ANALYSIS OF CORRELATIONS BETWEEN WCR ADULTS RECORDED AT DIFFERENT ALTITUDES AND CLIMATE FACTORS

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Abstract: *Studies covered the topic of this paper continue work started in 2008 in western part of Romania, actually refers to comparative studies between different localities. This approach is original and is the subject of research project. During 2010, as well as during previous year, the monitoring of Diabrotica virgifera virgifera (WCR) was done continuing the implementation of a usual protocol. For establish of adults number were used Hungarian pheromone traps (Csalomon ® Diabrotica v.v. pane type /2pieces). The traps were installed from June to September, in three repetitions (Trap1, Trap2, Trap3/place). The frequency of Diabrotica virgifera virgifera Le Conte adults was based on readings directly in fields, in 19 localities from 8 counties (Timiş, Arad, Hunedoara, Bihor, Cluj, Satu Mare, Sălaj, Caraş Severin, Alba, Mureş) situated in western part of Romania. For installing of traps we used the common methods and for finding the location the GPS was used. The researches were made in conventionally maize, untreated against target pest. The movement to experimental fields was made used the car from Entomology and Zoology Agricultural of BUASVMT. The air temperature, soil temperature, relative humidity and moisture constituted ecological factors from basis of correlations between adults' number and climatic conditions from different altitudes. The data were taken from Weather Stations associated each county studied. From analyzing the data obtained (averages of adults captures) in accordance with climatic factors apparent significance differences. After analyzing correlations with climatic factors reveals positive correlations compared with air temperature (r=0,324, r=0,005) soil temperature (r=0,373, p=0,015) and negative correlations compared with humidity* (r=0,279, p=0,015). *In conclusion, registered values of adults captured increase when humidity is low and high temperature or decrease if the humidity increases and temperature decreases.We acknowledge the Ministery Education financed this work within the framework of PN-II-ID-PCE-2007-1/RO project and Weather Stations from each county taken in study.*

Key words**:** *WCR, adult, correlation, captures, humidity, temperature, maize.*

INTRODUCTION

Western corn rootworm *(Diabrotica virgifera virgifera Le Conte)* is a very serious pest in maize fields from Europe. The WCR has been introduced into Europe on at least 3 separate occasions (ULRICH et al., 2008). In 1996 the *WCR* adults was detected in Romania, too for the first time (VONICA, 1998). From this first point of occurrence the invasive species has spread to other areas so today occupy much of the corn fields (CEAN, 2005, GROZEA et al, 2010). In 2000 the first areas with larval attack in a maize field of the Jimbolia zone was found. In this year the attack is stronger than before (GROZEA et al. 2006, 2007, 2009; PALAGESIU et al., 2001).

The *Diabrotica* populations have increased strongly year by year up to 2001 (Hancu et al, 2003). In monitoring activities the best results obtained used sex pheromone especially Hungarian pheromone traps (type of Csalomon ® Diabrotica v.v. tip panou/2). The traps were installed from June to September (GROZEA et al, 2010). The frequency of *Diabrotica virgifera virgifera* Le Conte adults was manifold, based on location and ecological conditions (CRISAN

et al, 2009). The pest has spread to all direction. So, this is explanation of the frequency of adults in all location with installed traps. The highest level of captures were registered in Arad and Timis counties (over 14000 beetles/traps1, 2, 3/locality) (GROZEA et al, 2010).

MATERIAL AND METHODS

Organization of practical activities

In organizing the practical work carried out during June to September 2010 were established the optimal places from placement of traps. This choice was based on movement in different directions from a low altitude (115 m) to a higher altitude (557 m) which allowed the growth and development of corn plants. The altitudes correspond to 18 localities as follow: Timişoara (110 m), Gătaia (115 m), Şimand (115 m), Covăsânț (134 m), Chelmac (140 m), Şoimi (145 m), Blaja (150 m) Gura Văii (164 m) (foto 5), Gurasada (183 m), Nuşfalău (214 m), Vârfurile (228 m), Prisaca (270 m), Reşița (305 m), Negreni (388 m), Teregova (401 m), Budureasa (392 m), Zlatna (435 m) Vălişoara (447 m) and Domaşnea (557 m).

After studying the possibilities of location we installed 3 sex pheromone traps type Csalomon (made in Humgary). The distance between the two traps was 100 m, where lots of corn was high enough and where they were smaller we set traps at a distance of 50 m.

Move to the experimental variants from corn fields was facilitated by the car-laboratory of the Entomology and Zoology discipline. Setting altitudes was carried out with GPS apparatus. Reading traps (T1, T2, T3) was daily and the data recording was done on site in special register. Pheromone traps were installed from June to September. Their readings were made daily and the change of panel and pheromones in two weeks. Daily readings were centralized in computer for statistical interpretation.

Identification of ecological factors and uninfested and infested areas by the pest in our country

Air temperature, soil temperature, relative humidity and rainfalls were the environmental factors that formed the basis of correlations between the WCR adults' number and ecological factors at different altitudes.

In this climate data were taken from Weather Station covering the checkpoints that we have installed traps to catch adults of *Diabrotica virgifera v*; data provides by the Regional Meteorological Centre Archive Banat-Crisana for follow stations: Timişoara, Şiria, Gurahonț, Reşița si Caransebeş, Stei and Regional Meteorological Centre Archive Transilvania for stations: Sălaj, Deva, Negreni and Satu Mare. Data were recorded daily and were centralized and statistically interpreted.

RESULTS AND DISCUSSIONS

Analyzing of data in accordance with climate factors approached

At level of localities (altitudes) taken in study, on June-September period observed significant differences between average values of adults captured on traps and ecological factors approached (table 1, fig.1).

Table 1

Descriptive analysis of data recorded on localities, 2010

Locality	N	Minimum	Maximum	Mean	Standard Deviation
Timisoara 2010	91	,00	101,00	24,0626	28,98939
Gataia 2010	91	,00	109,00	25,4835	30,35907
Simand 2010	91	,00	197,00	53,5788	58,02334
Covasant 2010	91	,00	103,00	25,1576	32,60499
Chelmac 2010	91	,00	99,00	20,3438	23,65601
Soimi 2010	91	,00	87,33	17,1132	20,91012

Locality	N	Minimum	Maximum	Mean	Standard Deviation
Blaja 2010	91	,00	98,33	28,7873	29,65500
Gura Vaii 2010	91	,00	37,67	8,4581	9,51687
Gurasada 2010	91	,00	54,00	16,7069	14,74208
Nusfalau 2010	91	,00	31,33	9,7656	8,64566
Varfurile 2010	91	,00	39,67	6,5200	8,99153
Prisaca 2010	91	,00	55,33	13,1685	14,42088
Resita 2010	91	,00	36,00	10,2338	10,52781
Negreni 2010	91	,00	21,67	7,1831	7,38151
Teregova 2010	91	,00	32,33	7,1280	8,63412
Budureasa 2010	91	,00	26,00	5,2341	7,08566
Valisoara 2010	91	,00	17,00	4,1464	4,98641
Domasnea 2010	91	,00	22,33	4,3114	6,14333
Valid N (listwise)	91				

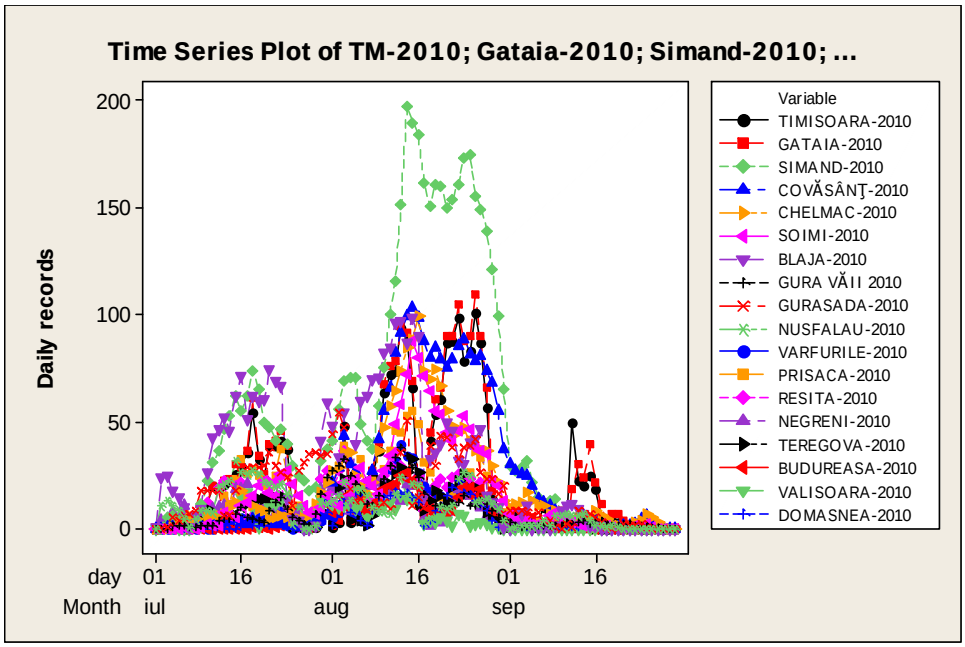

Figure 1. Time series associated with daily records in localities under study, 2010

Analysis of correlations with environmental factors

After analyzing correlations with climatic factors reveals positive correlations compared with air temperature (r=0,324, r=0,005) soil temperature (r=0,373, p=0,015) and negative correlations compared with humidity (r=0,279, p=0,015).

Regression analysis based on environmental factors lead to relation: Polynomial Regression Analysis.

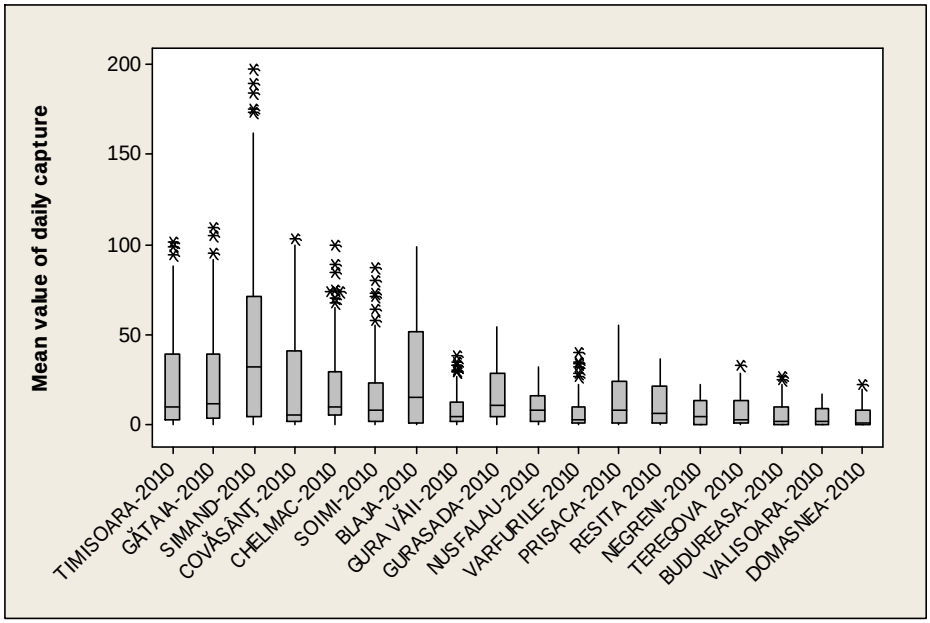

Figure 2. Box-Plot charts appropriates registrations in 2010

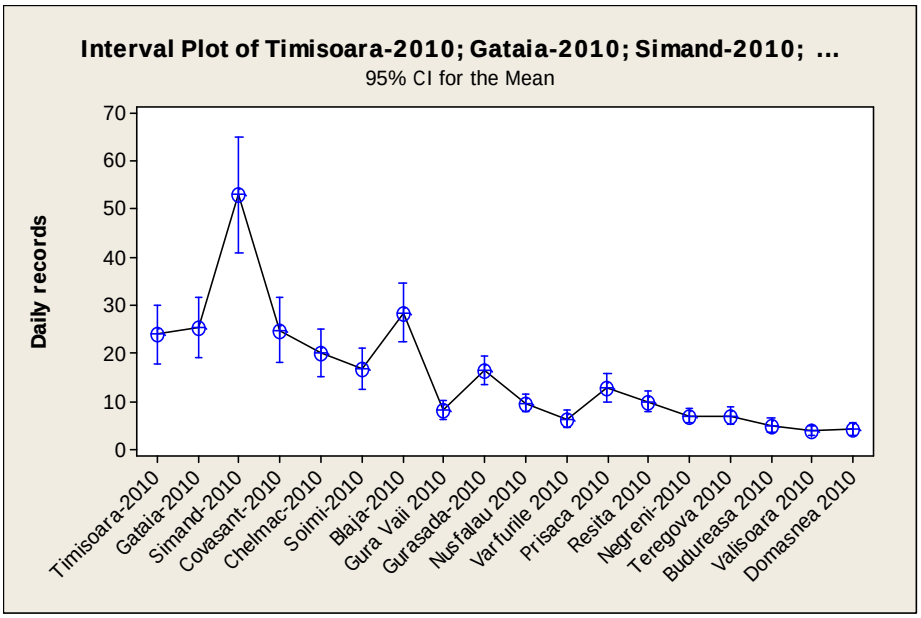

Figure 3. Averages and confidence intervals for mean values recorded for 2010

Considering those factors as temperature and humidity notice that registered values of adults captured increase when humidity is low and high temperature or decrease if the humidity increases and temperature decreases (figures 4, 5, 6).

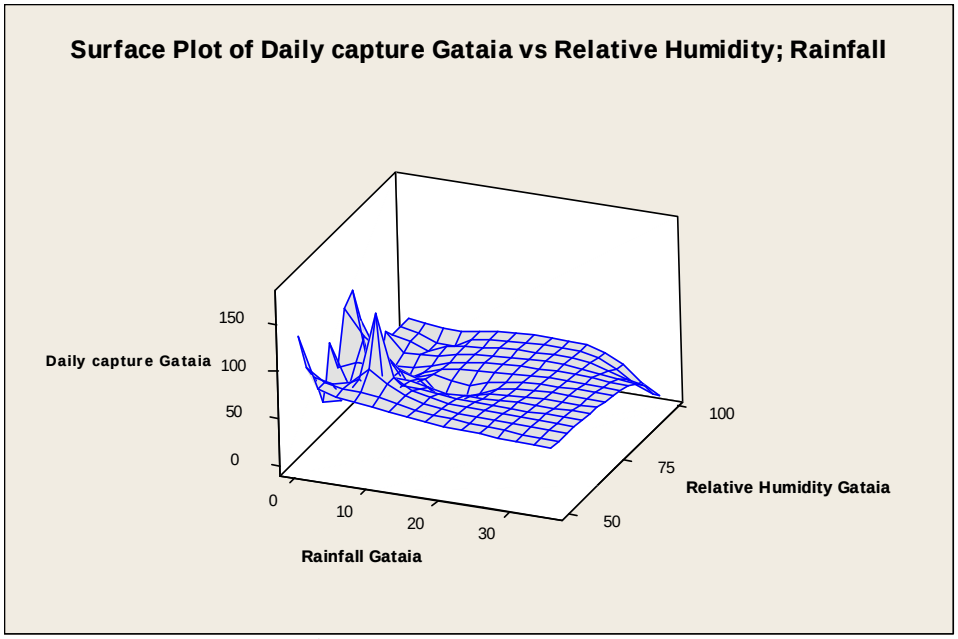

Figure 4. Correlative evolution of WCR adults captures (registered in Gataia) in accordance to relative humidity and rainfall

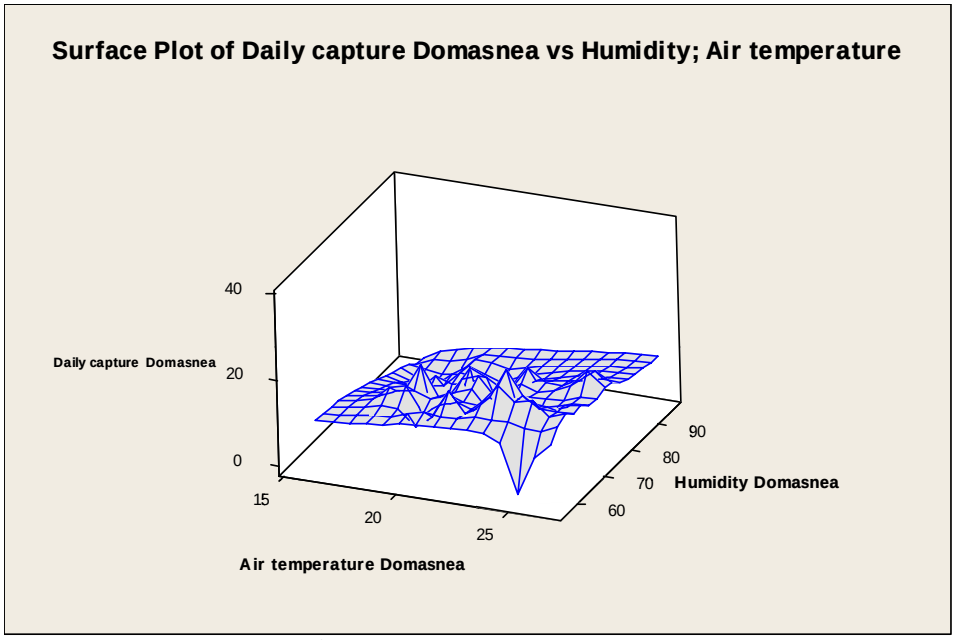

Figure 5. Correlative evolution of WCR adults captures (registered in Domasnea) in accordance to air temperature and humidity

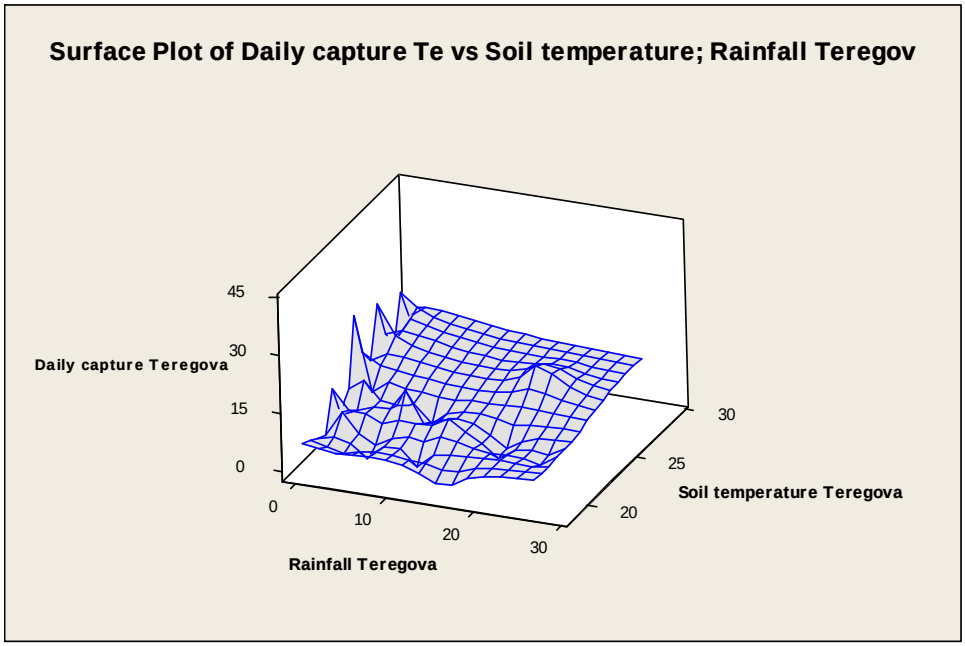

Figure 6. Correlative evolution of WCR adults captures (registered in Teregova) in accordance to air temperature and rainfall

Following the correlative evolution of number of individuals registered in relation with climate factors we observe that as humidity and rainfall volume increases the number of adults' decreases.

CONCLUSIONS

After analyzing correlations with climatic factors reveals positive correlations compared with air temperature (r=0,324, r=0,005) soil temperature (r=0,373, p=0,015) and negative correlations compared with humidity (r=0,279, p=0,015).

Registered values of adults captured increase when humidity is low and high temperature or decrease if the humidity increases and temperature decreases.

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