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EVALUTION OF THE ECONOMIC IMPORTANCE OF TERRESTRIAL GASTROPOD SPECIES USING SOME ECOLOGICAL PARAMETERS IN DAKAHLIA GOVERNORATE

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ABSTRACT

Field studies were conducted in seven districts representing Dakahlia Governorate, during 2003 , 2004 seasons to determine the economic importance value of land snail and slug species infesting major crops using some ecological parameters.

Results revealed that *Eobania vermiculata* Muller achieved the highest economic importance value species (48.761), whereas *Monacha cartusiana* Muller ranked the second with value of (46.852), followed by *Limax flavus* with (45.974), *Helix aperta* Born. (40.887), *Succinea putris* L. (21.357), *Succinea oblonga* Draparnaud (20.032), *Cepaea hortensis* Muller (16.596), *Deroceras reticulatum* Muller (16.9), *Deroceras laeve* Muller (14.231), *Lehmannia marginata* Muller (10.055), *Cochilcella acuta* Muller (9.409) and *Oxychilus alliarius* Muller (5.722) the species *Ruminna decollata* L. showed the least economic importance value (3.224). An importance value of any land snail and slug species differed according to plant species and time of the year (season).

Keywords: Terrestrial Gastropod, Districts, Dakahlia, Relative Population density.

INTRODUCTION

Terrestrial gastropods have increased greatly in economic importance at Dakahlia Governorate. Land snails are becoming serious pests in north Egypt. The injured plants may intensely recompile the damaged parts and the yield of crops seems not to be affected, but at least the quality was reduced so that the vegetable crops got poorer marketing ratings and was reduced in value (El-Okda, 1980).

Many authors estimated population density of land snail species on their infested host plants in most Governorates of Egypt (Hegab *et al.* 1999, Al-Akra, 2001 and Daoud 2003). No one determined importance value of these species in their Governorate, except Abd El-Aal (2001) on five land snail species in Sharkia Governorate.

The author was found 13 species of terrestrial gastropods (9 snails and 4 slugs) distributed at Dakahlia Governorate during 2000 /2001 seasons, (Mortada 2002). It can't determined which species have more existence with importance value in relation to evidence economic injury scientifically in this time.

Therefore, the objective of this work is to determine the importance value of land snail and slug species infesting major crops in Dakahlia Governorate using certain ecological parameters.

MATERIAL AND METHODS

During the activity period of land snail and slug species, samples were taken from seven districts representative Dakahlia Governorate. These districts were El-Mansoura, El-Manzala, Aga, Meniet El-Nasr, Sherbien, Meet-Salseel and Meet-Ghamr. Five localities (villages) were chosen of each district. Ten samples of 50 × 50 cm² were chosen randomly from all crops. Then, total of 350 samples were collected from Dakahlia Governorate. Samples were conducted according to Staikou *et al* (1990) in field, vegetable crops and perennial ornamental plants and according to Awad, (1994) in fruit and ornamental trees with simple modifications. Importance value of the identified snail and slugs were calculated according to Norton (1978) as follows:

$$\text{Relative frequency} = \frac{\text{Absolute frequency of species}}{\text{Sum of frequency of all species}} \times 100$$

$$\text{Relative density} = \frac{\text{No. of individuals of a species in sample}}{\text{Total no. of individuals in a sample}} \times 100$$

$$\text{Relative biomass} = \frac{\text{Absolute biomass of a species}}{\text{Sum biomass of all species}} \times 100$$

$$\text{Importance value} = \text{Relative frequency} + \text{Relative density} + \text{Relative biomass}$$

Norton's methods were applied in the field of plant nematology. It is necessary to mention here that to determine relative importance of many pest species with the same habits and belonging to same taxonomic group, it may be useful to combine relative frequency of occurrence, relative population density and relative biomass to gain the importance value of this species.

RESULTS AND DISCUSSION

Data in Table (1) and Fig.(1 A) showed that relative mean of population density of land snail and slug species were 20.188, 11.0, 3.113, 6.4,11.1,10.2, 8.7, 8.4, 5.087, 3.4, 7.412, 3.0, 2.0 % for *M. cartusiana, E. vermiculata, C. hortensis, L. flavus, S. oblonga, S. putris, D. reticulatum, H. aperta, D. laeve, L. marginata, C. acuta, O. alliarius* and *R. decollata*, respectively in the seven districts of Dakahlia Governorate during 2003 – 2004 seasons.

Four species only from all terrestrial gastropod species in Dakahkia Governorate representative 52.488 % from population density. These species were *M. cartusiana* (20.188), *S. oblonga* (11.1), *E. vermiculata* (11.0) and *S. putris* (10.2) % respectively, while *C. hortensis* (3.113), *L. marginata* (3.4), *O. alliarius* (3.0) and *R. decollata* snail was the lowest one (2.0) %.

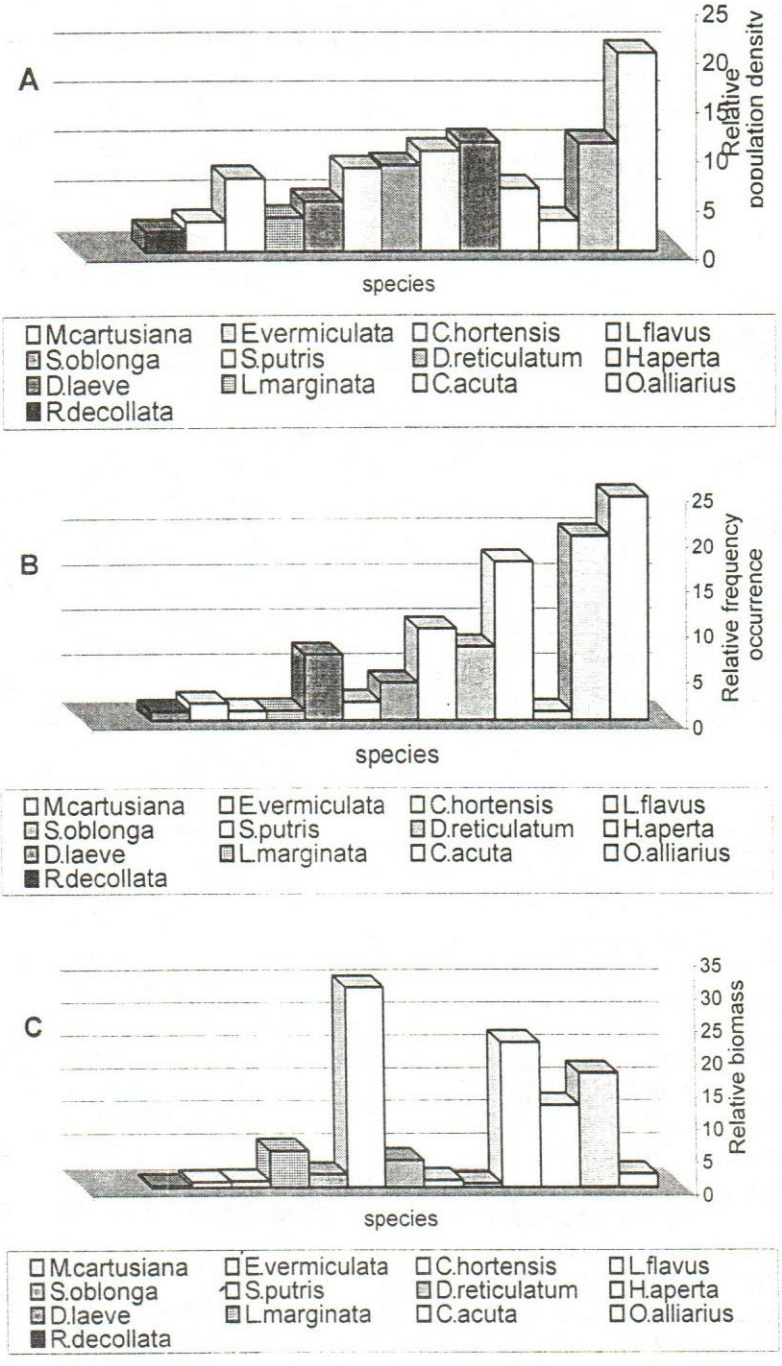

Fig. (1): Relative population density A, Relative frequency of occurrence B and Relative biomass C.

Table (1): Relative population density of terrestrial gastropod species in Dakahlia Governorate during 2003 – 2004 seasons.

Districts / Species	El- Mansoura	El-Manzala	Aga	Meniet El-Nasr	Sherbien	Meet Salseel	Meet-Ghamr	Mean of relative population density
M.cartusiana	38.1	23	26.08	10.85	10	19.2	14.086	20.188
E.vermiculata	30.4	9.7	7.5	0	14.2	9.4	5.8	11.000
C. hortensis	13.7	0	0	0	8.091	0	0	3.113
L. flavus	23.2	13.1	0	0	8.5	0	0	6.400
S. oblonga	16.1	6.4	8.1	13.2	18.3	6.2	9.4	11.100
S. putris	14.3	11.1	7.2	3.2	15.1	11.5	9.0	10.200
D. reticulatum	18.1	11.0	1.2	9.0	12.4	9.2	0	8.700
H. aperta	38.8	0	0	0	20.0	0	0	8.400
D.laeve	11.3	8.20	3.1	2.09	8.019	2.90	0	5.087
L. marginata	14.8	0	0	0	9.0	0	0	3.400
C.acuta	13.4	9.04	0	0	15.4	6.0	8.044	7.412
O.alliarius	8.5	0	6.5	0	6.0	0	0	3.000
R. decollata	8.5	0	0	0	5.5	0	0	2.000

Regarding the relative frequency of occurrence of terrestrial gastropod species in Dakahlia Governorate, it is clear that *M. cartusiana* (24.637) was the most relative frequently species followed by *E. vermiculata* (20.360) followed by *L. flavus* (17.50) and *S. putris* (10.078) %. On the other hand, four species were *O.alliarius* (1.888) followed descending by *L. marginata* slug (1.09), *C. acuta* (1.08) and *R. decollata* (1.01). Also, four species only representive 72.575 % from relative frequency of occurrence according to above mentioned criteria in Table (2) and fig.(1 B).

Results in Table (3) and Fig. (1 C) indicated that the relative biomass % of terrestrial gastropod species in Dakahlia Governorate were 30.487, 22.074, 17.401, 12.483, 5.565, 4.110, 2.027, 1.944, 1.079, 0.917, 0.865, 0.834 and 0.214 % for *H. aperta* , *L. flavus*, *E. vermiculata*, *C. hortensis*, *L. marginata*, *D. reticulatum*, *M. cartusiana*, *D. laeve*, *S. putris*, *C. acuta* , *S. oblonga*, *O.alliarius* and *R. decollata*, respectively.

Relative population density, relative frequency of occurrence and biomass can be combined together in a one equation to give importance value according to Norton (1978). Table (4) and Fig. (2) showed that terrestrial gastropod species can be arranged according to their importance value at Dakahlia Governorate as follows *E. vermiculata* snails the first important species (48.761) followed by *M. cartusiana* snails (46.852), *L. flavus* slugs (45.974), *H. aperta* snails (40.887), *S. putris* snails (21.357), *S. oblonga* snails (20.032), *C. hortensis* snails (16.596), *D. reticulatum* slugs (16.9), *D. laeve* slugs (14.231), *L. marginata* slugs (10.055), *C. acuta* snails

(9.409), *O. alliarius* snails (5.722) and *R. decollata* snails (3.224) % were the lowest importance value species.

Table (2): Relative frequency of occurrence of terrestrial gastropod species in Dakahlia Governorate during 2003 – 2004 seasons.

Districts / Species	El- Mansoura	El-Manzala	Aga	Meniet El-Nasr	Sherbien	Meet Salseel	Meet-Ghamr	Mean of frequency of occurrence
M.cartusiana	33.27	27.3	31.11	19.3	16.98	23.0	21.5	24.637
E.vermiculata	31.21	23.11	20.41	0	27.37	22.11	18.31	20.360
C. hortensis	4.64	0	0	0	2.36	0	0	1.000
L. flavus	71.2	36.3	0	0	15.0	0	0	17.500
S. oblonga	12.11	3.9	3.19	10.209	14.14	6.0	6.92	8.067
S. putris	13.3	12.4	5.55	4.006	16.09	11.2	8.0	10.078
D. reticulatum	12.4	4.3	1.53	1.0	5.1	4.3	0	4.090
H. aperta	11.0	0	0	0	3.20	0	0	2.000
D.laeve	14.2	9.1	2.0	7.3	11.1	6.7	0	7.200
L. marginata	5.03	0	0	0	2.6	0	0	1.090
C.acuta	1.9	1.0	0	0	2.4	1.06	1.2	1.080
O.alliarius	7.11	0	1.1	0	5.006	0	0	1.888
R. decollate	5.03	0	0	0	2.04	0	0	1.010

Table (3): Relative biomass of terrestrial gastropod species in Dakahlia Governorate.

Species	Absolute biomass	Relative biomass (%)
H. aperta	6.980	30.487
L. flavus	5.054	22.074
E. vermiculata	3.984	17.401
C. hortensis	2.858	12.483
L. marginata	1.274	5.565
D. reticulatum	0.941	4.110
M. cartusiana	0.464	2.027
D. leave	0.445	1.944
S. putris	0.247	1.079
C. acuta	0.210	0.917
S. oblonga	0.198	0.865
O.alliarius	0.191	0.834
R. decollate	0.049	0.214

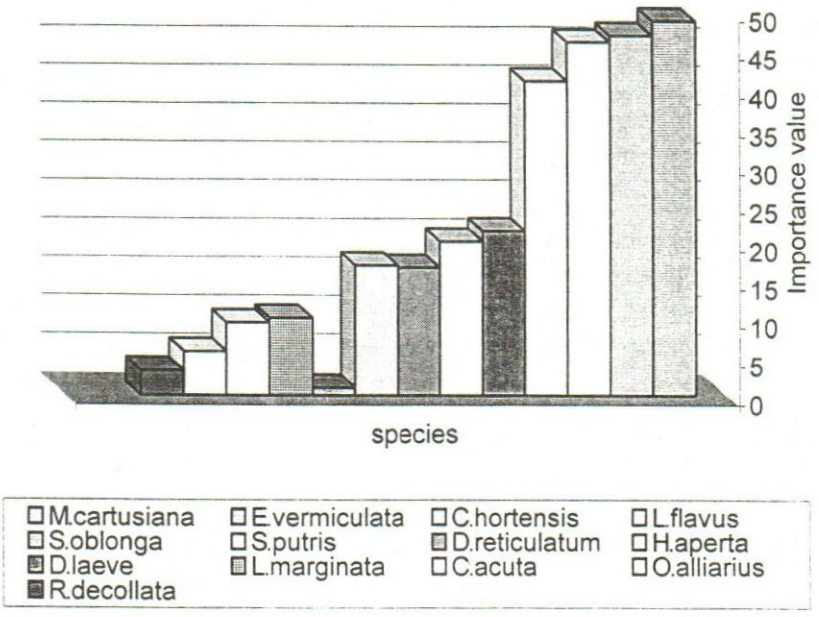

Fig. (2): Importance value of terrestrial gastropod species in Dakahlia Governorate during 2003 – 2004 seasons.

Table (4): Importance value of terrestrial gastropod species in Dakahlia Governorate during 2003 – 2004 seasons.

Species	Relative frequency of occurrence	Relative population density	Relative biomass	Importance value
E.vermiculata	11.00	20.360	17.401	48.761
M.cartusiana	20.188	24.637	2.027	46.852
L. flavus	6.400	17.500	22.074	45.974
H. aperta	8.400	2.000	30.487	40.887
S. putris	10.200	10.078	1.079	21.357
S. oblonga	11.100	8.067	0.865	20.032
C. hortensis	3.113	1.000	12.483	16.596
D. reticulatum	8.700	4.090	4.110	16.900
D.laeve	5.087	7.200	1.944	14.231
L. marginata	3.400	1.090	5.565	10.055
C.acuta	7.412	1.080	0.917	9.409
O.alliarius	3.000	1.888	0.834	5.722
R. decollata	2.000	1.010	0.214	3.224

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الأهمية الاقتصادية لأنواع البطنقدميات الأرضية فى محافظة الدقهلية

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أجريت دراسة حقلية فى سبعة مراكز تمثل محافظة الدقهلية ، خلال موسمى ٢٠٠٣ و٢٠٠٤ لتحديد الأهمية الاقتصادية للقواقع والبزاقات الأرضية التى تصيب معظم المحاصيل . ولاجراء ذلك تم استخدام عدة مقاييس بيئية مثل الكثافة النسبية ، التواجد النسبى ، وزن الكتلة الحيوية النسبى للأنواع الموجودة فى المحافظة . وشملت الدراسة مراكز المنصورة ، أجا ، المنزلة، منية النصر ، شربين ، ميت سلسيل و ميت غمر .

أوضحت النتائج أن قوقع الحدائق البنى *E.vermiculata* وهو أكثر الأنواع أهمية اقتصاديا (٤٨,٧٨١) نقطة ، يليه قوقع البرسيم الزجاجى *M.cartusiana* بمعدل (٤٦,٨٥٢) وان كان أكثر الأنواع انتشارا فى المحافظة . ثم البزاقة *L.flavus* و القوقع *Helix aperta* والقوقع *Succinea putris* والقوقع *Succinea oblonga* والقوقع *Cepaea hortensis* والبزاقة *Deroceras reticulatum* والبزاقة *Deroceras leave* والبزاقة *Lehmannia marginata* والقوقع *Cochilcella acuta* والقوقع *Oxychilus alliarius* والقوقع *Rumina decollata* حيث كانت نسب أهميتها الاقتصادية ٤٥,٩٧٤ ، ٤٠,٨٨٦ ، ٢١,٣٥٧ ، ٢٠,٠٣٢ ، ١٦,٩ ، ١٦,٥٩٦ ، ١٤,٢٣١ ، ١٠,٠٥٥ ، ٩,٤٠٩ ، ٥,٧٢٢ ، ٣,٢٢٤ على التوالى .