The status of diamondback moth and its natural enemies in the Forto Novo and Cotonou areas in Benin

D. Bordat¹ and A. E. Goudegnon²

¹Centre de Coopération Internationale en Recherche Agronomique pour le Développement, Département des productions Fruitières, Légumières et Horticoles (CIRAD-FLHOR), Laboratoire d’Entomologie, BP 5035, 34032 Montpellier Cedex 1, France

²Faculté Agronomique des Sciences et Technique, Université Nationale du Bénin (FAST-UNB), Laboratoire de Zoologie, Cotonou, Bénin.

Abstract

Plutella xylostella (L.) is year round the major pest in cabbage fields in the coastal zones of Benin, particularly in the Cotonou periurban area and in the Porto Novo lagoon. In these two areas, only 40 km apart, P. xylostella seems to have different population dynamics and parasitoid populations. In Cotonou, the highest population level of P. xylostella are observed in March and in December. The larval parasitoid Cotesia plutellae (Kurdjumov) is present all year round but its populations increase in May, October and December. In Porto Novo, the highest population level of P. xylostella is observed in September and C. plutellae is not present at all. In the both areas, some Euplectrus laphygmae Ferrière are found on P. xylostella larvae.

Key words: Plutella xylostella, Cotesia plutellae, population dynamics, Benin

Introduction

Among the pests in cabbage fields in Benin, the diamondback moth (DBM), Plutella xylostella (L.) (Lepidoptera: Yponomeutidae), is the most significant (Bordat & Goudegnon, 1991). It is found everywhere but particularly in the coastal zones where the humidity (80%) and the high temperature (28 °C) are present all year round. To control DBM, farmers use pesticides but populations have become resistant to deltametrin, the most common pesticide used in Benin against this pest (Goudegnon & Bordat, 1992). Before beginning Integrated Pest Management programs, it is first necessary to know the population dynamics of this pest. In this study, samples were taken over a one year period from each of two localities, the periurban area of Cotonou and the Porto Novo lagoon.

Materials and Methods

Samples (entire cabbage) were harvested from vegetable growers fields. The variety KK Cross was grown by the method usually employed in Benin: patches of 3 rows of cabbage, with 50 cm between rows and 40 cm between each cabbage.

The survey was done twice per month and for one year (1995). Every two weeks, a random selection of 20 cabbages was taken from each of the two localities. The cabbages were dissected, larvae and pupae of DBM were recuperated and reared. All parasitoids emerging from DBM were counted and identified in the laboratory of Taxonomy and Faunistic of CIRAD in Montpellier. The number of adults DBM were also counted.

Results

In the periurban area of Cotonou, DBM populations increased sharply in March and then declined until June. Populations began to rise again in October and were still high in December (Figure 1). The population curve of the main parasitoid, Cotesia plutellae (Kurdjumov) (Hymenoptera: Braconidae), had the same shape as DBM albeit with lower overall levels. Furthermore, the increases and decreases were later, i.e. a rise was seen in May, October and December (Figure 1). Some individuals of Euplectrus laphygmae Ferrière, (Hymenoptera: Eulophidae), were found in February, March, May, August and December (Figure 1).

Parasitism of DBM larvae by C. plutellae was found to be efficient (59%) despite a level of hyperparasitism near 20%. Hyperparasitism was principally due to Trichomalopsis af. lasiocampae (Grahman), (Hymenoptera: Pteromalidae) (Grahman, 1969), 13%, and Aphanogmus reticulatus (Fouts), (Hymenoptera: Ceraphronidae) (Dessart, 1971), 6% (Figure 2).

In the lagoon of Porto Novo, DBM populations increased slowly in March and then decreased until June. Population levels rose again sharply in September and then decreased until December (Figure 3). No adults of C. plutellae were found but some E. laphygmae individuals were found in February, May and September (Figure 3).

Discussion

Although Cotonou and the lagoon of Porto Novo are found only 40 km apart and share a similar climate, population dynamics of DBM were found to be quite different in each of the two localities in Benin. There
are several possibilities to explain this phenomenon. First, the dissimilarities in biotope: in Cotonou, large areas were cultivated with cabbage without tree cover, whereas in lagoon of Porto Novo, cabbage was grown under coconut and banana trees. Secondly, in the lagoon and until recently, the main culture was Amaranthus and cabbage has only been a year round crop for a few years. So it is possible that the DBM populations are not yet well established. It is also possible that for this same reason C. plutellae populations are not yet established.

In Cotonou and in Porto Novo, the small percentage of parasitism of DBM larvae by E. laphygmae is probably due to the fact that DBM larvae is not the ideal host for this species. Its females probably prefer to lay their eggs on the larvae of Spodoptera littoralis (Boisduval) (Lepidoptera: Noctuidae) which is also present on cabbage leaves and is the preferential host of this species.

The decrease in DBM populations in the two localities is likely due to the strong rains which wash the eggs of the pest from the cabbage leaves. Consequently, the number of larvae present on leaves will be lower.

It must be noted that in Cotonou, high population levels of Lipaphis erysimi (Kaltenbach) Homoptera: Aphididae, damage the cabbage from July to September, making it unfit for DBM larval consumption.

The results outlined in this study were from samples taken over only a one year period. These results must be confirmed over the next two years. This ongoing study has continued and, so far, the results appear to be the same, as those reported here, for the both areas.

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**References**


