RESEARCH ON ENTOMOFAUNA OF THE RUNNER BEAN (*PHASEOLUS COCCINEUS* L.) CROP CULTIVATED IN INTERCROPPING SYSTEM IN FIELD

CERCETĂRI CU PRIVIRE LA ENTOMOFAUNA DIN CULTURA DE FASOLE MARE (*PHASEOLUS COCCINEUS* L.) CULTIVATĂ ÎN SISTEM INTERCROPPING ÎN CÂMP

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Abstract. *This paper presents a study on entomofauna from runner bean crop (Phaseolus coccineus L.) cultivated in intercropping system with maize, sunflowers and Jerusalem artichokes and runner bean pure culture and pure culture of sugar maize, at "V . Adamachi" farm, Univesity of Agricultural Sciences and Veterinary Medicine Iaşi. The purpose of this study is to determine if the intercropping system is good for runner bean culture, regarding entomofauna, as compared with a pure crop, and entomofauna from a sugar maize crop. The collection was performed using the Barber insect trap. The results revealed a great diversity of fauna, useful and harmful species belonging to the Araneae, Coleoptera, Diptera, Lepidoptera, Hymenoptera, Isopoda, Orthoptera, Pulmonata and Homoptera orders. The frequency of these species varied depending on crop species and variants of intercropping.*
Key words**:** *Barber traps, sugar maize, sunflower*

Rezumat. *Lucrarea prezintă un studiu asupra entomofaunei din cultura de fasole mare (Phaseolus coccineus L.) realizată în sistem intercropping cu porumb, floarea soarelui şi topinambur, şi în cultura pură de fasole mare şi cultura pură de porumb zaharat, în condiţiile de la Ferma "V. Adamachi" a USAMV Iaşi. Scopul acestei lucrări este de a stabili dacă sistemul de culturi intercalate este benefic pentru cultura de fasole mare, în ceea ce priveşte entomofauna, în comparaţie cu o cultură pură, şi entomofauna dintr-o cultură de porumb zaharat. Colectarea insectelor a fost realizată folosind capcane de tip Barber. Rezultatele au pus în evidenţă o mare diversitate de specii de faună dăunătoare şi faună utilă din ordinele Araneae, Coleoptera, Diptera, Lepidoptera, Hymenoptera, Isopoda, Orthoptera, Pulmonata şi Homoptera. Frecvenţa acestor specii a variat în funcţie de specia cultivată şi de variantele de intercropping.*
Cuvinte cheie**:** *capcane Barber, floarea soarelui, porumb zaharat*

INTRODUCTION

Runner bean (*Phaseolus coccineus* L.) is a worthwhile species through a series of resistance genes in some pests such as plant fly (*Delia platura*) (Popa, 2010). However, present are also pests in unfavorable years which may

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completely compromise culture. Among the most commonly pests, include: bean weevil (*Acanthoscelides obtectus* Say), black bean aphid (*Aphis fabae* Scop.), gray slug (*Deroceras Agreste* L.), red spider mite (*Tetranychus urticae* Koch.) etc. (Popa, 2010; Tălmaciu, 2003). In our country, runner bean was studied in pure culture system, currently pursuing research on this species in intercropping system (Hamburdă et al., 2013; Hamburdă et al., 2014; Munteanu, 1985, Munteanu et al., 2013; Popa, 2010). One of the advantages of intercropping is to reduce insect populations due to the diversity of cultures and attracting a large number of insects especially useful one when included in the culture are already flowering plants (Kass, 1978; Koul and Cuperus, 2007; Southwood and Way, 1970; Vandermeer, 1989). Therefore, this knowledge led us to initiate a study to determine if the intercopping system is good for growing runner bean crop in comparison with a pure culture, regarding the present entomofauna and its structure, and entomofauna from a sugar maize crop**.**

MATERIAL AND METHOD

In accordance with the purpose and objectives of the research, an experiment was organized in 2014 in the experimental field of Vegetable growing department within the "V. Adamachi" farm of U.A.S.V.M. Iasi. The experimental device was made of randomized blocks with three repetitions type. Experimental factor studied was present entomofauna in following crops, which represents also proposed variants to study: V1 = pure culture of runner bean, V2 = pure culture of sugar maize (*Zea mays* L. var. *Saccharata*), V3 = runner bean in intercopping system with common maize (*Zea mays* L.), V4 = runner bean in intercopping system with sunflower (*Helianthus annuus* L.) and V5 =runner bean in intercopping system with Jerusalem artichoke (*Helianthus tuberosus* L.). The study of these factors was carried out under field conditions. Each plot had an area of 6 m^2, consisting of two rows located at a distance of 100 cm, and between runner bean plants, was ensured a distance of 40 cm. For pure culture the support system consisted in a trellis support formed of reinforced concrete pillars and a steel wire about 2 cm on the top thereof. The establishment of runner bean crop was conducted between 1.05 and 30.05. Sowing common maize, sugar maize and sunflowers, planting Jerusalem artichoke were made about two weeks before sowing runner bean.

Establishment of runner bean crop was done by direct seeding, three seeds of runner bean / nest and two seeds of common maize, sugar maize and sunflower/nest. At the time of emergence has been left in each nest, two runner bean plants and one plant of maize, sugar maize and sunflower. In the case of Jerusalem artichokes, two tubers /nest were planted, and, in emergence time, only two stems / plant were allowed.

To collect and determine entomofauna from this experimental field, Barber traps were used and were installed on 07/01/2014. Two such traps for each variant were placed. Approximately every two weeks samples were collected respectively in data of 07/14/2014, 01/08/2014, 27/08/2014. The main research method used was observation. Determination of species and their systematic classification was carried out in the Laboratory of Entomology of UASVM, according to the specialized literature (Gaetan du Chatenet, 1990; Panin, 1951; Panin, 1952; Reitter, 1908; Rogojanu and Perju, 1979).

RESULTS AND DISCUSSIONS

The data were processed and presented comparatively for each variant.

Entomofauna collected from the runner bean pure culture highlights insects belonging to nine orders: *Araneae, Coleoptera, Diptera, Hymenoptera, Homoptera, Isopoda, Lepidoptera, Orthoptera* and *Pulmonata.* The highest number of insects , 118, was recorded in the order *Diptera* (tab.1).

Table 1

Results obtained in pure culture of runner bean (V_1)

Orders	14.07.2014	01.08.2014	27.08.2014	Total
Araneae	5	-	1	6
Coleoptera	2	3	1	6
Diptera	56	51	11	118
Hymenoptera	22	17	23	62
Homoptera	-	3	-	3
Isopoda	2	1	-	3
Lepidoptera	1	3	6	10
Orthoptera	2	-	-	2
Pulmonata	2	1	-	3

Entomofauna collected from sugar maize crop belongs to orders: *Araneae, Coleoptera, Diptera, Hymenoptera, Lepidoptera* and *Orthoptera* and the highest number of insects, 58, recorded at the *Hymenoptera* order (tab. 2).

Table 2

Results obtained in pure culture of sugar maize (V_2)

Orders	14.07.2014	01.08.2014	27.08.2014	Total
Araneae	-	2	-	2
Coleoptera	1	2	-	3
Diptera	-	12	2	14
Hymenoptera	15	25	18	58
Homoptera	-	-	-	-
Isopoda	-	-	-	-
Lepidoptera	1	5	-	6
Orthoptera	-	-	1	1
Pulmonata	-	-	-	-

Entomofauna collected from runner bean in intercropping system with common maize belongs to the following orders: *Araneae, Coleoptera, Diptera, Hymenoptera, Lepidoptera and Orthoptera,* and the highest number of insects, 77, recorded at the *Diptera* order (tab. 3)

Table 3

Results obtained in runner bean in intercropping system with common maize (V_3)

Orders	14.07.2014	01.08.2014	27.08.2014	Total
Araneae	1	-	-	1
Coleoptera	2	-	3	3
Diptera	10	21	46	77
Hymenoptera	7	13	-	20
Homoptera	-	-	-	-
Isopoda	-	-	-	-
Lepidoptera	2	3	4	9
Orthoptera	-	3	9	12
Pulmonata	-	-	-	-

Entomofauna collected from runner bean in intercropping system with sunflower belongs to the following orders*: Araneae, Coleoptera, Diptera, Hymenoptera, Isopoda* and *Lepidoptera*. The highest number of insects, 144, was recorded in the *Diptera* order (tab. 4).

Table 4

Results obtained in runner bean in intercropping system with sunflower (V_4)

Orders	14.07.2014	01.08.2014	27.08.2014	Total
Araneae	5	-	-	5
Coleoptera	3	6	-	9
Diptera	9	48	57	114
Hymenoptera	13	14	9	36
Homoptera	-	-	-	-
Isopoda	-	6	1	7
Lepidoptera	-	2	5	7
Orthoptera	-	-	7	7
Pulmonata	-	-	-	-

Entomofauna collected from runner bean in intercropping system with Jerusalem artichoke belongs to orders: *Araneae, Coleoptera, Diptera, Hymenoptera, Homoptera, Isopoda, Lepidoptera* and *Isopoda*, and the highest number of insects, 41, was recorded in the *Diptera* order (tab. 5).

Table 5

Results obtained in runner bean intercropping system with Jerusalem artichoke (V_5)

Orders	14.07.2014	01.08.2014	27.08.2014	Total
Araneae	1	-	1	2
Coleoptera	-	2	-	2
Diptera	7	25	9	41
Hymenoptera	20	7	7	34
Homoptera	2	-	-	2
Isopoda	13	-	-	13
Lepidoptera	-	-	10	10
Orthoptera	1	-	28	29
Pulmonata	-	-	-	-

We determined the following species belonging to the *Coleoptera* order, mostly harmful species (tab. 6).

Table 6

Species belonging to the *Coleoptera* order found in collected samples

Species scientific name	Variant					Total insects
	V1	V2	V3	V4	V5	
Cantharis fusca	1	1	-	-	-	2
Cicindela germanica	1	-	-	-	-	1
Coccinella septempunctata	1	-	-	-	-	1
Coccinella 14 punctata	1	-	-	-	-	1
Oxythyrea funestra	-	1	-	-	-	1
Pseudophonus griseus	-	1	-	5	-	6
Pseudophonus rufipes	1	-	3	4	1	9
Silpha carinata	1	-	-	-	-	1
Staphylinus caesareus	-	-	-	-	1	1

CONCLUSIONS

1. Following collection performed the highest number of insects, 364, recorded in the *Diptera* order.
2. The most diverse entomofauna recorded in pure culture of runner bean, belonging to a number of nine orders.
3. Stage of crop growth and development is directly proportional to entomofauna collected, with the number of insects belonging to each order.
4. Intercropping system is beneficially for the cultivation of runner bean.

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