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RESEARCH PAPER

Survey and surveillance of soybean pink pod borer, *Cydia ptychora* (Meyrick) in northern Karnataka

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Abstract: Roving survey was undertaken in three districts of northern Karnataka *viz.,* Dharwad, Belagavi and Haveri to know the incidence pattern of pink pod borer, *Cydia ptychora* during *kharif* 2021. The highest larval incidence was observed in Dharwad district (4.12 larvae/5 plants) followed by Belagavi district (3.92 larvae/5 plants) and the lowest incidence was recorded in Haveri district (1.19 larvae/5 plants). The maximum number coccinellids and chrysopids were observed in Belagavi (0.71 and 0.41 adults/plant) and lowest population was recorded in Haveri (0.50 and 0.17 adults/plants). Fixed plot survey was conducted during *kharif* 2021 at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad. The incidence of pink pod borer on soybean was noticed from 32nd Meteorological Standard Week (MSW) and continued till 40th MSW. The larval population in JS 335 variety ranged from 0.99 to 13.02 larvae/5 plants. The incidence of natural enemies were found from 32nd MSW onwards and the mean number of coccinellids (*Cheilomenes sexmaculata* and *Illeis* sp.) and chrysopids (*Chrysoperla carnea*) observed were 0.59 and 0.33 per plant, respectively.

Key words: *Cydia ptychora,* Soybean, Surveillance, Survey

Introduction

Soybean (*Glycine max* L.) Merrill) is the world's most widely planted oilseed crop. It belongs to the order Fabales and family Fabaceae. Soybean is renowned as "Yellow jewel", "Wonder crop" or "Golden Bean". It is often referred to as the "Miracle crop" of the 21st century because of its wider geographical adaptation, chemical composition and multiple uses. Soybean contains 40% protein and 20% oil of its total weight. It is the world's leading provider of protein and oil, as well as a good source of protein because it contains a high amount of essential amino acids like lysine (6.4%), glycine and tryptophan which are lacking in most of the cereals. Soybean is the cheapest and most abundant source of edible vegetable protein among all pulse crops. Soy vegetable oil is another product of the soybean crop and fat-free soybean meal is the cheapest protein for animal feeds.

In India pink pod borer, *Cydia ptychora* is a serious pest on cowpea, black gram and soybean (Adimani, 1976). Pink pod borer oviposits on the soybean pods and the larva after hatching bore into the seeds, producing yellowish dry frass and exits through the pods exit hole. The exit holes on the pods, webbing within the pods and production of frass will severely reduce food value and germination capacity. It undergoes pupation in the soil by forming the earthen cocoon. In Karnataka, the pod borer *Cydia ptychora* is a major insect pest of soybean that causes significant damage. It is of foremost importance because it is a major insect pest in Dharwad area and causes severe crop damage resulting in significant losses. In 1975, the proportion of damage to soybean pods caused by *C. ptychora* soon before harvest ranged from 10.5 to 91.29 on crops sown in October and July, respectively (Adimani, 1976), Hence to know the current status and sevearity of *Cydia ptychora* in Northern Karnataka is very important and taking surveys as an objective is very needful.

Material and methods

Roving Survey was conducted during *kharif* 2021 in major soybean growing areas of Dharwad, Belagavi and Haveri disticts of northern Karnataka. The survey was undertaken during the pod formation stage of the crop from August 2021 till September 2021. From each taluk, three villages with five fields were surveyed for the incidence of pod borer, *Cydia ptychora.*

During the roving survey, observations on the number of larvae per five plants were recorded in five randomly selected spots of the field and observations on per cent pod damage was also recorded at five randomly selected plants in five randomly selected spots. The per cent pod damage was worked out using the formula,

$$\text{Per cent pod damage} = \frac{\text{Number of damaged pods}}{\text{Total number of pods}} \times 100$$

Fixed plot survey was carried out in 10 m x 10 m, plot at Main Agricultural Research Station, UAS, Dharwad campus during *kharif*-2021 to record the incidence pod borer on soybean variety JS 335 planted with a spacing of 30 cm x 10 cm. In a fixed plot survey, the plot was divided into four sub plots. In each sub plot 10 plants were randomly selected for observation.

In fixed plot survey, observations on the number of larvae was made from five randomly selected plants at weekly intervals after the appearance of pest till harvesting of the soybean crop. The observations on pod damage was made by counting the total number of pods and infested pods from five randomly selected plants in five randomly selected spots of each sub plot and per cent pod damage was calculated by using above mentioned formula. Observations on seed damage were made by counting the total number of seeds and infested seeds from five randomly selected plants in five randomly selected spots of each sub plot. Later, the per cent pod damage was worked

out using the above formula and per cent seed damage was worked out using the following formulas and transformed to arcsine values for statistical analysis.

$$\text{Per cent seed damage} = \frac{\text{Number of damaged seeds}}{\text{Total number of seeds}} \times 100$$

During the course of the study, observations on natural enemies on the soybean pod borer, *C. ptychora* have been made to know the population density of natural enemies *viz.,* coccinellids and chrysopids were recorded in each treatment leaving border rows at before and after treatment imposition.

Results and discussion

A detailed roving survey was undertaken during *kharif* 2021 in parts of northern Karnataka to gather information on the severity and distribution of pink pod borer of soybean from different localities. This information is highly useful to identify the hot spots of this pest in Dharwad, Belagavi and Haveri districts where soybean is extensively grown as oilseed crop.

From the survey it was revealed that the severity of this pest was varied from locality to locality. In Dharwad district, Dharwad taluk has recorded highest larval population of 4.90 larvae/5 plants with 18.11 per cent pod damage, followed by Hubli (4.02 larvae/5 plants and 15.77% pod damage). Least population was observed in Kundagol taluk (3.66 larvae/5 plants and 13.08% pod damage). Maximum number of Coccinellids were recorded in Kalagatagi taluk (0.94/plant) and highest number of chrysopids were recorded in Dharwad and Kundagol taluk (0.35/plant) (Table 1).

In Belagavi district, Bailhongal taluk has recorded highest larval population of 4.67 larvae/5 plants with 17.56 per cent pod damage and followed by Hukkeri (3.98 larvae/5 plants and 10.52% pod damage). Least larval population was recorded in Belagavi (3.10 larvae/5 plants and 11.12% pod damage). Highest number of coccinellids were recorded in Bailhongal (1.21/plant) and maximum number of chrysopids were recorded in Belagavi and Hukkeri (0.74/plant) (Table 2).

In Haveri district, Haveri taluk has recorded maximum larval population of 1.28 larvae/5 plants and 5.23 per cent pod damage (Table 3) and least was recoded in Shiggaon taluk with larval population of 1.09 larvae/5 plants and 3.84 per cent pod damage. Maximum number of coccinellids and chrysopids were recorded in Shiggaon 0.62/plant and 0.17/plant, respectively.

Among the three districts surveyed the pink pod borer incidence was prevalent in all these districts. The maximum population of *C. ptychora* was recorded in Dharwad (4.12 larvae/5 plants) causing mean per cent pod damage of 15.11% followed by Belagavi (3.92 larvae/5 plants) with pod damage of 13.07 per cent Whereas, lowest mean larval population was recorded in Haveri (1.19 larvae/5 plants) with 4.54 per cent of pod damage. Similar reports were made by Santhosh (2008) who reported that the per cent pod damage by pod borers was significantly lower in the early sown crop of soybean and in case of late sown crop maximum per cent pod damage of 58.77 per cent was recorded. Jakhmola and Singh (1985) who reported that *C. ptychora* as a pod borer pest of green gram and black gram in Madhya Pradesh. They observed that the infested locule of the pod gets shrivelled and turned lighter in colour.

In fixed plot survey, the incidence of pink pod borer, *C. ptychora* was noticed from 32nd Meteorological Standard Week (MSW) and continued till 40th MSW of the *kharif* season. The larval population of *C. ptychora* in variety JS 335 ranged from 0.99 to 13.02 larvae/five plants. The larval incidence showed an increasing trend from the initial stage of crop till its harvest. This indicated that the pod borer preferred to feed on matured seeds. The initial pod damage of 4.21 per cent was recorded on 32nd MSW and attained a peak of 32.18 per cent on 40th MSW of

Table 1. Status of *Cydiaptychora* and natural enemies in Dharwad district

Taluka	Name of village	Larval count/ 5 plants	Pod damage (%)	Predators/plant	
				Coccinellids	Chrysopids
Dharwad	Garag	5.31	19.25	0.28	0.64
	Narendra	4.59	17.05	0.04	0.11
	Yadawad	4.81	18.02	0.13	0.29
Mean		4.90	18.11	0.15	0.35
Kalaghatagi	Dummawad	3.58	11.98	2.01	0.12
	Kalaghatagi	4.99	17.56	0.21	0.40
	Gudihal	3.16	10.92	0.59	0.18
Mean		3.91	13.49	0.94	0.13
Hubli	Agadi	4.25	17.59	0.26	0.03
	Mavinkoppa	2.59	9.34	0.74	0.16
	Bommaasandra	5.21	20.39	0.83	0.05
Mean		4.02	15.77	0.61	0.08
Kundagol	Kundagol	2.99	9.15	1.01	0.33
	Betadur	3.97	13.05	0.21	0.21
	Shirur	4.02	17.03	0.64	0.84
Mean		3.66	13.08	0.62	0.35
District mean		4.12	15.11	0.58	0.23

Table 2. Status of *Cydia ptychora* and natural enemies in Belagavi district

Taluka	Name of village	Larval count/ 5 plants	Pod damage (%)	Predators/plant	
				Coccinelids	Chrysopids
Belagavi	Hirebagewadi	3.69	12.06	0.12	1.02
	Belawadi	2.56	9.68	0.08	0.98
	Jalikoppa	3.05	11.63	0.10	0.22
Mean		3.10	11.12	0.10	0.74
Hukkeri	Hukkeri	2.06	9.56	0.20	0.82
	Hosur	2.29	10.02	1.30	0.35
	Gotur	3.58	11.98	0.98	1.05
Mean		3.98	10.52	0.83	0.74
Bailhongal	Bailhongal	4.21	16.41	1.42	0.12
	Bevinkoppa	5.36	18.97	1.99	1.02
	Amatur	4.45	17.29	0.21	0.09
Mean		4.67	17.56	1.21	0.41
District mean		3.92	13.07	0.71	0.41

Table 3. Status of *Cydia ptychora* and natural enemies in Haveri district

Taluka	Name of village	Larval count/5 plants	Pod damage (%)	Predators/plant	
				Coccinellids	Chrysopids
Haveri	Haveri	1.25	4.32	0.28	0.12
	Devihosur	0.58	3.07	0.49	0.04
	Motebennur	2.01	8.31	0.36	0.15
Mean		1.28	5.23	0.38	0.10
Shiggaon	Shiggaon	1.05	4.03	0.29	0.21
	Timmapur	0.99	3.24	0.66	0.19
	Dassor	1.24	4.26	0.92	0.10
Mean		1.09	3.84	0.62	0.17
District mean		1.19	4.54	0.50	0.17

Table 4. Seasonal incidence of *Cydia ptychora* in soybean (Fixed plot survey) during *Kharif* 2021-22

Month/year	SMW	Larval count /5 plants	Pod damage (%)	Seed damage (%)	Predators/plant	
					Coccinellids	Chrysopids
Aug-21	29	0.00	0.00	0.00	0.00	0.00
	30	0.00	0.00	0.00	0.00	0.00
	31	0.00	0.00	0.00	0.00	0.00
	32	0.99	4.21	3.98	0.19	0.03
Sep-21	33	2.03	10.63	7.99	0.21	0.14
	34	2.99	12.09	10.12	1.58	0.94
	35	4.15	18.16	14.37	1.95	1.56
	36	5.29	20.16	15.81	2.06	1.21
Oct-21	37	6.36	23.39	16.39	1.02	0.09
	38	8.01	25.76	18.37	0.05	0.02
	39	10.69	29.38	20.19	0.03	0.01
	40	13.02	32.18	23.24	0.01	0.00
Mean		4.46	14.66	10.87	0.59	0.33

Note- Variety JS 335
SMW-Standard Meteorological Week
Date of Sowing- 21/07/2021

kharif (Table 4). The same trend was noticed with respect to seed damage. The seed damage in JS 335 soybean variety ranged from 3.98 per cent on 32nd MSW to 23.24 per cent on 40th MSW.

The incidence of natural enemies were found from 32nd MSW onwards. The mean number of coccinellids observed were 0.59 per plant and the more activity of population found during 36th MSW (2.06 per plant) and the mean number of chrysopids was 0.33 per plant and the maximum number were found during 35th MSW (1.56 per plant) and natural enemies showed dip in population as crop reaches maturity stage (Table 4).

Present investigation results are in line with the findings of Kumar (1978) and Shivaraju *et al.* (2011) who revealed that the pink pod borer *C. ptychora* activity was commenced from 35-40 days after sowing and peak incidence was during fourth week of October in black gram. Madhurima and Patil (2017) who reported that crop sown on the first week of June recorded minimum larval population (9-10 larvae/plant) and peak incidence was recorded in the crop sown during the last week

of July (30-40 larvae/plant). The present study was also in conformity with the findings of Prabhu (2013) who reported that the highest per cent pod damage (46.00%) in late June sown crop during its maturity period in September. This depicts that the incidence of *C. ptychora* begins from August and extends up to October. The July month sown crop suffers maximum pod and seed damage by pink pod borer.

Conclusion

From the foregoing discussion it can be concluded that among the three districts surveyed the pink pod borer incidence was prevalent in all the districts. The maximum population of *C. ptychora* was recorded in Dharwad causing mean per cent pod damage of 15.11% followed by Belagavi with pod damage of 13.07 per cent Whereas, lowest mean larval population was recorded in Haveri with 4.54 per cent of pod damage. The incidence of pink pod borer, *C. ptychora* on soybean was noticed from 32nd Meteorological Standard Week (MSW) and continued till 40th MSW of the *kharif* season. The larval population of *C. ptychora* in JS 335 variety ranged from 0.99 to 13.02 larvae / five plants. The pod damage by *C. ptychora* ranged from 4.21 per cent on 32nd MSW to 32.18 per cent on 40th MSW. The same trend was noticed with respect to seed damage. The present findings also help to the severity and distribution of pink pod borer of soybean from different localities. This information is highly useful to identify the hot spots of the pest.

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