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PEST COMPLEX OF KING CHILLI, *CAPSICUM CHINENSE* JACQUIN IN ASSAM, NORTH EAST INDIA

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ABSTRACT
Field experiment on pest complex of King chilli was carried out at Horticultural Orchard, Assam Agricultural University, Jorhat during *rabi* (2014-15 and 2015-16). Altogether 19 species of arthropod pests were found to be associated with King chilli at Jorhat, out of which *Aphis gossypii*, *Myzus persicae*, *Bemisia tabaci*, *Bactrocera latifrons*, *Scirtothrips dorsalis* and *Polyphagotarsonemus latus* were identified as major pest. The pest species recorded during the period of investigation included 9 hemipterans, 3 lepidopterans, 2 Trombidiformes and one species each from under order Orthoptera, Coleoptera, Diptera, Thysanoptera and Blattodea. During 2014-15, 14 species were identified and 17 species during 2015-16 and their relative abundance was higher in 2015-16 (54.84%) compared to 2014-15 (45.16 %). Among the insect pests recorded, 12 species *viz*., *M. persicae*, *B. latifrons*, *G. africana*, *Cofana* sp., *Empoasca* sp., *Sogatella* sp., *Coccus* sp., *Phenacoccus* sp., *S. litura*, *Orvasca* sp., *Blattella* sp. and *Tetranychus* sp.) have been reporting for the first time from Assam adding the number of insect pests in King chilli ecosystem.

INTRODUCTION

King chilli (*Capsicum chinense* Jacquin) is an important spice crop belongs to the family Solanaceae with chromosome number 2n = 24. The crop is extensively grown in North Eastern region of India, predominantly in three states *viz*., Assam, Manipur and Nagaland. The chilli is known by various names in different regions and it is widely known as *Bhut Jolokia* or *Bih Jolokia* in Assam*; Raja Mircha* or *Raja Mirchi* in Nagaland and *U-Morok* or *OO-Morok* in Manipur. This regional crop of North East India is gaining its fame because of high capsaicin contains (3-5%) as compared to any other chillies found in India and in 2007, Guiness World Records certified this chilli as the world's hottest chilli pepper, which is 400 times hotter than Tabasco sauce (Baruah *et al.,* 2014).

Among the various constraints in chilli cultivation, the attack of a multitude of insect pests and mites at different crop stages is of utmost concern (George and Giraddi, 2007). Surveys conducted by AVRDC, Taiwan in Asia revealed that the major pests that attack chilli are aphids (*Myzus persicae*, *Aphis gossypi*), mite (*Polyphagotarsonemus latus*) and thrips (*Scirtothrips dorsalis*) (Berke and Sheih, 2000). Due to monoculture of chilli, pest build up is so much that farmers have to resort to minimum of 5-6 chemical sprays. Number of sprays have increased over the years to manage the sucking pests resulting in cost of cultivation that has increased enormously making cultivation of chilli highly risk and non profitable. In addition to these, the pesticidal sprays have become a threat to chilli ecosystem causing a negative impact to natural enemy fauna with a positive trend to resurgence of pests (George and Giraddi, 2007). In Assam, the King chilli was found to be infested by *Aphis gossypii*; *Scirtothrips dorsalis*, *Bemisia tabaci, Amrasca biguttula biguttula, Agrotis ipsilon* and *Monolepta signata* (Buragohain *et al.,* 2017) and also highly susceptible to viral diseases showing symptoms of mosaic, leaf curl, etc. which greatly reduce the growth and fruit yield (Talukdar *et al.,* 2015). Baruah *et al*. (2016) also reported that the plant was found to be infected by Cucumber mosaic virus (CMV), Potato virus Y (PVY), Tomato spotted wilt virus (TSWV) and Chilli leaf curl virus (ChLCV) which is transmitted by aphids, thrips and whitefly respectively. Since little work has been done on insect pests of chilli in North East India, an effort was made to study the pest complex of King chilli in Jorhat.

MATERIALS AND METHODS

Study on the pest complex of King chilli was carried out at the Experimental farm, Department of Horticulture, Assam Agricultural University, Jorhat during two *rabi* season (2014-15 and 2015-16). The locally available King chilli cultivar was grown as the host crop for the present investigation which was suitable for all agro climatic zones of Assam. Preparation of the field and raising of the crop were done by following package and practices for horticultural crops of Assam. The seed were then sown on 15th September, 2014 and 20th September, 2015 in V type plastic trays filled with cocopit and one/two seeds were sown per hole of the tray. The seedlings were transplanted on 10th January, 2015 and 14th January, 2016 for studying the pest complex. The seedlings were

maintained with the spacing of 75×75 cm in 100 m^2 plot and observations on the incidence of insect pests were recorded at weekly interval in the morning hrs starting from initial appearance to the harvest of the crop from 30 randomly selected plants / plot as followed by Begam *et al*. (2016).

The insect pests were photographed and collected by using aspirator, pit fall trap and insect collecting net. The insect specimens were killed by using chloroform and preserved them in 80 per cent ethanol in plastic vials for small and soft bodied insects and pinning was done for larger insects. The samples were sent to National Bureau of Agricultural Insects Resources (NBAIR), Bangalore for identification. The relative abundance was also calculated by counting total number of species in each season and sum of species and expressed in percentage. Similarly, relative abundance of species within the season was also assessed by counting total species in each order and total number of species recorded during the season and expressed in percentage by adopting a standard procedure (Thangjam, 2012).

RESULTS AND DISCUSSION

The present investigation on pest complex of King chilli conducted in Jorhat during two *rabi* season (2014-15 and 2015-16) were recovered and found that the chilli was infested by many insects and non insect pests under field condition (Table 1). Altogether 19 species of arthropods pests were found to be associated with King chilli, out of which 6 species were identified as "major" and they were *Aphis gossypii* (Glover), *Myzus persicae* (Sulzer), *Bemisia tabaci* (Gennadius), *Bactrocera latifrons* (Hendel), *Scirtothrips dorsalis* (Hood) and *Polyphagotarsonemus latus* (Banks) whereas *Gryllotalpa africana* (Palisot de Beauvois), *Cofana* sp., *Empoasca* sp., *Amrasca biguttula biguttula* (Ishida), *Sogatella* sp., *Coccus* sp., *Phenacoccus* sp., *Monolepta signata* (Olivier), *Spodoptera litura* (Fabricius), *Orvasca* sp., *Agrotis ipsilon* (Hufnagel), *Blattella* sp. and *Tetranychus* sp. were not causing serious damage to the crop and therefore they were categorized as minor pest (Table 1). During 2014-15, 14 species of pests were identified and 17 species during 2015-16 and the relative abundance of pests was higher in 2015-16 (54.84%) compared to 45.16 per cent during 2014-15 (Table 1). The pest species recorded during the period of investigation included 9 hemipterans, 3 lepidopterans, 2 Trombidiformes and one species each from under order Orthoptera, Coleoptera, Diptera, Thysanoptera and Blattodea (Table 2). The relative abundance of hemipteran pests were maximum both in 2014-15 and 2015-16 (42.86 and 47.06%, respectively) followed by lepidopteran pests (21.43 and 17.65%, respectively). However, the relative abundance of mites was 14.29 per cent during 2014-15 and 5.88 per cent in 2015-16. The relative abundance of insects under order Coleoptera, Diptera and Thysanoptera were 7.14 and 5.88 per cent during 2014-15 and 2015-16, respectively and Orthoptera and Blattodea were recorded only in 2015-16 with the relative abundance of 5.88 per cent each (Table 2 and Fig. 1).

The numbers of pest species were low during *rabi,* 2014-15 as compared to 2015-16 and this might be due to early arrival of monsoon and also the experimental site was surrounded

Table 1: List of pest recorded in King chilli during 2014-15 and 2015-16

Sl. No.	Common name	Scientific name	Family	*rabi*2014-15	*rabi*2015-16	Order	Status
1	Mole cricket	*Gryllotalpa africana* (Palisot de Beauvois, 1805)	Gryllotalpidae		+	Orthoptera	Minor
2	Cotton aphid	*Aphis gossypii* (Glover, 1877)	Aphididae	+	+	Hemiptera	Major
3	Green peach aphid	*Myzus persicae* (Sulzer, 1776)	Aphididae		+	Hemiptera	Major
4	Silverleaf whitefly	*Bemisia tabaci* (Gennadius, 1889)	Aleyrodidae	+	+	Hemiptera	Major
5	Leaf hopper	*Cofana* sp.	Cicadellidae	+		Hemiptera	Minor
6	Leaf hopper	*Empoasca* sp.	Cicadellidae	+	+	Hemiptera	Minor
7	Leaf hopper	*Amrasca biguttula biguttula* (Ishida, 1912)	Cicadellidae	+	+	Hemiptera	Minor
8	White backed plant hopper	*Sogatella* sp.	Delphacidae	+	+	Hemiptera	Minor
9	Soft scale insect	*Coccus* sp.	Coccidae		+	Hemiptera	Minor
10	Mealybug	*Phenacoccus* sp.	Pseudococcidae		+	Hemiptera	Minor
11	Leaf beetle	*Monolepta signata* (Olivier, 1808)	Chrysomelidae	+	+	Coleoptera	Minor
12	Solanum fruit fly	*Bactrocera latifrons* (Hendel, 1912)	Tephritidae	+	+	Diptera	Major
13	Chilli thrips	*Scirtothrips dorsalis* (Hood, 1919)	Thripidae	+	+	Thysanoptera	Major
14	Tobacco cutworm	*Spodoptera litura* (Fabricius, 1775)	Noctuidae	+	+	Lepidoptera	Minor
15	Tussock Caterpillar	*Orvasca* sp.	Lymantriidae	+	+	Lepidoptera	Minor
16	Black cutworm	*Agrotis ipsilon* (Hufnagel, 1766)	Noctuidae	+	+	Lepidoptera	Minor
17	Cockroach	*Blattella* sp.	Blattellidae		+	Blattodea	Minor
18	Broad Mite	*Polyphagotarsonemus latus* (Banks, 1904)	Tarsonemidae	+		Trombidiformes	Major
19	Mite	*Tetranychus* sp.	Tetranychidae	+	+	Trombidiformes	Minor
Total				14	17		
Relative abundance (per cent)				45.16	54.84		

** Note: " + " denote the presence of insects during the respective seasons

Table 2: Relative abundance of different insect pests order in King chilli during 2014-15 and 2015-16

Sl. No.	Order	Common name	Scientific name	Family	*rabi*2014-15	*rabi*2015-16	Crop stage
1	Orthoptera	Mole cricket	*Gryllotalpa africana* (Palisot de	Gryllotalpidae	-	+	Seedling
Relative abundance (per cent)			Beauvois, 1805)		0.00	5.88	
1	Hemiptera	Cotton aphid	*Aphis gossypii* (Glover 1877)	Aphididae	+	+	Seeding to maturity
2		Green peach aphid	*Myzus persicae* (Sulzer 1776)	Aphididae	-	+	Seeding to maturity
3		Silverleaf whitefly	*Bemisia tabaci* (Gennadius, 1889)	Aleyrodidae	+	+	Seeding to maturity
4		Leaf hopper	*Cofana* sp.	Cicadellidae	+	-	Vegetative to fruiting
5		Leaf hopper	*Empoasca* sp.	Cicadellidae	+	+	Vegetative to fruiting
6		Leaf hopper	*Amrasca biguttula biguttula*(Ishida, 1912)	Cicadellidae	+	+	Vegetative to fruiting
7		White backed plant hopper	*Sogatella* sp.	Delphacidae	+	+	Vegetative to fruiting
8		Soft scale insect	*Coccus* sp.	Coccidae	-	+	Vegetative to maturity
9		Mealybug	*Phenacoccus* sp.	Pseudococcidae	-	+	Vegetative to maturity
Relative abundance (per cent)					42.86	47.06	
1	Coleoptera	Leaf beetle	*Monolepta signata* (Olivier, 1808)	Chrysomelidae	+	+	Seedling to maturity
Relative abundance (per cent)					7.14	5.88	
1	Diptera	Solanum fruit fly	*Bactrocera latifrons* (Hendel 1912)	Tephritidae	+	+	Fruiting to maturity
Relative abundance (per cent)				7.14	5.88		

Sl. No.	Order	Common name	*Scientific name*	Family	*rabi*2014-15	*rabi*2015-16	Crop stage
1	Thysanoptera	Chilli thrips	*Scirtothrips dorsalis* (Hood 1919)	Thripidae	+	+	Vegetative to fruiting
Relative abundance (per cent)					7.14	5.88	
1	Lepidoptera	Tobacco cutworm	*Spodoptera litura* (Fabricius, 1775)	Noctuidae	+	+	Vegetative to fruiting
2		Tussock Caterpillar	*Orvasca* sp.	Lymantriidae	+	+	Vegetative to fruiting
3		Black cutworm	*Agrotis ipsilon* (Hufnagel)	Noctuidae	+	+	Seedling
Relative abundance (per cent)					21.43	17.65	
1	Blattodea	Cockroach	*Blattella* sp.	Blattellidae	-	+	Vegetative to maturity
Relative abundance (per cent)					0.00	5.88	
1	Trombidiformes	Chilli mite	*Polyphagotarsonemus latus* (Banks, 1904)	Tarsonemidae	+	-	Vegetative to maturity
2		Spider mite	*Tetranychus* sp.	Tetranychidae	+	+	Vegetative to maturity
Relative abundance (per cent)					14.29	5.88	

** Note: " + " denote the presence of insects during the respective seasons

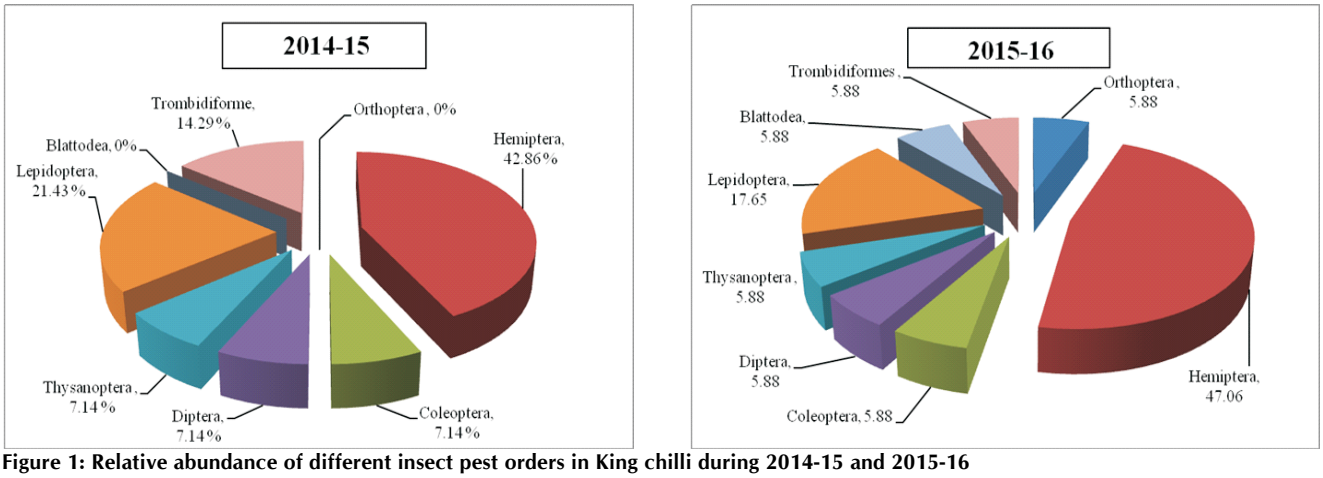

Figure 1: Relative abundance of different insect pest orders in King chilli during 2014-15 and 2015-16

by solanaceous crops. Earlier many insect pests have been identified by many scientists from different regions at different crop stages of chillies, however, only few pests have been identified from King chilli (*Capsicum chinense* Jacq.) as reported by Priyakshi *et al*. (2015), Bathari *et al*. (2016) and Begam *et al*. (2016) and *Aphis gossypii*, *Scirtothrips dorsalis*, *Bemisia tabaci* and *Polyphagotarsonemus latus* were the major pests and *Amrasca biguttula biguttula*, *Agrotis ipsilon* and *Monolepta signata* were associated with *Capsicum chinense* Jacq. in Assam. However, during the present investigation, altogether 19 species of pests have been identified and out of which 12 species *viz*., *M. persicae*, *B. latifrons*, *G. africana*, *Cofana* sp., *Empoasca* sp., *Sogatella* sp., *Coccus* sp., *Phenacoccus* sp., *S. litura*, *Orvasca* sp., *Blattella* sp. and *Tetranychus* sp. have been reporting for the first time from Assam adding the number of pests in King chilli.

The present results were also in conformity with Krishna Kumar *et al*. (1996) who reported that thrips (*S. dorsalis* Hood), whitefly (*B. tabaci* Gennadius), aphid (*M. persicae* Sulzer), broad mites (*P. latus* Banks), fruit borer (*H. armigera* Hubner) and tobacco caterpillar (*S. litura* Fabricius) were the major pests of chilli in India. Reddy and Puttaswamy (1983; 1984) recorded 51 species of insects and 2 species of mites belonging to 27 families under 9 orders in transplanted chilli and 35 species of insect pests and 1 species each of mite and snail in nursery. Moreover, *Agrotis ipsilon, S. dorsalis, P. latus* and *S. litura* were recorded as serious pests in Dharwad, Karnataka. Dey *et al*. (2001) and Chakraborti *et al*. (2015) also observed 21 insects and non-insect pests infesting chilli crop and found that *S. dorsalis*, *A. gossypii*, *P. latus* and *B. tabaci* were the major pest in chilli at West Bengal. Jadhav *et al*. (2004) also reported 39 genera and 51 species of insects and mite and out of which *A. gossypii*, *S. dorsalis* and *A. bigutulla* were the major insect pests of chilli. Sarwar (2012) and Roopa and Kumar (2014) also observed *P. latus, Tetranychus* sp., *A. gossypii, M. persicae, S. dorsalis, B. tabaci, Gnorimoschema sp., Neosilba* sp., *Liriomyza sativae, S. litura* and *A. ipsilon* as a major pests of chilli. Boopathi *et al*. (2013) reported that fruit flies (*Bactrocera* sp.) caused extensive damage to capsicum in Mizoram and Wingsanoi and Siri (2012) also reported *B. latifrons* Hendel as a serious pest in chilli from Indonesia.

Since many insect pests have been identified from King chilli ecosystem, it is therefore required to identify their natural enemies and also to prepare a management strategies for controlling them that are safe to environment and also reduce the use of chemical pesticides in King chilli.

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