	28
20.		2. GARLA MARE	3	94	0	94
21.	TIMIS	1. CENAD	7	161	32	193
22.		2. SANICOLAU MARE	39	243	22	265
23.		3. JIMBOLIA	55	736	380	1116
24.		4. STAMORA MORAVITA	170	325	126	451
25.		5. CRUCENI LUGOJ 1	232	205	71	276
26.		6. DETA PUIU	538	400	44	444
27.		7. TIMISOARA	39	20	5	25

F = pheromone traps

M = multigard yellow sticky traps

Discussion

The initial discovery of WCR beetles in Romania occurred in 1996. Since that time, the distribution of this pest has expanded throughout the Romanian territory. In 1997, the WCR beetles infested the counties of Caras-Severin, Timis, Mehedinti and Arad. In 1998, the dissemination area increased to include Bihor county (with approximately 40 km to the north), Hunedoara county (with approximately 25 km to the east on Mures river valley) as well as in Mehedinti county (with 30 km to the east on the left side of Danube river). In 1998 the WCR adults randomly infested approximately 12,000 km², of which 2,000 km² was maize. Also in 1998, an increase in the average number of captured adults was noted, as compared to 1997. The dissemination of WCR adults was not impeded by the traps filters or even natural obstacles (mountain ranges, etc.).

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