PRELIMINARY STUDIES ON THE CHEMICAL BASIS OF RESISTANCE IN BRASSICA SPECIES TO MUSTARD APHID (LIPAPHIS ERYSIMI)

K.S. LABANA, K.L. AHUJA, M.L. GUPTA and K.S. BRAR

Department of Plant Breeding
Punjab Agricultural University
Ludhiana (India)

INTRODUCTION

Mustard aphid is one of the serious pests of rapeseed and mustard. It has been reported to cause upto 97 per cent damage in different parts of the country (Bakhetia, 1979 and 1982; Chowdhary and Roy; 1977; Phadke, 1980; Rout and Pani, 1967 and Singhvi et al (1978). Although large number of insecticides are available for the control of this pest (Bakhetia, 1982) but they may pose hazards to animals, men and beneficial insects. Limited information is available on chemical basis of resistance for this pest (Anand, 1976). So study was made to find out the relationship of chemical constituents of shoots with aphid population.

MATERIAL AND METHODS

The species/varieties were grown under normal agronomic practices at the research station of Punjab Agri. University, Ludhiana on 18th November, 1981. The experiment was conducted in randomized block design with three replications in a plot size of 3 rows x 5 m.

The observations on the mustard aphid were recorded during peak infestation period from ten plants selected at random in each replication. To count the population of aphids 10 cm long central shoot was taken from each plant. Ascorbic acid was determined from fresh leaves of these shoots by the method of A.O.A.C. Total glucosinolates were extracted by the procedure of Van Etten et al. (1974) and determined by the method of Van Etten et al. (1976).

RESULTS AND DISCUSSION

The data presented in Table 1 show that variation in shoots of different species with respect to Ascorbic acid, total glucosinolates and aphid population exists. Ascorbic acid

contents varied from 0.72 mg/ (B. campestris) to 15.42 mg/g (B. carinata). Total glucosinolates percentage ranges from 0.4 (B. campestris) to 1.4 (B. carinata). Nakabayashi et al. (1972) also reported that B. carinata had higher glucosinolates content than B. campestris, B. oleracea and B. napus. Similarly aphid population per 10 cm shoot varied from 6.2 (B. napus) to 226.0 (B. alba). Maximum population was recorded on B. alba, followed by variety G.S.D. (B. napus) & varuna (B. juncea). The lowest population was observed in Gulivar (B. napus) and (B. carinata). Entries having low aphid population had maximum ascorbic acid and glucosinolates content. Our results are in agreement with Anand (1976) who also reported that the higher tolerance of exotic B. juncea cultivars than the locals was due to the proportionately higher amount of sinigrin glucosinolate in them. He further ascribed the higher tolerance of B. nigra. B. carinata & B. oleracea to be also due to the presence of sinigrin.

Correlation studies also revealed that there is a significant association between ascorbic acid and total glucosinolates. Both ascorbic acid and glucosinolates had negative correlation with aphid population. This study indicates that ascorbic acid and glucosinolates are responsible for aphid resistance in Brassica species.

REFERENCES

Anand, I.J. 1976. 'Oil quality vis-à-vis aphid resistance in Brassica' presented at the Seminar cum workshop on Oilseeds Research in India, held at P.K.V. Nagpur, 5-9th April, 1976.

A.O.A.C. 1970. Official methods of analysis. 12th ed.pp. 777-778. Washington, D.C.

Bakhetia, D.R.C. 1979. Insect pest problems and their management in rapeseed and mustard. Paper presented in the 15th Annual Workshop-cum-Seminar held at CSA Uni. Agric. Tech., Kanpur. Sept. 12-13, 1979.

Bakhetia, D.R.C. 1982. Pest management strategies for rapeseed and mustard in India. Presented in the National Seminar on Production. Problems and prospects of Rapeseed and Mustard in India, held at IARI, New-Delhi, Aug. 9-10, 1982.

Chowdhary, R. and Roy, C.S. 1977. Evaluation and economics of some insecticides for the control of mustard aphid, Lipaphis erysimi (Kalt.) on brown sarson. Pesticides. 15 (1) : 11-13.

Nakabayashi, Ohira, K., Fujiwora, A. 1972. Content of isothiocyanate and oxazolidine-thione in Brassica seeds. Utsunomiiya Daigaku Nogakubu Gokutru Hokoku. 8 (2) : 1-7.

Phadke, K.G. 1980. Strategy for increasing rapeseed and mustard production through insect pest control. Proc. of group discussion of increasing Pulses and Oilseeds Production in India, FAI, New-Delhi, Sept. 4-5, 1980. p. 151-58.

Rout, G. and Pani, S.C. 1976. Extent of damage in the mustard by mustard aphid Lipaphis erysimi (Kalt.). Indian Oilseeds J. 3. : 170-78.

Singhvi, S.M. Verma, N.D. and Yadava, T.P. 1978. Estimation of losses in rapeseed (Brassica campestris L. Var. toria) and mustard (Brassica juncea Coss.) due to mustard aphid (Lipaphis erysimi). HAU, J. Res. 3 : 170-78.

Van Etten, C.H., Daxenbichler, M.E., Williams, P.H. and Kwolek, W.F. 1976. Glucosinolates and derived products in cruciferous vegetables. J. Agric. Food. Chem. 24 : 452-455.

Van Etten, C.H. Mc Graw C.E. and Daxenbickler, M.E. 1974. Glucosinolate determination in cruciferous seed and meals by measurement of enzymatically released glucose. Agricultural and Food Chemistry. 22 : 483.

Table 1 : Relationship of Ascorbic acid and total glucosinolates content with aphid population in different species of Brassica (on fresh at basis).

Species	Ascorbic acid content mg/gm	Total glucosinolates content %	Number of aphids per 10 cm shoot
1. B. alba	1.0	0.5	226.0
2. B. campestris	0.7	0.4	179.0
3. B. napus (Gulivar) .	5.0	1.0	6.2
4. B. carinata	15.4	1.4	8.0
5. B. napus (G.S.D.) .	1.7	0.6	223.0
6. B. juncea (Varuna)	1.2	0.7	206.6
7. B. juncea (RLM 198)	6.2	0.9	149.4
8. B. juncea (RLM 514)	6.3	1.0	182.0

C.D. at 5 % = 0.71

Correlation coefficients

Ascorbic acid with glucosinolates – 0.93

Ascorbic acid with aphid population – 0.75

Glucosinolates with aphid population – 0.78