The length of the dorsal versus ventral appendage of the hypopygium is a diagnostic character in *A. longistyla*: the length of the dorsal appendage is almost two thirds of the length of the ventral one. However, the dorsal appendage may look shorter in dorsal view because it is more or less curled upwards (Fig. 1).

Furthermore, some characters, not mentioned in literature, were observed in the ventral appendage: its base bears several weak setae and a small but pronounced lateral spine is often present on the appendage body (Fig. 1).

Acknowledgements

The authors wish to thank the N.F.W.O.; Claudine DEVRIES-DUCHENE is thanked for her technical help in figure 1; they are also very grateful to all those who helped in the sampling program, especially Lieve CLEMENT.

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Bull. Annls Soc. r. belge Ent. 128 (1992): 319-324

Spring densities of Ground Beetles (Coleoptera: Carabidae) in cultivated fields

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Summary

The density of Carabidae present in a winter wheat field and in a stubble field was determined in April with the quadrat method. Fourteen species were caught which were principally small spring breeders. The density varied between 16 and 33 individuals/m² according to field and proximity of the field edges. Two species were the most abundant, Bembidion lampros *(HERBST) and* Asaphidion flavipes *(L.), with respectively 29.8 to 49% and 32 to 38% of the total density. Aggregation of total carabids was only detected by means of a variance/mean ratio index in the stubble field, probably because of the presence of small patches of organic matter there.*

Résumé

La densité des Carabidae (Coleoptera) dans un champs d'escourgeon et dans un champs encore recouvert des chaumes de la précédente culture a été déterminée au début du mois d'avril en utilisant la méthode des quadrats. Quatorze espèces ont été récoltées parmi lesquelles principalement des reproducteurs de printemps de petite taille. La densité maximale a varié entre 16 et 33 individus par m² en fonction du champ et de la proximité des bordures. Deux espèces ont été principalement capturées. Il s'agit de Bembidion lampros *et de* Asaphidion flavipes *constituant respectivement de 29,8 à 49% et de 32 à 38% de la densité totale. L'utilisation d'un test d'agrégation basé sur le rapport variance/moyenne a montré que la répartition des Carabidae était aléatoire dans le champ d'escourgeon alors qu'une agrégation a été mise en évidence dans le champs recouvert de chaumes probablement en relation avec la répartition hétérogène de la matière organique.*

Introduction

In field crops, an important part of the carabid fauna overwinters in the adult stage. The survivors constitute the first carabid population in early spring. The abundance of these predators may influence the settlement of the spring pest species, especially aphid populations. Because of their tremendous potential for population increase, the beginning of an aphid infestation is critical for crop protection (HANCE, 1990). Moreover, as aphids are virus vectors, their spring dissemination increases the risk of virus spread. Numerous spring species of Carabidae are aphid predators (SCHELLER, 1984; HANCE, 1987; SUNDERLAND, 1987), so it is important to estimate their early field densities.

Material and Methods

On the 4 April 1986, two sampling sites were chosen: a winter wheat field and a stubble field (winter barley harvested the previous autumn), both on silt-laden soil. During the preceeding month, the mean temperature recorded near the fields was 5.2°C (Min: - 5°C. and Max 13.5°C.). The mean temperature of the day was 5.2°C and mean relative humidity equaled 78%(ANONYMOUS, 1986). In the first site, two areas of 100 m^2 were delimited; the first one in the middle of the field at 200 m from the nearer edge, and the second one at 10 m from a field edge. Edges consisted of grassy strips, 1 m wide, preceeding a hedge, 10 m wide. In the stubble field, only one 100 m^2 area was sampled at 5 m from the grassy edge. The size of the winter barley field was approximatively 10 ha, while the stubble field measured 1.2 ha.In each area, 20 quadrats of 0.25 m^2 were used. A frame with aluminium walls (50 cm * 50 cm * 25 cm) was buried in the soil to delimit each quadrat. Soil, plants and plant roots were carefully searched and the carabids presents in each quadrat were manually collected to a depth of 15 cm. All the beetles collected were placed in alcohol and identified in the laboratory. An anova test was performed to compare the density in each area.

When organisms are distributed randomly in their environment, the presence of an individual at a given point does not change the probability to find another individual at a neighbouring point. So, in a random distribution the number of individuals found in each quadrat must agree with a Poisson distribution, and mean must be equal to variance. In order to test this hypothesis, we used an index based on the variance/mean ratio (SOUTHWOOD, 1978). Its equation is:

$$I_D = \frac{S^2(n-1)}{\bar{X}}$$

where n is the number of samples. As it is approximately distributed as a χ^2 with (n - 1) degrees of freedom, this index could be used as a test criterion for the null hypothesis that the pattern is random. If not, the

mean/variance ratio will approach zero for regularly distributed organisms, whilst a large value implies aggregation (SOUTHWOOD, 1978).

Results

A total of fourteen species were caught, nine in winter wheat and eleven in the stubble field (Annexe 1). For the winter wheat field the average densities reached 16.2 individuals/m^2 (range from 4 to 28/m^2) in the middle of the field and 25 individuals/m^2 (range from 8 to 60 by m^2) near the edge (Table 1). In the winter wheat field, two species represented the majority of the captures. The first one was *Bembidion lampros* (HERBST) with 7.8 individuals/m^2 (range from 0 to 16 individuals/m^2) (49% of the total density) in the middle of the field, and 12 individuals/m^2 (range from 0 to 44 individuals/m^2) near the border. According to WALLIN (1985), this species is positively influenced by adjacent habitats such as grassy strips. The second species was *Asaphidion flavipes* (L.), with respectively 7.4 (range from 0 to 12 individuals/m^2) (34% of the total density) and 8.4 individuals/m^2 (range from 0 to 16 individuals/m^2) (32% of the total density) in the middle and near the border of the field.

Table 1. Mean carabid densities in the spring in winter wheat and stubble field. **: significatively different values indicating aggregative behaviour ($\chi^2_{(19,0.95)} = 30.14$).

	winter wheat		stubble field
location	middle station **W1**	border station **W2**	border station **S**
Number of species	6	8	11
Carabid density (all species)	16.2 ind/m^2	25 ind/m^2	32.6 ind/m^2
I_D value	15.03	24.52	66.97**
Bembidion lampros	7.8 ind/m^2	12 ind/m^2	9.6 ind/m^2
I_D value	15.72	46.17**	20.26
Asaphidion flavipes	7.4 ind/m^2	8.4 ind/m^2	12.4 ind/m^2
I_D value	58.66**	23.16	53.34**

In the stubble field, the average density of Carabidae was estimated to be 32.6 individuals/m^2 (range from 4 to 84 individuals/m^2) among which *Asaphidion flavipes* represented 12.4 individuals/m^2 (range from 0 to 40 individuals/m^2) (38.5% of the total density in this area) and *Bembidion lampros* 9.6 individuals/m^2 (range from 0 to 28 individuals/m^2) (29.8% of the total density).

The difference in total densities between the three areas were significant (F = 6.32, DF = 2,57, α = 0,05).

The use of mean/variance ratio index as described above showed a significant aggregation for total carabids in the stubble field, but not in the wheat field (see Table 1).

In the stubble field and in the middle of the winter wheat field, *Asaphidion flavipes* showed an aggregative distribution (I_D = 53.34 and 58.66 respectively), but not near the border of the wheat field (I_D = 23). At the same time, for *Bembidion lampros*, aggregation was found only near the border of the wheat field (I_D = 46.17) and not in the two other areas sampled (I_D = 15.72 and 20.26).

Discussion and conclusions

Althought a limited number of areas were sampled, this study has shown that carabid beetles could be present at high densities early in the season in arable land. The fourteen species trapped overwintered in the adult stage. In early spring, because of the temperature conditions, they contituted the first carabid assemblage, probably even before migration from edges and neighbouring fields and before the emergence of species which overwinter in the larval stage. It is, however possible that somme species will be unsampled as they can remain below 15 cm during the daytime (LUFF, 1978). The proximity of the grassy edges seems to induce differences in density levels probably because they provide shelter for overwintering adults (DESENDER, 1982; HANCE *et al.*, 1990).

Few data is available on carabid densities in annual or perennial crops. In an orchard in March, HOLLIDAY & HAGLEY (1979) found lower carabid densities: 12.9 individuals/m^2. In spring barley and in spring wheat in June, VICKERMAN & SUNDERLAND (1975) have estimated carabid density at respectively 35 individuals/m^2 and 22 individuals/m^2. BASEDOW (1991) found the lowest total carabid density (13.2 individuals/m^2) for intensive cultivation, whilst he recorded the highest density (26.9 individuals/m^2) in an organic field following a red clover.

The population density found in the stubble field was higher than in the winter wheat field probably because of the shelter given by the straw but also because of the greater availability of prey as a consequence of large amounts of organic matter. Influence of organic matter on carabid fauna was already pointed out by HANCE & GRÉGOIRE-WIBO (1987).

An aggregation pattern was found for total carabids in the stubble field only. *Bembidion lampros* and *Asaphidion flavipes* seemed to react in an opposite way to the presence of straw as soil cover or to the proximity of the edge. It is perhaps the result of a competition for a similar habitat or prey.

This one-season study has pointed out the necessity to take into account the carabid distribution and its change throughout the year. A thorough knowledge of the aggregation patterns could also bring new information for the pitfall trap data analysis and interpretation.

Acknowledgment

I am indebted to Professeur Ph. LEBRUN for his advices and to M. L. RENIER for his help during sampling. I am also grateful to Dr. G. BOIVIN (Agriculture Canada, Research Station, P.O. Box 457, St Jean sur Richelieu, Qc, Canada) for his comments on the manuscript.

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Annexe 1. List of species collected and total number of individuals per area.. W1: Winter wheat field in the middle, W2 winter wheat field near the edge, S: stubble field.

Species	W1	W2	S
Bembidion lampros (HERBST)	39	60	48
Asaphidion flavipes (L.)	27	41	62
Bembidion tetracolum SAY	4	8	18
Bembidion obtusum SERVILLE	6	9	16
Clivina fossor (L.)	4	2	9
Bembidion quadrimaculatum (L.)	1	0	0
Notiophilus biguttatus (FABRICIUS)	0	3	2
Pterostichus cupreus L.	0	1	0
Agonum mulleri (HERBST)	0	1	0
Loricera pilicornis (FABRCIUS)	0	0	1
Agonum dorsale (PONT.)	0	0	1
Pterostichus strenuus (PANZER)	0	0	4
Dromius linearis OLIVIER	0	0	1
Pterostichus vernalis (PANZER)	0	0	1

Bull. Annls Soc. r. belge Ent. 128 (1992): *325-334*

Trois genres et deux espèces nouveaux de Sarcophagines africaines (Diptera, Sarcophagidae)

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Résumé

On décrit les genres Callostuckenbergia *gen. n. (espèce-type* Callostuckenbergia limela *sp. n.) du Kenya,* Transvaalomyia *gen. n. (espèce-type* Transvaalomyia erlangeri *sp. n.) de l'Afrique du Sud et du Transkei et* Zumptiopsis *gen. n. (espèce-type* Sarcophaga hera *ZUMPT, 1972) de l'Afrique du Sud.*

Abstract

The genera Callostuckenbergia *gen. n. (type species* Callostuckenbergia limela *sp. n.) from Kenya,* Transvaalomyia *gen. n. (type species* Transvaalomyia erlangeri *sp. n.) from South Africa and Transkei and* Zumptiopsis *gen. n. (type species* Sarcophaga hera *ZUMPT, 1972) from South Africa are described.*

Introduction

Dans les collections de Sarcophagines du Natal Museum (Pietermaritzburg, Afrique du Sud), qui représentent largement la faune de ce groupe de diptères de la zone méridionale du continent africain, nous avons trouvé une série d'éléments taxonomiques inconnus ou insuffisamment étudiés par les pionniers de la diptérologie afrotropicale moderne. Parmi ceux-ci, nous allons décrire les genres *Callostuckenbergia* gen. n., *Transvaalomyia* gen. n. et *Zumptiopsis* gen. n., qui sont caractérisés surtout par les types de structure, très différents, des phallosomes de leurs espèces-types. Les deux premiers genres sont fondés sur des espèces nouvelles, tandis que le dernier sur *Sarcophaga hera* ZUMPT, 1972, qui a été réexaminée par nos soins.