BUL3*20

Oviposition in Dasineura Brassicae Winn. (Dipt. : Cecidomyiidae). Adaptive, mechanistic and applied aspects.

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Abstract

Brassica spp. are the main hosts of the gall midge *D. brassicae*, but occasionally eggs are laid on other cruciferous species. In preference tests, more eggs were laid on *Brassica napus* (rape) and *B. campestris* (turnip rape) than on *B. nigra*, *B. juncea* and *B. carinata*. Observations on oviposition behaviour showed that the higher density of eggs on *B. napus* compared with *B. juncea* was due to a greater number of females landing and more eggs laid per ovipositing female on *B. napus*. Attempts have been made to determine the plant characteristics most responsible for this differential response. Glucosinolate compositions do not seem to adequately explain the differences. "Wax" extracted from the pod surfaces elicit female host searching behaviour. Furthermore, *D. brassicae* responds to mechanical and chemical characteristics of the oviposition site with sensilla located distally on the ovipositor. *D. brassicae* oviposits in pre-existing holes in the pods. These are usually made by the weevil *Ceuthorrhynchus assimilis*. However, artificially made pin holes received at least as many eggs as did weevil feeding punctures. No *D. brassicae* eggs were found in smaller punctures made by the weevil for its oviposition. Furthermore, less oviposition occurred in fresh pin holes and in holes where adjacent seeds were missing. Eggs laid on crucifers other than *Brassica*, resulted in small larvae, and led to high mortality on certain species. However, on two cruciferous species, *Capsella bursa-pastoris* and *Thlaspi arvense*, larval performance records were similar to those on low-quality *Brassica* hosts. The poor growth of larvae on *B. nigra*, *B. juncea*, and *B. carinata* compared with growth on the preferred *B. napus* and *B. campestris* might be attributed the high release of glucosinolate products (isothiocyanates) from these less suitable species.

Isothiocyanates are very toxic to eggs of *D. brassicae*. The basic knowledge about the reactions of *D. brassicae* to its hosts has been used to suggest ways of developing and utilizing *Brassica* oilseed crops resistant to this pest.

BUL3*21

Improvement of rapeseed meal quality through breeding for high protein content.

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Abstract

There is a wide range of variation in the protein content of the breeding material of rape and turnip rape. Selection for high protein content in the meal has been successful although the realized heritability was generally low. The increase in protein quantity did not have any negative consequences on the biological value and availability of the protein and was not accompanied by any undesirable effect on the content of hull, fibre, tannin, sinapine and phytic acid or on amino acid composition. Selection for high sum of oil and protein content in the seed (O+P) was not effective, probably depending on the high initial level of O+P in the population. On the contrary, selection for low O+P in the same population was very effective. The populations selected for high protein content in the meal and high O+P respectively, produced more oil and protein per ha than Sv Topas. In some of the investigated populations, the correlation between oil content in the seed and protein content in the meal was positive but in others, it was negative. Selection for high protein content in the meal may work as an indirect selection for high O+P. In the experiments with selection for high protein content, the selection intensity has been rather high (on an average 13 %). In spite of this, the observed variance has not changed much from one generation of selection to the other. To further improve the progress in protein content the best plants should be progeny-tested and mated in a recurrent selection program thereby accumulating alleles causing high protein content.