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Surveying on incidence of chilli gall complex in major chilli growing districts of Karnataka

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Abstract

The investigation on “Surveying on incidence of chilli gall complex in major chilli growing districts of Karnataka”. Survey was conducted in three major chilli growing district of Karnataka viz., Raichur, Ballari and Bagalkot, Karnataka, India during kharif season of the year 2013-14. The roving survey conducted indicated that the presence of all three species of gall formers. Among them *Asphondylia capparidis* and *Goethella asulcata* were observed to be predominant species in all the three districts of Karnataka viz., Raichur, Ballari and Bagalkot and least by *Ceratoneura indi* during 2014. The peak activity was noticed during first fortnight November 2013 with a highest incidence of 25 per cent in fruits from Raichur, Karnataka.

Keywords: Survey, gall, damage, *Asphondylia capparidis*, *Goethella asulcata* and *Ceratoneura indi*

Introduction

Chilli (*Capsicum annum* L.) is an important vegetable and spice crop grown across the tropical and sub tropical regions of the world, which belongs to the genus *Capsicum*, family, *Solanaceae* with chromosome number $2n=24$. Chilli also referred to as chillies, chile, hot peppers, bell peppers, red peppers, pod peppers, cayenne peppers, paprika, pimento and capsicum in different parts of the world. The term capsica is derived from Latin word mean hollow pod. India being the world's largest producer, consumer and exporter of chillies has the largest area of 7.33 lakh ha accounting for 42.81 per cent of world area. India ranks 1st in the world in chilli production with 17.64 lakh tonnes followed by China (3.21 lakh tonnes), Ethiopia (2.94 lakh tonnes), Thailand (2.47 lakh tonnes) and Pakistan (1.48 lakh tonnes) in 2018-19.

Gall midge is a serious pest in chilli growing states like Andhra Pradesh, Telangana, Karnataka, Tamil Nadu, Maharashtra and Madhya Pradesh causing 10-40 per cent yield loss (Kumar *et al.*, 2009) [4]. Infestation by the chilli gall midge results in severe flower drop, reduction in yield, fruit size, seed number and production of malformed fruits. The same species was reported to attack bell pepper and brinjal also. The infestation due to gall insects on *Capsicum* ranged from 10-56 per cent depending on the variety or hybrid, stage of crop, location and management practices (Nagaraju *et al* 2002) [5]. Though gall midge damage was largely restricted to sweet peppers and brinjal in the recent past, perceptible host shift has been observed to encompass chilli pepper particularly in irrigated conditions.

Materials and Methods

Roving survey was conducted in two major chilli growing states namely Hyderabad Karnataka. In Karnataka state, three major chilli growing districts were selected viz., in case of Bagalkot, Biligi and Bagalkot taluka, in case Raichur, Gabbur and Raichur taluka and in case of Ballari, Siruguppa and Ballaritaluka were selected. In each district, three chilli fields were selected to collect the samples. The sample included 100 chilli flower buds, that were cut opened and the percent incidence by different species viz., *A. capparidis*, *G. asulcata* and *C. indi*. was recorded including different life stages like larva, pupae and adults. The per cent damage was calculated by using the following formula,

$$\text{Per cent damage} = \frac{\text{No. of deformed flowers and fruits}}{\text{Total No. of fruits and flowers}} \times 100$$

Observations on the species and number of gall formers were recorded. Such sampling was carried out at 15 days interval starting from initiation of the flowering till crop maturity.

Results and Discussion

Incidence of chilli gall midge in Raichur district during 2013-14

Gabbur

At Gabbur, Raichur, incidence of all the three gall formers was noticed and the per cent incidence of *A. capparisi* ranged between 7.00 and 27.00 during the course of investigation. The midge incidence increased from 21.0 to 27.0 per cent during second fortnight of December and later started decreasing, reaching 7.0 per cent during first fortnight of February. The mean incidence was 19.4 ± 7.44 per cent (Table 1).

The incidence of *G. asulcata* ranged from 15.0 to 44.00 per cent during the period of observation. During the first observation taken on first fortnight of December, incidence of *G. asulcata* was 27 per cent and started increasing and reaching a peak of 44 per cent during second fortnight of December and lowest incidence recorded during first fortnight of January with 15.00 per cent. Further, overall mean incidence was 28.8 ± 12.91 per cent.

The incidence of *C. indi* was not noticed during first fortnight December. The peak incidence (16.00%) was noticed during second fortnight of January and lowest incidence was observed during first fortnight of December with 8.0 per cent. Among the gall formers, *G. asulcata* was highest ranging from 15.00 to 44.00 per cent with a mean incidence of 28.8 ± 12.91 per cent throughout the observation period. This was followed by gall midge, *A. capparisi* recording a mean incidence of 19.4 ± 7.44 per cent. Incidence of *C. indi* ranged between 8.0 to 16.00 per cent with an average of 11 ± 3.00 per cent. During different dates of observation, total incidence of all the gall formers was highest during first fortnight of January (77.00 %) followed by 75.00 per cent in second fortnight of December.

Raichur

Incidence of all the three gall formers was noticed at Raichur. The per cent incidence of *A. capparisi* ranged between 7.0 and 22.0 during the course of investigation. The midge incidence increased from 16.0 to 22.0 per cent from first fortnight of December and later started decreasing reaching to 7 per cent during first fortnight of February. The mean incidence was 13.2 ± 5.89 per cent (Table 2).

The incidence of *G. asulcata* ranged from 5.0 to 31.0 per cent during the period of observation. Peak incidence of *G. asulcata* was 31.0 per cent noticed during second fortnight of December and lowest incidence was during first fortnight of February with 5.0 per cent and overall mean incidence was 17.8 ± 9.47 per cent.

The incidence of *C. indi* was noticed during first fortnight December with 8 per cent. The peak incidence of 13.0 % was noticed during first fortnight of January and lowest with no incidence was observed in first fortnight of February.

Among the gall formers, *G. asulcata* was highest which ranged from 5.0 to 31.0 per cent with a mean incidence of 17.8 ± 9.47 per cent throughout the observation period. This was followed by gall midge, *A. capparisi* recording a mean incidence of 13.2 ± 5.89 per cent. The mean incidence of *C. indi* was 7.6 ± 4.83 and was lowest among all three species. During different dates of observation, total incidence of all the

gall formers was highest during second fortnight of December (63.00 %) and least in first fortnight of February (12.00%).

Incidence of chilli gall formers in Ballari district, Sirguppa (Ballari)

Per cent incidence of *A. capparisi* ranged between 4.0 and 30.0 during the course of investigation. The midge incidence increased from 22.0 to 30.0 per cent from first fortnight of December and least incidence of 4.0 per cent was observed during second fortnight of January. The mean incidence was 13.8 ± 10.69 per cent (Table 3).

The incidence of *G. asulcata* ranged from 0.0 to 29.0 per cent during the period of observation. Peak incidence of *G. asulcata* was 29.0 per cent noticed during second fortnight of January and no incidence was observed during first fortnight of February. However, overall mean incidence was 13.8 ± 10.50 per cent.

The incidence of *C. indi* was very low compared to rest of the species during first fortnight January with 2.00 per cent and there was no incidence was observed in rest of the observation period.

Among the gall formers, *A. capparisi* was highest ranging from 4.0 to 30.0 per cent with a mean incidence of 15.8 ± 10.69 per cent throughout the observation period. This was followed by gall midge, *G. asulcata* recording a mean incidence of 13.8 ± 10.50 per cent. The mean incidence of *C. indi* was 0.6 ± 4.83 and was the lowest among the gall formers. During different dates of observation, total incidence of all the gall formers was highest during second fortnight of December (44.00 %) and least in first fortnight of February (7.00%).

Ballari

Incidence of all the three gall formers was noticed at Ballari. The per cent incidence of *A. capparisi* ranged between 11.00 and 40.00 during the observation period. The midge incidence was highest during the first fortnight of December with 40 per cent and least in first fortnight of February (11%) with mean incidence of 23.6 ± 10.69 per cent (Table 4).

G. asulcata incidence ranged from 10 to 30 per cent during the period of observation. Peak incidence of *G. asulcata* was 30 per cent noticed during second fortnight of December and lowest incidence recorded during first fortnight of February with 10 per cent and the overall mean incidence was 20.6 ± 7.73 per cent.

The incidence of *C. indi* was low compared to other two species which ranged in between 3.00 to 11.00 per cent with highest in second fortnight January and least in January first fortnight with a mean incidence of 6.6 ± 3.36

Among the gall formers, *A. capparisi* was highest with a mean incidence of 23.6 ± 10.69 per cent followed by gall midge, *G. asulcata* recording a mean incidence of 20.6 ± 7.73 per cent. The mean incidence of *C. indi* was 6.6 ± 3.36 and was the lowest among all the species of gall formers. Overall the incidence of gall formers accounted for 50.8 ± 17.15 per cent and highest was during first fortnight of December (70.00 %) and least in first fortnight of February (25.00 %).

Incidence of chilli gall formers in Bagalkot district

Biligi

At Biligi, Bagalkot, incidence of all the three gall formers was noticed. The per cent incidence of *A. capparisi* ranged between 0.00 and 19.00 during the course of investigation. The midge incidence increased from 11.00 to 19.00 per cent during first fortnight of December and later started

decreasing, reaching 8.00 per cent during second fortnight of January. The mean incidence was 9.6 ± 6.80 per cent (Table 5).

The incidence of *G. asulcata* ranged from 2.0 to 7.0 per cent during the period of observation. During the first observation taken on first fortnight of December, incidence of *G. asulcata* was 5.0 per cent and started decreasing. Peak incidence of 7.0 per cent recorded during second fortnight of January and lowest incidence recorded during first fortnight of February with only 2.0 per cent. Overall mean incidence was 4.4 ± 1.95 per cent.

The incidence of *C. indi* was very low that was noticed only during second fortnight of January with 2.0 per cent.

Overall mean incidence of gall formers was 14.4 ± 7.44 per cent, among the gall formers, *A. capparisi* was highest (9.6 ± 6.8 %) followed by gall midge, *G. asulcata* recorded a mean incidence of 4.4 ± 1.95 per cent. During different dates of observation, total incidence of all the gall formers was highest during second fortnight of December (22.00 %) and least of 2.0 per cent in first fortnight of February.

Bagalkot

Incidence of all the three gall formers was noticed at Bagalkot with a mean of 25.4 ± 13.54 per cent. The per cent incidence of *A. capparisi* ranged between 3.00 and 22.00 during the observation period. The midge incidence was highest during the second fortnight of December with 22 per cent and least during first fortnight of February (3.00%) with mean incidence of 14.0 ± 7.42 per cent (Table 6).

G. asulcata incidence ranged from 0.0 to 15.00 per cent during the period of observation. Peak incidence of *G. asulcata* was 30.00 per cent noticed during first fortnight of December and no incidence during first fortnight of February and overall mean incidence was 9.4 ± 5.68 per cent.

The incidence of *C. indi* was low compared to other two species which ranged in between 0.0 to 6.0 per cent with

highest during first fortnight December and incidence decreased thereafter and over mean incidence of 2.0 ± 2.45 per cent.

Among the gall formers, *A. capparisi* was highest with a mean incidence of 14.0 ± 7.42 per cent followed by gall midge, *G. asulcata* recording a mean incidence of 9.4 ± 5.68 per cent. The mean incidence of *C. indi* was 2.0 ± 2.45 and was lowest among all the species of gall formers. During different dates of observation, total incidence of all the gall formers was highest during first fortnight of December (36.00 %) which continued by up to second fortnight of December and least in first fortnight of February (3%).

In case *A. capsici*, highest mean incidence was observed in Ballari district and followed by Gabbur of Raichur lowest mean incidence in Raichur district, in case of *G. asulcata*, highest mean incidence was observed in Gabbur and lowest in the case Biligi of Bagalkot. In the case of *C. indi*, highest mean incidence was observed in Gabbur and followed by Raichur and lowest incidence was observed in Biligi of Bagalkot. Infestation by chilli gall midge, *A. capparisi* was reported Basavaraj (2010) [1] from Karnataka where its mean incidence of was 23.6 per cent in Ballari district which was in close agreement with the reports of Basavaraj (2010) [1] who recorded incidence of *A. capparisi* on fruits ranging from 0.76 to 19.52 per cent with an average incidence of 8.17 per cent during October 2009 to January 2010. Kalavathi (2014) [2] also recorded incidence *G. asulcata* on fruits range from 11 to 29 per cent. With peak incidence of 29.00 per cent during first fortnight of January. The peak incidence of *C. indi* (16.00 %) was noticed during second fortnight of January, in close agreement with observation of Kalavathi (2014) [2]. Whereas Krishnakumar *et al.* (1998) [3] reported incidence on fruits rang from zero to 66.67 per cent. Variation in the extent of damage could be attributed due to change in place, variety and management practices under taken.

Table 1: Incidence of chilli gall formers at Gabbur, Raichur district during 2013-14

Sl. No.	Date of Survey	Incidence of gall formers (%)			
		<i>A. capparisi</i> *	<i>G. asulcata</i> *	<i>C. indi</i> *	Total
1	December I Fortnight	20.00	27.00	8.00	55.00
2	December II Fortnight	21.00	44.00	10.00	75.00
3	January I Fortnight	27.00	40.00	10.00	77.00
4	January II Fortnight	22.00	15.00	16.00	53.00
5	February I Fortnight	7.00	18.00	11.00	36.00
	Mean	19.4 ± 7.44	28.8 ± 12.91	11 ± 3.00	59.2 ± 17.04

* Average of 100 flowers/buds

Table 2: Incidence of chilli gall formers at Raichur district during 2013-14

Sl. No.	Date of Survey	Incidence gall formers (%)			
		<i>A. capparisi</i> *	<i>G. asulcata</i> *	<i>C. indi</i> *	Total
1	December I Fortnight	16.00	19.00	8.00	43.00
2	December II Fortnight	22.00	31.00	10.00	63.00
3	January I Fortnight	11.00	20.00	13.00	44.00
4	January II Fortnight	10.00	14.00	7.00	31.00
5	February I Fortnight	7.00	5.00	0.00	12.00
	Mean	13.2 ± 5.89	17.8 ± 9.47	7.6 ± 4.83	38.6 ± 18.77

* Average of 100 flowers/buds

Table 3: Incidence of chilli gall formers at Siruguppa, Bellary district during 2013-14

Sl. No.	Date of Survey	Incidence gall formers (%)			
		<i>A. capparitis</i> *	<i>G. asulcata</i> *	<i>C. indi</i> *	Total
1	December I Fortnight	22.00	16.00	1.00	39.00
2	December II Fortnight	30.00	14.00	0.00	44.00
3	January I Fortnight	16.00	10.00	2.00	28.00
4	January II Fortnight	4.00	29.00	0.00	33.00
5	February I Fortnight	7.00	0.00	0.00	7.00
	Mean	15.8±10.69	13.8±10.50	0.6±0.89	30.2±14.31

* Average of 100 flowers/buds

Table 4: Incidence of chilli gall formers at Bellary district during 2013-14

Sl. No.	Date of Survey	Incidence gall formers (%)			
		<i>A. capparitis</i> *	<i>G. asulcata</i> *	<i>C. indi</i> *	Total
1	December I Fortnight	40.00	24.00	6.00	70.00
2	December II Fortnight	22.00	30.00	9.00	61.00
3	January I Fortnight	26.00	16.00	3.00	45.00
4	January II Fortnight	19.00	23.00	11.00	53.00
5	February I Fortnight	11.00	10.00	4.00	25.00
	Mean	23.6±10.69	20.6±7.73	6.6±3.36	50.8±17.15

* Average of 100 flowers/buds

Table 5: Incidence of chilli gall formers at Biligi, Bagalkot district during 2013-14

Sl. No.	Date of Survey	Incidence of gall formers (%)			
		<i>A. capparitis</i> *	<i>G. asulcata</i> *	<i>C. indi</i> *	Total
1	December I Fortnight	11.00	5.00	0.0	16.00
2	December II Fortnight	19.00	3.00	0.0	22.00
3	January I Fortnight	10.00	5.00	0.0	15.00
4	January II Fortnight	8.00	7.00	2.0	17.00
5	February I Fortnight	0.00	2.00	0.0	2.00
	Mean	9.6±6.80	4.4±1.95	0.4±0.89	14.4±7.44

* Average of 100 flowers/buds

Table 6: Incidence of chilli gall formers at Bagalkot district during 2013-14

Sl. No.	Date of Survey	Incidence of gall formers (%)			
		<i>A. capparitis</i> *	<i>G. asulcata</i> *	<i>C. indi</i> *	Total
1	December I Fortnight	15.00	15.00	1.00	36.00
2	December II Fortnight	22.00	11.00	0.00	35.00
3	January I Fortnight	19.00	9.00	2.00	30.00
4	January II Fortnight	11.00	12.00	0.00	23.00
5	February I Fortnight	3.00	0.00	0.00	3.00
	Mean	14±7.42	9.4±5.68	0.6±0.89	25.4±13.54

* Average of 100 flowers/buds

Conclusion

From the investigation it was found that, all three species of gall former complex were recorded in Karnataka.

References

- Basavaraj K. Studies on the seasonal incidence of chilli gall formers, biology and crop loss estimation due to chilli midge, *Asphondylia Capparitis* (Rubsamen), M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Raichur; c2010.
- Kalavathi KK, Naganagouda A, Sreenivas AG, Prabhuraj A. (b), Study on preferred stage of fruiting bodies for infestation of gall former on chilli and screening of chilli genotypes against *G. asulcata* G. Green Farming Int. J. 2014;5(4):701-704.
- Krishnakumar NK, Krishnamoorthy PN, Srinivasan K, Raman N, Anitha Perlinesther A. Seasonality and management of gall midge, *Asphondylia* sp. on brinjal and sweet pepper. In- Advances in IPM for horticultural crops, Proc. I national symposim. Pest management. Hort. Crops Environmental Implications Thrusts, Bangalore, India; c1998.
- Kumar KNK, Ranganath HR, Rami Reddy PV. Management of thrips, white mite, fruit borers and gall midge in chilli, National seminar on spices Current trends and future prospects of spices with special reference to chillies, Turmeric and seed spices, March 24th and 25th held at Horticultural research station, Lam, Guntur, Souvenir and abstracts; c2009. p. 19-24.
- Nagaraju DK, Virakthamath CK, Krishnakumar NK. Screening of bell pepper accessions against gall insects and their chemical control. Pest manage. Hortic. Ecsyst. 2002;8(1):12-19.