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Surveying on incidence of chilli gall midge in major chilli growing areas of North Karnataka

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Abstract

The investigation on "Surveying on incidence of chilli gall midge in major chilli growing areas of North Karnataka". Survey was conducted in three major chilli growing district of Northern Karnataka viz., Haveri, Gadag and Dharwad, Karnataka, India during *kharif* season of the academic year 2018-19. The data revealed that Byadagi taluk of Haveri district recorded highest flower bud damage (13.82%) and Haveri taluk of Haveri district recorded highest fruit damage (13.84%) incidence caused by gall midge as compared with other taluks. However overall per cent gall midge damage recorded in Haveri district (25.56%) as compared with Gadag (22.68%) and Dharwad (21.66%).

Keywords: survey, village, damage, gall, percent, kharif

Introduction

Chilli (*Capsicum annum*) is a most diverse vegetable species and is considered to be high value crop. Which belongs to genus *Capsicum*, family Solanaceae with chromosome number $2n=24$. It is believed that origin of chilli is around 700 BC and origin was Mexico. It is introduced to India through Indonesia and other part of Asia around 400-500 years ago by Portuguese traders (Berke and Sheih, 2000) [4]. In this mainly five (5) domestic species are there, viz., *C. pubescens*, *C. baccatum*, *C. chinensis*, *C. frutescens* and *C. annum*, which have been described and studied extensively (Smith *et al.*, 1987) [9]. Among these different domestic species of genus *Capsicum*, *C. annum* is the most widely cultivated genus all over world because of its pungency and pungent (sweet pepper) fruits (Bosland and Votava, 2000) [5]. It is mainly grown in South Africa, New Zeland, Australia, Pakistan and in other Asian countries. Chilli spread from India, through Central Asia and Turkey, to Hungary. It is grown mainly in tropical climatic conditions with ideal temperature of between, 20-25 °C and requires the warm climate and loamy soil having high amount of organic content are best suited. In India chilli is a most important commercial cultivated crop for vegetable, spice and industrial (oleoresin and capsicum extraction) purpose (Kumar and Raj, 2005) [7].

India is one of the major chilli producing country in the world which shares 25-26% of dry chilli production and occupies an area of 8.31 lakh with production of 18.72 lakh mt and productivity is 2.25 mt per ha in India.

The major chilli growing states includes Andhra Pradesh (49%), Maharashtra (26%), Karnataka (15%), West Bengal (12%) and Tamil Nadu (3%) consisting nearly 75% of total area and production and Andhra Pradesh is the major growing state where area under chilli is 2.06 lakh ha with the production of 8.83 lakh ha under Byadagi variety and other chilli cultivars producing 1.03 lakh MT (Anon, 2017) [1].

Byadagi chilli is one of the most important cultivated farmers variety which is mainly grown in different parts of Karnataka viz., Haveri, Dharwad, Gadag. The name Byadagi comes after a town of Byadagi District. The business of Byadagi chilli has 2nd largest turnover among all chilli variety of India.

Chilli blossom midge (*A. capsici*) is a serious pest on chilli crop in Maharashtra, Madhya Pradesh, Karnataka, Tamil Nadu and Andhra Pradesh. The extent of loss ranges from 16.3 to 64 per cent (Basavaraj *et al.*, 2011).

The gall midge mainly infests the flower buds and fruits that leads to the deformation of flower buds and fruits resulting in severe flower bud drop, decreasing in fruit size, seed number and finally reduction in yield.

Therefore, it is an essential to develop pest management strategies by incorporating various IPM components such as use of organic amendments and botanicals. Keeping these points in view, detail investigations were undertaken with the following objectives.

Materials and Method

Nature of damage caused by gall midge, *Asphondylia capsici* Barnes

Dult of *Asphondylia capsici* is light yellowish brown, mosquito like full grown maggot is light, very small about (3 mm in length) pointed at both the end. Female gall midge oviposited on tender flower bud and flowers (Plate 5 & 6). The adult female insect egg inside ovary, flower buds and young tiny fruits. This observations conformity with Patel and Chary (1970), Orphanides (1975) and Maryana (2006), reported that maggot is the damaging stage and one or two maggots were seen in separate chambers. Present findings also in close agreement with Orphanides (1975); Nagaraju (2000)^[8]; Tommer (1993) and Rangarajan and Mahadevan (1974) and reported that more than one maggots were found in a single fruit. The maggot which feed on the internal body content of the ovary results in formation of deformed fruits instead of normal fruit.

Survey

Chilli is one of the most commercial grown important crop in *kharif* season in part of the Haveri. That is in the month of July/ August and harvesting commences from January and continued till February.

Roving survey was carried out in the month of October and November in different villages of Dharwad (Kundagol), Haveri (Byadagi and Haveri) and Gadag districts (Naragund). In each village five plots were selected and in each plot 10 plants were randomly observed for the incidence of gall midge based on deformed flower buds and fruits. In each plant total number of flower buds and total number of fruits and similarly total number of deformed flower buds and total number of deformed fruits were observed. The per cent damage was calculated by using following formula.

$$\text{Per cent damage} = \frac{\text{No of deformed flower buds \& fruits / plant}}{\text{Total no flower buds \& fruits / plant}} \times 100$$

Incidence of chilli gall midge in Haveri district during 2018-19

Based on the survey carried out and result present in Table-3, indicated that, mean per cent deformed flower buds per plant, ranged from 13.10 to 14.26 in Byadagi taluk of Haveri district. It was lowest in Lakkamagikoppa (13.10 per cent/plant) and highest in Guddada Mallapur (14.26 per cent/plant) village, however in other villages *viz.*, Bannihatti, the incidence of deformed flower bud was 14.10 per cent.

Mean per cent incidence of deformed flower buds per plant in Haveri taluk revealed that, it was 13.04 per cent in Kabbur village whereas, 12.19 per cent in Agadi village. Further, overall mean per cent deformed flower buds per plant was 13.39 per cent in Haveri district (Table 1 and Fig 1).

Mean per cent deformed fruits per plant ranged from 10.08 to 16.14 per cent, which was lowest in Bannihatti (10.08 per cent/plant) and highest in Agadi village (16.14 per cent/plant). In other villages *viz.*, Kabbur, Lakkamagikoppa and in Guddada Mallapur, the incidence of 11.54, 11.54 and 11.81 per cent respectively. Further, overall mean per cent deformed

fruits per plant was 12.22 in Haveri. Similar results were also obtained by Basavaraj (2010)^[3] reported that due to severe attack of *A. capsici* on chilli fruit, the per cent of galled fruit ranged from 0.76 to 19.52 per cent and Kalavathi *et al.* (2014) reported the incidence gall midge on chilli fruit ranged from 5.80 to 15.60 per cent in Raichur district (Table 1 and Fig 1). The per cent gall midge damage in Haveri taluk ranged from 24.18 to 28.33. It was lowest in Bannihatti village (24.18%) and highest in Agadi (28.33%) and in other villages *viz.*, Kabbur, Lakkamagikoppa and Guddada Mallapur the incidence was 24.58, 24.64 and 26.07 per cent respectively. Further, overall per cent of gall midge damage was 25.56 in Haveri district which is in close agreement with reports of Nagarjun (2000)^[8] recorded the maximum incidence of 90.91 per cent damage in Golluchinnappanahalli near Bangalore. Whereas, Krishnakumar *et al.* (1998)^[6] reported that the incidence of gall midge on fruit ranged from zero to 66.67 per cent. The variation in extent of damage could be attributed due to the change in management practices undertaken, variety and place (Table 1 and Fig 1).

Incidence of chilli gall midge in Gadag district during 2018-19

Survey was carried out in different villages of Gadag district and result presented in Table-3. Mean per cent deformed flower buds per plant, ranged from 11.03 to 12.12 in Naragunda taluk of Gadag district. It was lowest in Kapli (11.03 per cent/plant) and highest in kallapur (12.12 per cent/plant). However, in other villages *viz.*, Vasana, Boodihal and Sirol, the incidence was 11.41, 11.54 and 11.92 per cent respectively. Further, overall mean per cent deformed flower buds per plant was 11.60 in Gadag district (Table 1 and Fig 1).

Incidence of mean per cent deformed fruits per plant ranged from 10.69 to 11.29 per cent, which was lowest in Sirol (10.69 per cent/plant) and highest in Kallapur (11.29 per cent/plant). However in other village's *viz.*, Vasana, Boodihal and Kapli, the incidence of deformed fruits was 11.11, 11.07 and 11.26 per cent respectively. Further overall mean per cent deformed fruits per plant was 11.08 in Gadag district. Similar results were also obtained by Basavaraj (2010)^[3] reported that due to severe attack of *A. capsici* on chilli fruit, the per cent of galled fruit ranged from 0.76 to 19.52 per cent and Kalavathi *et al.* (2014) reported the incidence gall midge on chilli fruit ranged from 5.80 to 15.60 per cent in Raichur district (Table 1 and Fig 1).

The per cent incidence of gall midge in Naragund taluk ranged from 22.29 to 23.41 per cent. It was lowest in Kapli (22.29%) and highest in Kallapur (23.41%). In other villages *viz.*, Vasana, Boodihal and Sirol, the incidence was 22.52, 22.61 and 22.61 per cent respectively. Further, overall per cent gall midge damage was 22.68 in Gadag district which is in close agreement with reports of Nagarjun (2000)^[8] recorded the maximum incidence of 90.91 per cent damage in Golluchinnappanahalli near Bangalore. Whereas, Krishnakumar *et al.* (1998)^[6] reported that the incidence of gall midge on fruit ranged from zero to 66.67 per cent. The variation in extent of damage could be attributed due to the change in management practices undertaken, variety and place (Table 1 and Fig 1).

Incidence of chilli gall midge in Dharwad district during 2018-19

Based on the survey carried out and result presented in Table-3. Indicated that, mean per cent deformed flower buds/plant,

ranged from 10.81 to 11.95 in Kundagol taluk of Dharwad district. It was lowest in Kumbihal (10.81%) and highest in Yalival (11.95%). However in other villages viz., Belligatti, Ingalagi and Ramanakoppa, the incidence of gall midge recorded was 10.93, 10.50 and 11.19 per cent respectively. Further, overall mean per cent deformed flower buds/plant was 11.27 (Table 1 and Fig 1).

Incidence of mean per cent deformed fruits per plant ranged from 9.51 to 10.97 per cent, which was lowest in Belligatti (9.51 per cent/plant) and highest in Yalival (10.97 per cent/plant). However in other villages viz., Kumbihal, Ingalagi and Ramanakoppa, the incidence of gall midge recorded was 10.46, 10.57 and 10.41 per cent respectively. Further overall mean per cent deformed fruits/plant was 10.38. Similar results were also obtained by Basavaraj (2010) [3] reported that due to severe attack of *A. capsici* on chilli fruit, the per cent of galled fruit ranged from 0.76 to 19.52 per cent and Kalavathi *et al.* (2014) reported the incidence gall

midge on chilli fruit ranged from 5.80 to 15.60 per cent in Raichur district (Table 1 and Fig 1).

The per cent incidence of gall midge in Kundagol taluk ranged from 20.44 to 22.92 per cent. It was lowest in Belligatti (20.44 per cent/plant) and highest in Yalival (22.92 per cent/plant), However in other villages viz., Kumbihal, Ingalagi and Ramanakoppa, the per cent incidence of gall midge was 21.27, 22.07 and 21.60 respectively. Further, overall, per cent gall midge damage was 21.66 which is in close agreement with reports of Nagarjun (2000) [8] recorded the maximum incidence of 90.91 per cent damage in Golluchinnappanahalli near Bangalore. Whereas, Krishnakumar *et al.* (1998) [6] reported that the incidence of gall midge on fruit ranged from zero to 66.67 per cent. The variation in extent of damage could be attributed due to the change in management practices undertaken, variety and place (Table 1 and Fig 1).

Table 1: Incidence of chilli gall midge in major chilli growing areas of northern Karnataka, 2018-19

| Sl. No. | District | Taluk | Village | Stage of the crop | Mean per cent deformed flower buds/plant | Mean per cent deformed fruits/plant | Total per cent gall midge damage |
|---------|----------|-----------|------------------|----------------------------|--|-------------------------------------|----------------------------------|
| 1 | Haveri | Byadagi | Guddada Mallapur | Flowering & fruiting stage | 14.26 | 11.81 | 26.07 |
| | | | Bannihatti | Flowering & fruiting stage | 14.10 | 10.08 | 24.18 |
| | | | Lakkamagikoppa | Flowering & fruiting stage | 13.10 | 11.54 | 24.64 |
| | | Haveri | Agadi | Flowering & fruiting stage | 12.19 | 16.14 | 28.33 |
| | | | Kabbur | Flowering & fruiting stage | 13.04 | 11.54 | 24.58 |
| Average | | | | | 13.39 | 12.22 | 25.56 |
| 2 | Gadag | Naragunda | Vasana | Flowering & fruiting stage | 11.41 | 11.11 | 22.52 |
| | | | Kallapur | Flowering & fruiting stage | 12.12 | 11.29 | 23.41 |
| | | | Boodihal | Flowering & fruiting stage | 11.54 | 11.07 | 22.61 |
| | | | Kapli | Fruit maturity stage | 11.03 | 11.26 | 22.29 |
| | | | Sirrol | Flowering & fruiting stage | 11.92 | 10.69 | 22.61 |
| Average | | | | | 11.60 | 11.08 | 22.68 |
| 3 | Dharwad | Kundagol | Belligatti | Fruit maturity stage | 10.93 | 9.51 | 20.44 |
| | | | Kumbihal | Fruit maturity stage | 10.81 | 10.46 | 21.27 |
| | | | Ingalagi | Flowering & fruiting stage | 11.50 | 10.57 | 22.07 |
| | | | Yalival | Flowering & fruiting stage | 11.95 | 10.97 | 22.92 |
| | | | Ramanakoppa | Fruit maturity stage | 11.19 | 10.41 | 21.6 |
| Average | | | | | 11.27 | 10.38 | 21.66 |

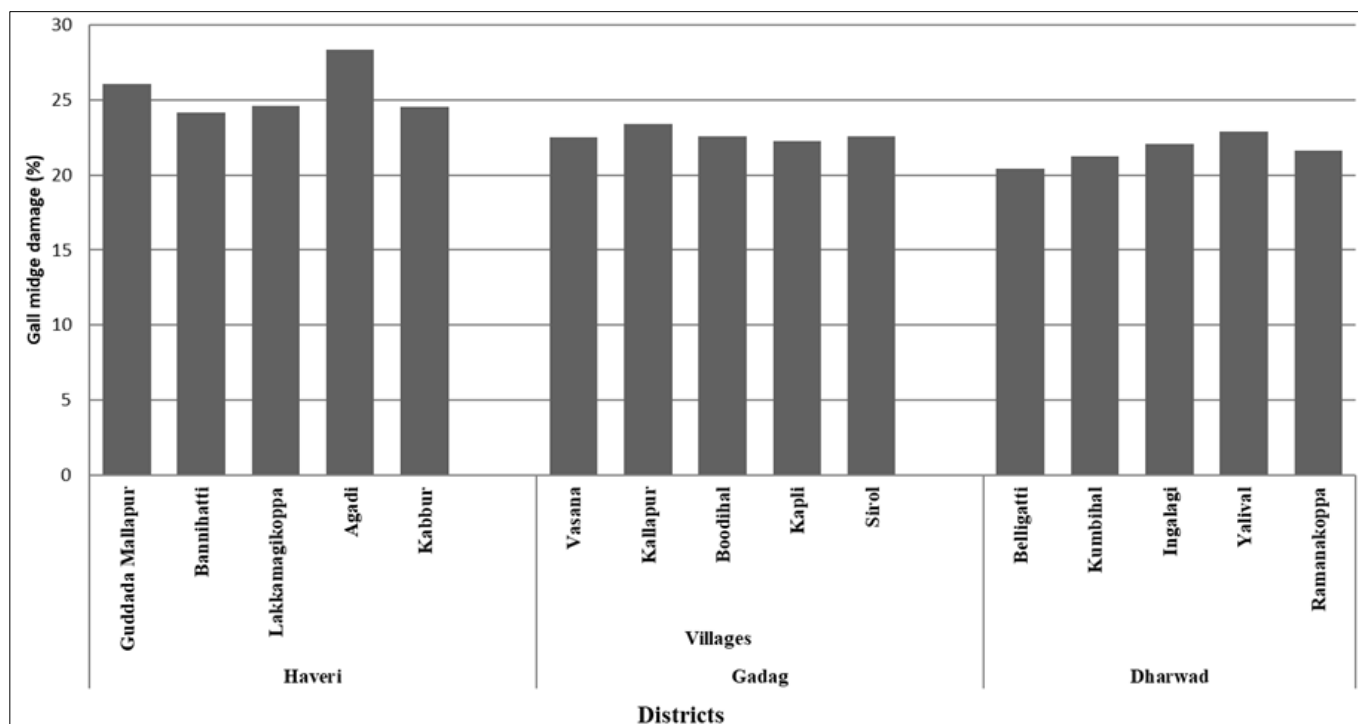


Fig 1: Incidence of chilli gall midge in major chilli growing areas of Northern Karnataka during *Kharif* 2018-19

Summary and Conclusion

Survey was carried out in three major chilli growing areas of Northern Karnataka viz, Haveri, Gadag, and Dharwad district and highest mean per cent of deformed flower buds recorded in Guddada mallapur (14.26%) and Bannihatti (14.10%) of Byadagi taluk followed by Kobbur (Haveri) taluk which recorded the mean per cent of 13.04. Overall Byadagi taluk, (13.82%) has highest flower bud damage as compared to Haveri taluk (12.61%) and highest mean per cent of fruit damage was in Agadi (16.14%) of Haveri taluk followed by Guddada mallapur (11.81%) of Haveri taluk and overall per cent of fruit damage in Haveri taluk (13.84%) as compared to Byadagi taluk (11.14%). The per cent of gall midge damage highest in Haveri taluk (26.45%) compared to Byadagi taluk (24.96%).

In Gadag district the mean per cent of deformed flower buds is highest in Kallapur (12.12%) village as compared to other village viz., Sirol (11.92%), Boodihal (11.54%), Vasana (11.41%) and Kapli (11.03%) of Naragund taluk.

Similarly, occurrence of mean per cent of deformed fruits in Kallapur (11.29%) village as compared to other villages viz., Kapli (11.26%), Vasana (11.11%), Boodihal (11.07%) and Sirol (10.69%) of Naragund taluk and per cent gall midge damage of 22.68 per cent in Gadag district.

In Dharwad district, the occurrence of mean per cent of deformed flower bud in Yalival (11.95%) and lowest in Kumbihal (10.81%) as compared to other villages viz., Ingalagi (11.50%), Ramanakoppa (11.19%) and Belligatti (10.93%) of Naragund taluk and total per cent of gall midge damage in Dharwad is 21.66 per cent.

In all these district, the overall incidence of gall midge is highest in Haveri district (25.56%) as compared with Gadag (22.68%) and Dharwad district (21.66%).

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