



Studies on parasitoids associated with Cabbage *Aphid Brevicoryne brassicae* and diamond back moth, *Plutella xylostella* on cauliflower

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ABSTRACT

Field experiments were conducted for two consecutive years (2002-03 and 2003-04) to study the parasitoids associated with cabbage aphid and diamond back moth and their extent of parasitisation in Marathwada region. The important parasitoids recorded were *Aphidius* spp. from cabbage aphids with maximum parasitisation of 76.43 and 82.33 per cent in 2002-03 and 2003-04 respectively. The parasitoids of *P.xylostella* include a larval parasite *Cotesia plutellae* and a larval and pupal parasite *Oomyzus sokolowskii*. The extent of larval and pupal parasitisation was 10.80 and 26.83 per cent respectively, in 2002-2003 while it was 11.33 and 28.38 per cent in 2003-04.

Keywords: Aphid, Diamond back moth, cabbage, Parasitoids.

INTRODUCTION

Cauliflower (*Brassica oleracea*) var. *botrytis* Linn. is an important vegetable crop mainly grown in winter season on an area of 0.28 million hectares with an annual production of 4.80 million tonnes (Anonymous, 2003). Cauliflower is mostly used for culinary purpose in curries, pickles, etc. From nutritional point of view it is an important source of minerals, vitamins, protein, carbohydrate and dietary fibres (Chatfield, 1984).

This vegetable crop however suffers from various insect pests during different growth stages. The predominant pest species attacking the crop are cabbage aphid *Brevicoryne brassicae* Linn., diamond back moth (DBM) *Plutella xylostella* Linn., cabbage borer, *Hellula undalis* Fab., cabbage looper *Trichoplusia ni* Hub. and tobacco caterpillar *Spodoptera litura* (Narsimhamurthy *et al.*, 1998). In India, at least 52 per cent loss in marketable yield occurs due to DBM alone and more than 80 per cent when attack is severe (Chelliah and Srinivasam, 1986). Reports on natural enemies of cabbage pests are well documented (Marallo *et al.*, 1990; Talekar and Hu, 1996). In the present study we investigated the important natural enemies associated with the cabbage aphid and DBM on cauliflower.

MATERIALS AND METHODS

The present studies were undertaken during the years 2002-03 and 2003-04. The field experiment was conducted at Department of horticulture and laboratory experiment

at Deptt. of Entomology, M.A.U., Parbhani. To study the natural enemies associated with aphid and DBM four quadrats each of 10 x 10 m were maintained free from plant protection operations. The regular agronomic practices were done as per regular protocol.

Parasitoids of *P.xylostella*

The known number of larvae and pupae of *P.xylostella* were collected from field and reared in the laboratory in separately on fresh cauliflower leaves upto the emergence of parasitoids. The emerged parasitoids from both larvae and pupae were identified.

Parasitoids of *B.brassicae*

The known number of aphids were collected and reared in laboratory upto emergence of parasitoids and the emerged parasitoids from mummified aphids were further identified. The total population from ten plants were counted and per cent parasitism were calculated.

RESULTS AND DISCUSSION

Parasitization of aphid by *Aphidius* spp.

The data pertaining to aphid parasitisation are presented in Table 1. The total populations from 10 plants were counted and present parasitism was calculated. During 2002-03, aphid parasitisation was 1.07 per cent in 47th meteorological week (3rd December) and was found to be increasing steadily from 48th meteorological week to 3rd meteorological week (MW) and it become more pronounced in 4th MW and declined steadily thereafter upto

Table 1. Parasitisation of aphid from 2002-04 by *Aphidius* spp.

Meteorological week	Aphids / 3 leaves			
	2002-03		2003-04	
	Population	Parasitisation	Population	Parasitisation
46	1.32	0.00	0.00	0.00
47	8.70	1.07	1.22	0.00
48	22.3	3.14	3.15	1.14
49	20.20	2.98	23.17	3.48
50	60.15	4.27	80.17	16.13
51	72.80	15.18	51.4	12.29
52	84.77	16.15	76.42	15.33
1	110.85	35.17	161.67	53.19
2	140.92	50.38	82.07	24.86
3	131.05	48.62	219.22	71.53
4	164.85	66.96	150.5	60.21
5	97.70	41.73	145.35	52.76
6	90.35	40.83	286.17	80.83
7	273.12	76.43	317.05	80.73
8	192.22	50.16	319.15	82.33
9	85.27	25.28	74.07	31.19
10	120.32	18.36	31.32	10.03

During 2003-04, aphid parasite activity was first noticed (1.14%) in 48th MW to 1st MW (53.19 percent), it decreased in 2nd MW upto (24.86%) and fluctuated upto 8th meteorological week where it reached its peak 82.33 per cent and declined thereafter upto 10th MW. In both the years when climatic conditions were optimum for the multiplication of the pest and the parasite activity was meagre. The incidence started increasing from December and reached its peak at the end of January although the parasite activity was more but it could not reduce the population due to profound increasing rate of its host. Frueler *et al.* (2001) reported that *D.rapae*, *Aphidius matricariae*, *Aphidius ervi* and *Bracon* sp. clearly dominated *B.brassicae* with generally more than 90 per cent of individual. Biradar (1999) also reported that *Aphidius* spp. was predominant parasitoid with 95 per cent parasitisation in the moth of February in Marathwada region.

Vaz *et al.* (2004) also reported parasitisation of *B.brassicae* by *Aphidius celomei* under field studies. However, *Aphidius* spp was only the predominant parasitoid of *B.brassicae* in both the seasons. It is therefore, necessary to explore the possibility of utilisation of this parasite in the management schedule of aphid. Further work on mass multiplication technique, time of release and number to be released per unit area needs to be initiated. In earlier literature pertaining to the work on per cent parasitisation of aphid infesting cauliflower from Marathwada has not been reported. However, the finding of the earlier workers gave some support to the present findings.

Parasitisation of DBM

The data on per cent parasitisation of DBM i.e. larval parasitisation by *Cotesia plutellae* and pupal parasitisation by *Oomyzus sokolowsii* and total parasitisation are presented in Table 2. During both the years *C.plutellae* and *O.sokolowskii* were found the major natural enemies of DBM.

Larval Parasitisation of DBM by *Cotesia plutellae*

In 2002-03, parasitoid activity of DBM was first noted 50th MW with 0.50 percent larval parasitisation and it fluctuated upto 2nd MW and then increased steadily upto 8th MW (10.80 percent) and later it started to decline upto 10th MW. In 2003-04, parasitoid activity of DBM was first noted in 52nd (3.58 %) and it fluctuated upto 5th MW where it reached its peaks and later it start declining upto 10th MW.

Pupal Parasitisation of DBM by *Oomyzus sokolowskii*

The pupal parasitisation of DBM pupae were recorded in 52nd MW (2.13 %) during 2002-03 from 52nd MW. It starts increasing upto 4th MW (12.48%) and later it decreases upto 7th MW week (8.26%) and then started increasing and reaches its peak during 9th MW (20.83%) and after decreasing upto 10th MW. During 2003-04, the pupal parasitoid activity was first noticed in 52nd MW (4.93%) and it fluctuates upto 5th MW and later it start increasing upto 8th MW and reaches its maximum population in the week (28.38%) and later it starts decline upto 10th MW.

Total Parasitisation of DBM

During 2002-03, the parasitisation of DBM larvae and pupae was first noticed during 50th MW (0.50%) and it fluctuated upto 6th MW and later started increasing upto 9th MW where it recorded maximum parasitisation of 35.90% and later it decreases. During 2003-2004 the parasitoid activity of both the parasitoids was first recorded in 52nd MW (8.51%) and it fluctuated upto 5th MW and later it starts increasing and reaches its peak during 8th MW (39.44%) and later it start decreasing upto 10th MW. The larval parasitoid *C. plutellae* and pupal parasitoids *O.sokolowskii* were the predominant parasitoids of DBM in this region. More over natural enemies of *P.xylostella* were reported by earlier workers like Kitauchi and Nogami (1984), Alam (1992), Noda *et al.*, (1996), Talekar and Hu (1996) and Wang *et al.* (1998) from different areas.

Cherian and Basheer (1939) observed 68.5 per cent parasitisation of *P. xylostella* in November by *O. sokolowskii* and 70.0 per cent by Chauhan *et al.* (1997) in April. Cock (1985) reported 89 to 100 per cent pupal parasitisation of DBM. Similar observations were also recorded by Jayarathnam (1977), and Kitauchi and Nogami (1984). Liu *et al.* (2000) also reported that *O.sokolowskii* parasitoids 3.1, 13.2 and 6.8 larvae DBM at different

Table 2. Parasitisation of *Plutella xylostella* during 2002-04 by *Cotesia plutallae* and *Oomyzus sokolowaskii*.

Mw	DBM population per 10 plants		per cent parasitization					
	2002-03	2003-04	Larval		Pupal		Total Larval + Pupal	
			2002-03	2003-04	2002-03	2003-04	2002-03	2003-04
46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47.	1.17	1.2	0.00	0.00	0.00	0.00	0.00	0.00
48	2.42	3.3	0.000.	0.00	0.00	0.00	0.00	0.00
49	1.28	2.95	0.00	0.00	0.00	0.00	0.00	0.00
50	8.12	3.17	0.50	0.00	0.00	0.00	0.00	0.00
51	14.80	8.97	1.00	0.00	0.00	0.00	0.00	0.00
52	19.32	23.17	1.13	3.58	2.13	4.93	3.26	8.51
1	13.05	88.12	0.90	8.85	2.00	9.18	2.90	18.03
2	38.70	30.20	4.16	5.28	6.32	5.13	10.48	10.41
3	70.75	81.12	7.40	8.31	9.29	10.12	16.69	18.43
4	98.55	106.12	8.12	9.21	12.48	14.46	20.60	23.67
5	35.22	93.17	8.11	9.14	9.31	13.29	17.42	22.43
6	30.70	111.15	8.23	10.12	8.26	19.26	16.49	29.38
7	119.77	129.22	9.19	11.33	18.21	27.89	27.40	39.22
8	102.02	103.15	10.80	11.06	24.13	28.38	34.93	39.44
9	73.17	65.22	9.07	8.79	28.83	25.18	35.90	33.97
10	45.12	30.12	5.80	4.18	12.81	10.77	18.61	22.79

temperatures and *C.plutellae* were the key factors in control of natural population of DBM.

Sentos *et al.* (2000) reported that *O.sokolowskii*, *D. insulare* and *Conura petioleventris* were the most common parasites emerges from parasitised larvae and pupae of *P.xylostella*. This is in contradiction to the earlier report where Joshi and Sharma (1974) indicated the dominance of larval parasite *A.plutellae* (36.6 per cent) in Rajasthan. Chellian and Srinivasan (1986) observed 72 per cent larval parasitisation. Oh *et al.* (1997) reported 9.8% parasitism in different season. Reddy and Singh (1998) reported 13.13 to 36.17 per cent parasitisation in different generations for first instar and 18.33 to 43.33 in second instar. In the present investigation the percentage of parasitisation by both the parasitoid differed from the report by earlier workers that may be due to host density, season and climatic conditions which are different at different places but the work done by the earlier scientists brings conformity in findings of the present investigation.

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