92329154

STATUS: IN PROCESS 20120628 **OCLC #:** 475806670

REQUEST DATE: 20120628 **NEED BEFORE:** 20120728 **SOURCE:** ILLiad

BORROWER: COO **RECEIVE DATE:** **DUE DATE:**

RENEWAL REQ: **NEW DUE DATE:** **SPCL MES:**

LENDERS: *DAV, DAV

LHR SUMMARY: vol. 13- (1990-)
TITLE: IOBC / Bulletin OILB/SROP.
IMPRINT: Paris : IOBC/WPRS.
ARTICLE TITLE: Meadow, R., J. Bligaard and A. M. Shelton: Is there an easy method for monitoring
root flies in Brassic
VOLUME: 19
ISSUE NUMBER: 11
ISSUE DATE: 1996
PAGES: 12-17
VERIFIED: <TN:969853> OCLC
SHIP TO: Mann Interlibrary Services/ Cornell University Library/ Mann Library/ Tower Road/ Ithaca,
NY 14853-5301

BILL TO: same
SHIP VIA: 1st class,Ariel or Mail
MAXCOST: IFM - $50
COPYRIGHT COMPLIANCE: CCL
FAX: 607/255-0850 ARIEL: 128.253.78.96
EMAIL: mann_ill@cornell.edu
BORROWING NOTES: Odyssey, Ariel or Email

10

PATRON: G-Davis, Courtney, <TN:969853>

Is there an easy method for monitoring root flies in Brassica crops?

R. Meadow[1], J. Bligaard[2] & A.M. Shelton[3]

[1] *Norwegian Crop Research Institute, Plant Protection Centre, Dept. of Entomology and Nematology, Fellesbygget, N-1432 Ås, Norway*
[2] *Danish Institute of Plant and Soil Science, Dept. of Plant Path. and Pest Management, Lottenborgvej 2, DK-2800 Lyngby, Denmark*
[3] *Dept. of Entomology, Cornell University, NYS Agric. Expt. Station, Geneva, New York 14456, USA*

Summary

Most of the known methods for monitoring root flies were tested. Water traps were tried, but were soon abandoned due to the great diversity of similar fly species caught. Sorting of water trap catches was too time consuming to be of practical value. A new, selective water trap (Brassiceye®) was tested in both Norway and Denmark in 1994, and in Norway and the USA in 1995. Results indicated that the catch was much too small for use in monitoring and that the trap only began catching the flies after peak oviposition.

Direct counts of eggs in the field gave an indication of when oviposition started, but counting eggs was very difficult, and there was great variability between "scouts", especially in a grower-based system. Direct counts added the risk that the same eggs would be counted on more than one occasion. Presence-absence counts correlated well with the number of eggs in soil samples.

Collecting soil from the base of the plants should give the best indication of the actual number of eggs present at any given time. Eggs can be removed from the soil by flotation. In practice, eggs are difficult to count in some soil types due to the presence of organic matter or clay. For this reason, clean sand was used instead of soil around the base of plants used for monitoring.

Results for field experiments in several localities in Norway and Denmark produced large differences in the numbers of eggs counted using the different monitoring methods. In many instances there was a good correlation between the number of eggs recorded using soil-flotation, sand-flotation or felt traps. Under extreme conditions, or when oviposition was low, the felt traps usually did not contain eggs.

Introduction

The cabbage root fly (*Delia radicum*) is the most important pest of brassica vegetable and root crops in Denmark and Norway. It is also a pest in some years in the northeastern

USA. The turnip root fly (*D. floralis*) is equally important as a pest of both brassica root crops and some cole crops in Norway. Both of these pests have been controlled traditionally by preventative chemical methods. Withdrawal of insecticides from the market, the reduced effects of insecticides in the field, and the development of IPM programs, have created a need for methods to establish the time and intensity of oviposition in the crop.

Since the mid-1980´s, several systems have been used to monitor cabbage root fly populations in northern Europe. These systems have been based mainly on using either water traps for the adult flies or felt traps for monitoring egg numbers. In Denmark, felt traps have been used since 1985 for a centralized monitoring program co-ordinated by the Danish Institute of Plant and Soil Science, Department of Plant Pathology and Pest Management, in Lyngby (Bromand 1988).

At the outset of the Nordic project, "Reducing the Use of Insecticides in Brassica Vegetable and Root Crops", an attempt was made to adapt the Danish monitoring system for Norwegian conditions. Deficiencies in the felt traps, similar to those described by den Ouden (1988), became evident. This led to the investigation of other methods.

Materials and Methods

Seven methods of monitoring brassica root flies were investigated during 1991-95. These seven were the felt 'egg-traps', flotation of the fly eggs from soil samples, flotation of the fly eggs from sand samples, direct counts of the eggs seen around the base of crop plants, the presence or absence of eggs in the soil around crop plants, the yellow water traps, and the Brassiceye® selective traps.

The number of fly eggs found in the felt traps, the soil samples and the sand samples were counted twice weekly, as were the direct egg counts and the presence-absence counts . Flies captured in the water traps and Brassiceye® traps were counted once a week.

The felt 'egg-traps' (Freuler & Fischer, 1983) were placed around the plant base and were removed for counting the eggs. Eggs were removed before replacing the traps on the plants.

For the flotation from soil method, the soil was collected from around the plant base in a radius of approx. 5 cm and a depth of 2 cm to fill a 100 cc container. The soil was then taken to the laboratory and poured into containers of water to float out the eggs. Soil from between the plant rows was used to replace the soil removed from around the plants at sampling (Hughes & Salter, 1959).

Flotation from sand samples was done in the same way as for soil, except that sand placed previously around the base of the plant was removed and replaced with clean sand. This facilitated egg counting by eliminating problems with organic matter and other particles floating in the water.

Direct egg counts were done by moving the stem of the plant slightly and counting the number of eggs on the stem or between the stem and the soil. In the Norwegian experiments, the eggs themselves were removed, whereas in the Danish experiments the soil was removed after counting and replaced with soil from between the plant rows. Direct counts were not made in the USA trials.

The presence-absence counts were done in the same way as the direct counts, except that only the presence or absence of eggs was recorded, not the actual numbers of eggs.

The yellow water traps were placed on posts with adjustable holders to keep them just above the vegetation. In the studies in 1995 in the USA, water traps as described by Finch (1991) were used, with the inside walls painted black to exclude syrphid flies. These traps were placed on bare soil between the crop and border vegetation. Attractants were not added to the traps.

A new, selective water trap (Brassiceye®) was tested in Denmark and Norway in 1994, and in Norway and the USA in 1995. The trap uses ethyl-isothiocyanate to help attract cruciferous pests, and it was believed that this chemical would increase trap selectivity. The openings into the trap are small, to exclude unwanted insects. These traps were placed around the edges of fields. In one experiment in the USA, an extra row of holes was made in the traps to increase the rate of release of the attractant. It was hoped that this would increase the numbers of flies caught.

The data from the different egg counting methods were compared with the data from the soil flotation method using regression analysis. The data from the water traps and Brassiceye® traps were not subjected to statistical analysis.

Results and Discussion

Field experiments in several localities in Norway and Denmark showed large differences in the numbers of eggs recorded using the different monitoring methods. There was good correlation between the numbers of eggs recovered using flotation from both the soil and the sand samples. The numbers of eggs counted from the sand samples was usually higher than from the soil samples (e.g. Fig. 1). These experiments do not indicate whether this is due to the presence of more eggs or the ease with which eggs could be counted.

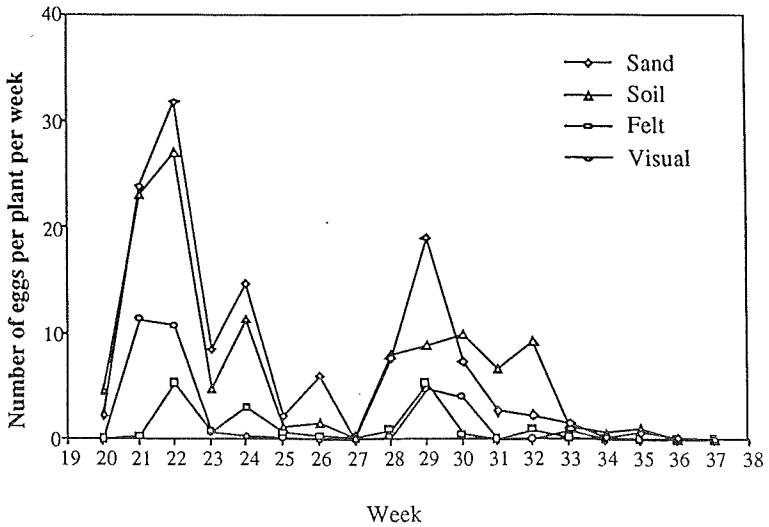

Fig. 1: Number of brassica root fly eggs (*Delia radicum* and *D. floralis*) found using four sampling methods, Ski, Norway, 1992.

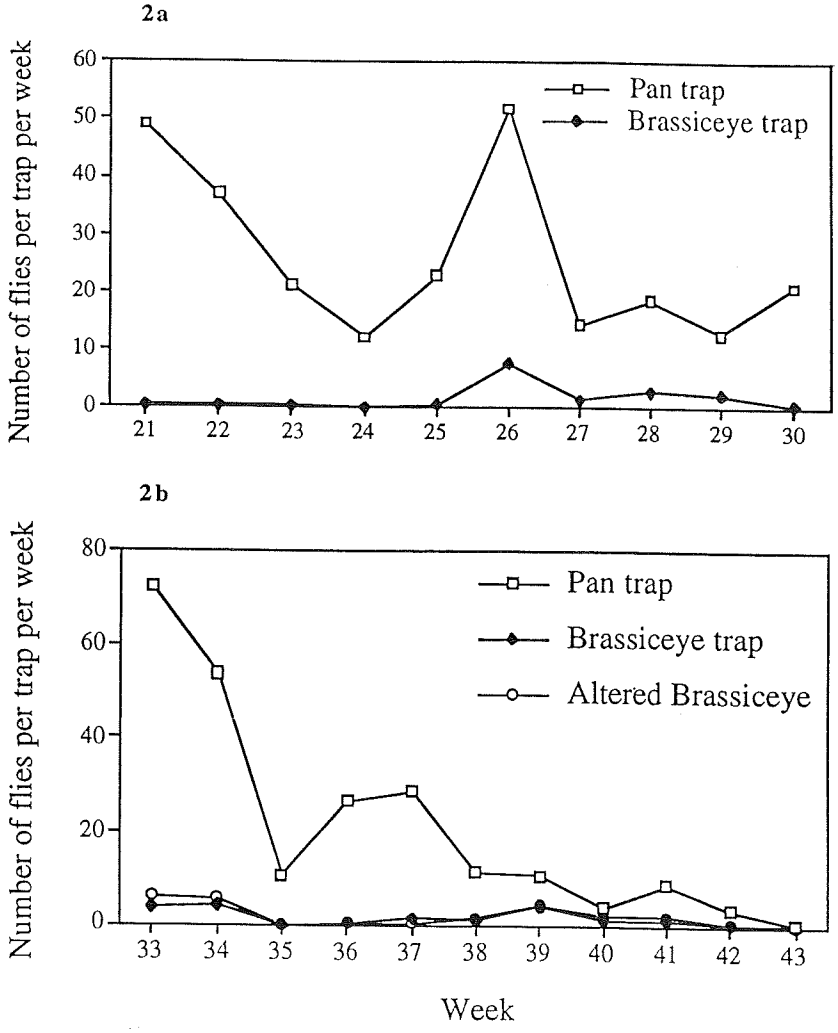

Fig. 2: Numbers of cabbage root flies (*Delia radicum*) caught in Brassiceye® traps compared to pan traps, Geneva, N.Y., USA, 1995. 2a. Early to mid-season catches. 2b. Late-season catches, including those in the altered version of the Brassiceye® trap.

While the felt traps also gave a good correlation to the other methods in many instances, under extreme conditions, i.e. very dry, very wet, very soiled, very clean or when oviposition rates were low, they tended to contain fewer eggs, or no eggs at all (e.g. Fig. 1). Freuler (1988) found a better relationship between the numbers of eggs found in felt traps and in the soil than in the current studies, whereas the current study supports den Ouden´s (1988) findings.

Direct counts of eggs in the field gave some indication of when oviposition began, but making these counts was difficult. There was too much variability between "scouts" for this method to be recommended for use in a grower-based system. Visual counts usually gave the lowest numbers of eggs. Direct counts, where the soil was not removed and replaced, added the risk that the same eggs were counted on more than one occasion. In some cases the number of plants with or without eggs (presence-absence test) was correlated surprisingly well with the number of plants infested, whereas in other cases the correlation was poor. This method was very inexpensive, both in terms of time and materials, and is used commonly in many other pest monitoring situations (e.g. Shelton *et al.*, 1994).

The yellow water traps caught a great diversity of fly species. Sorting of water trap catches was too time consuming to be of practical value. Results in Denmark indicated that the Brassiceye® trap began catching flies after peak oviposition. Field trials with the Brassiceye® trap in the USA in 1995 also showed very poor catches (Fig. 2a), even when an extra row of holes was made for release of the attractant (Fig. 2b).

After 1 year of using felt traps in Norway, advisers changed in 1993 to using the method of floating the eggs from sand samples. Participation in the monitoring program increased in 1994 and 1995. Variation in the timing of oviposition over short distances suggests that this method of sampling should be done locally, as warnings based on the numbers of eggs counted cannot be generalized even on a regional basis.

Résumé

Existe-t'il une méthode facile pour suivre les mouches du chou dans les cultures de Brassica ?

La plupart des méthodes connues pour suivre les mouches du chou ont été testées. Les pièges à eau furent essayés puis abandonnés en raison de la grande diversité des espèces de mouches semblables capturées. Le tri des captures obtenues est trop coûteux en temps pour avoir une valeur pratique. Un nouveau piège à eau sélectif (Brassica) a été testé en Norvège et au Danemark en 1994, et en Norvège et aux USA en 1995. Les résultats indiquent que le nombre des captures était trop faible pour être utilisé dans un suivi et que le piège ne commence seulement à capturer les mouches qu'après le pic de ponte.

Le comptage direct des oeufs dans le champ donne une indication sur le début de la ponte, mais il est très difficile, et on observe une grande variabilité entre les opérateurs (scouts), particulièrement dans un système basé sur les agriculteurs. Le comptage direct additionne le risque que les mêmes oeufs puissent être comptés plus d'une fois. Les comptages de type présence-absence se corrèlent bien avec le nombre des oeufs dans les échantillons de sol.

La collecte du sol à la base des plantes pourrait donner une meilleure indication du nombre réel d'oeufs présents à un moment donné. Les oeufs peuvent être récupérés du sol par flottaison. Dans la pratique, il est difficile de compter les oeufs dans certains types de sol en raison de la présence de matière organique ou d'argile. Pour cette raison, un sable propre a été utilisé et placé sur le sol autour de la base des plantes utilisées pour le suivi des populations.

Les résultats obtenus des parcelles expérimentales de plusieurs localités de Norvège et du Danemark fournissent des différences importantes dans le nombre des oeufs comptés en utilisant les différentes méthodes de suivi. Dans plusieurs cas, il y a une bonne corrélation entre le nombre d'oeufs obtenus par flottation à partir du sol, à partir du sable ou à partir des pièges en feutre. Dans les conditions extrêmes, ou lorsque la ponte est faible, le piège en feutre ne contient habituellement pas d'oeufs.

Acknowledgements

The studies were funded by the Nordic Council of Ministers, the Norwegian Research Council, and the Danish Research Secretariat, under the auspices of the Nordic Joint Committee for Agricultural Research.

References

Bromand, B. 1988. Three years experience of using a warning system to predict the times of attack by the cabbage root fly (*Delia radicum*). *IOBC/WPRS Bulletin* **11:** 77-88.

den Ouden, H. 1988. Problems in monitoring cabbage root fly, *Delia radicum (brassicae)* by oviposition traps. Progress on pest management in field vegetables. Proceedings of the CEC/IOBC Expert Group Meeting, IOBC/WRPS, 1985. pp.11-14.

Finch, S. 1991. Influence of trap surface on the numbers of insects caught in water traps in brassica crops. *Entomologia Experimentalis et Applicata* **59 (2):** 169-173.

Freuler, J. & S. Fischer. 1983. Le piége á œufs, nouveau moyen de prévision d'attaque pour la mouche du chou, *Delia radicum (brassicae)* L. *Revue suisse Vitic. Aboric. Hortic.* **15 (2):** 107-110.

Hughes, R.D. & D.D. Salter. 1959. Natural mortality of *Erioschia brassicae* (Bouche)(Diptera, Anthomyiidae) during the immature stages of the first generation. *Journal of Animal Ecology* **28:** 231-241.

Shelton, A.M., J. Theunissen & C.W. Hoy. 1994. Efficiency of variable-intensity and sequential sampling for insect control decisions in cole crops in the Netherlands. *Entomologia Experimentalis et Applicata* **70:** 209-215.