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Bean Gall Weevil and Blister Beetle as New Pests on Red Kidney Bean (*Phaseolus vulgaris* L.) in India

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Abstract Red kidney bean (*Phaseolus vulgaris* L.) an important cash crop is attacked by eight species of insect pests which cause considerable damage. They included thrips, *Scirtothrips dorsalis*; aphids, *Aphis craccivora*; whitefly, *Bemisia tobaci*; hairy caterpillar, *Spilosoma obliqua*; stemfly, *Ophiomyia phaseoli*; pulse beetle *Callosobruchus chinensis*; bean gall weevil *Alcidodes signatus* and blister beetle *Cyaneolylta coerculea*. Of all these pests, bean gall weevil *Alcidodes signatus* and blister beetle, *Cyaneolylta coerculea* were the serious pests and recorded for the first from the crop and the country.

Key words Red kidney bean, insect pests, damage

Introduction

Pulses have been grown since millennia and have been a vital ingredient of the human diet in India. Of the several pulses, red kidney bean (*Phaseolus vulgaris*) (Leguminosae: Fabacea) possessing flavour and organoleptic qualities is widely grown in temperate areas of Jammu and Kashmir (above 1500 m altitude). Beans are a high nutritive and low-cost protein food. Green beans have been reported to contain 6.2% protein, 0.2% fat, and 63% carbohydrate (Sandsted, 1980). One of the major constraints in the production of red kidney bean, is the attack of various insect pests such as *Epilachna vigintioctopunctata*, the flea beetle, *Longitarsus belgaumensis*, an aphid, *Smynthurodes betae*, and the bean fly, *Ophiomyia phaseoli* which cause considerable damage (Golob and Kilminster, 1982., Pajni and Jabbal, 1986., Rizvi and Singh, 1995., Flood et al 1995, Srivastava and Agarwal, 2004). Besides, the minor insect pests of beans include, armyworm, black bug, grasshopper, thrips and leaf miners. In Brazil, *Zabrotes subfasciatus* has been reported as a serious pest of common beans, *P. vulgaris*. (Carvalho, et al 1968., Golob and Kilminster, 1982). In the eastern US,on the other hand, the Mexican bean beetle (*Epilachna varivestis*) has been recorded as the serious pest of beans. The other pests include: bean leaf beetle (*Cerotoma trifurcata*), seed corn maggot (*Delia platura*), bean weevil (*Acanthoscelides obtectus*), bean thrips (*Caliothrips fasciatus*) and bean aphid (*Aphis rumicis*) (Liebenberg, 2000). In some locations in Jammu and Kashmir, there had been a complete failure of the crop whereas in other places losses to the tune of 90-95% have been noticed. The present study was, therefore, conducted to determine the pest complex associated with red kidney beans and their nature of damage to prepare base for future studies. The results obtained are presented in this paper.

Materials and methods

The study was conducted in Luvang area of Bani about 200 km away from Jammu city during August 2006. The area is typically temperate. The crop was sown in the month of June as per the recommended package of practices (Anon, 2005). Each experimental plot consisted of 4 rows of 5 m length each. The row to row and plant to plant distance was maintained 40 cm and 15 cm, respectively. For observation on insect pests, 30 plants or parts of plants, in 3 replications (10 plants in each replication) were randomly selected. The insect pests observed on the plants were collected and preserved for identification. Aphid populations were assessed by visually examining plant leaves and terminals and recording the number of

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wingless, colonizing aphids. On each sampling date 5 young (a fully expanded leaf about 4-5th nodes from the terminal) and 5 old (3-4th leaf position from the base of the plant) leaves per plot were examined and the number of aphids per leaf were counted. Once bloom began and plants began to set seed, aphid colonies were visually examined on seed pod extensions. Similarly, other pests like white flies were collected from leaves and thrips from flowers. The beetles feeding on foliage and gall forming weevils attacking stems of the plants were also recorded. Simultaneously, the nature of damage caused by each insect pest was also recorded.

Results and Discussion

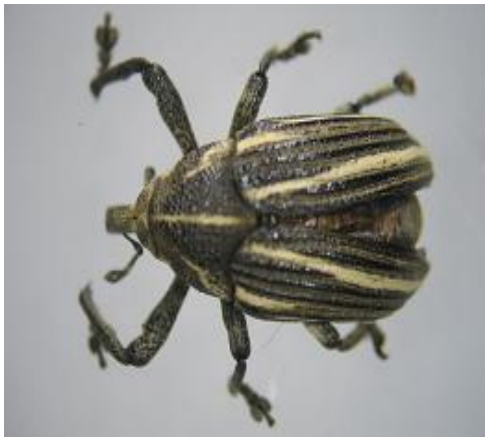
The data presented in table 1 revealed the presence eight species of insects associated with the crop which result in significant damage to the crop. They included; aphids, thrips, weevils, beetles, stem fly and hairy caterpillars (Table 1).

Of all the pests recorded in the present study, bean weevil, *Alcidodes signatus* was found to be the serious pest of red kidney beans. These weevils were found to damage the plants by stem girdling and boring which leave the characteristic ring of frayed fibers. Larvae enter stems, pupate in the galls formed resulting in no fruit setting and the death of the plant. On an average, 6.2±1.2 (n=20) galls have been recorded per plant. Each gall contained 3-5 developing grubs. The damage was more than 95%. The pest was very active from July to September and infested the main stem and side branches of the plant. In earlier studies, Sundramurthy and Chitra, (1992) have also found bean gall weevil, *Alcidodes erythropterus* and the internode borer, *Alcidodes affaber* Aurivillus as serious pest of cotton in South India. Some other species of weevils have been recorded damaging various species of crop plants in different parts of the world which include *Alcidodes crassus*; *Al. curvirostris*; *Al dipterocarpi*; *Al frenatus*; *Al. gmelinae*; *Al hoplomachus*; *Al humeralis*; *Al. micranthiphilus*; *Al. micronchus* and *Al. rameze* (Liebenberg, 2000). The discovery of *Alcidodes signatus* forming stem galls in red kidney bean constitutes first record in the world. Similarly, grubs and/or adults of blister beetle *Cyaneolylta coerculea* were found in large numbers feeding voraciously on leaves and flowers of red kidney beans. On an average, 6.00±1.20, n=30 blister beetles were found per 30 plants. Their behaviour of aggregation on one patch of plants and then other makes them most serious pests of beans causing considerable damage by feeding on the foliage or flower heads. Similarly, many earlier workers (Greathead, 1963, Selander, 1987, Booth et al 1990) have reported that adult meloids on account of their moderate size and swarming behaviour, can cause considerable damage to crops by feeding on the foliage or flower heads. In earlier studies also (Arnett, et al 2002), meloids of the genus *Cyaneolylta* have been reported as leaf feeding group of blister beetles causing damage to leaves and flowers of several families of plants such as Asteraceae, Leguminosae, Solanaceae and Umbelliferae. Sansone (2002) re-

Table 1. Insect pests associated with red kidney bean and their nature of damage in Jammu region of Jammu& Kashmir state.

Name of the pest	Nature of damage	Status
Aphid *Aphis craccivora* Koch (Hemiptera: Aphididae)	Adults and nymphs sucks cell sap from upper leaves and inflorescences	Minor
Whitefly *Bemisia tobaci* Genn. (Hemiptera: Aleyrodidae)	Nymphs and adults suck the sap from the leaves and also transmit yellow mosaic	Minor
Hairy caterpillar *Spilosoma obliqua* (Wlk) (Lepidoptera: Arctidae)	Larvae defoliate the plants	Minor
Thrips, *Scirtothrips dorsalis* Hood. (Thsanoptera: Thripidae)	Nymphs and adults suck the sap from the flowers resulting in flower drop.	Minor
Stemfly, *Ophiomyia phaseoli* Tryon (Diptera: Agromyziidae)	Maggots bore through the stem causing yellowing and wilting of the plant	Minor
Pulse beetle, *Callosobruchus chinensis* (Linnaeus) (Coleoptera: Bruchidae)	Grubs feed on developing grains	Minor
Bean gall weevil, *Alcidodes signatus* Boheman (Coleoptera: Curculionidae)	Weevils lay eggs at the node axle and grubs feed on the tissue at the axle resulting in the gall formation at internodes.	Major
Blister beetle, *Cyaneolylta coerculea* Luckert (Coleoptera: Meliodae)	Grubs and/or adults feed voraciously on leaves and flowers	Major

(A)



(B)

(C)

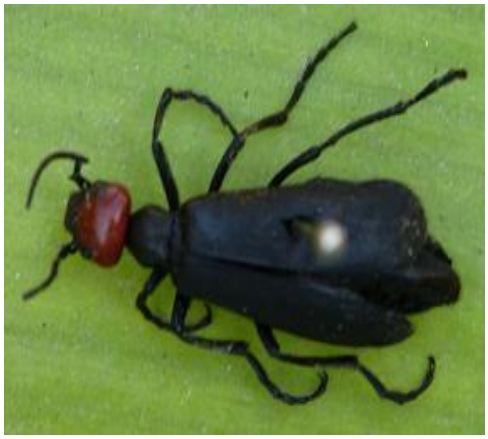


Fig. 1. A = *Alcidodes signatus* (adult); B = Showing gall formed by bean weevil *Al. signatus* on the internode of red kidney bean (*Phaseolus vulgaris*); C = Blister beetle, *Cyaneolylta coerculea* (Adult)

ported them as serious pests of potato, tomato, alfalfa, sugarbeet and variety of vegetables in Texas USA.

In India, several insect pests have been recorded attacking beans which include *Epilachna vigintioctopunctata*, the flea beetle, *Longitarsus belgaumensis*, an aphid, *Smynthurodes betae*, and the bean fly, *Ophiomyia phaseoli* (Rizvi and Singh, 1994). Similarly, the Mexican bean beetle (*Epilachna varivestis*) was found to be the most serious insect pest attacking bean in the eastern US. The other pests identified were: bean leaf beetle (*Cerotoma trifurcata*), seed corn maggot (*Delia platura*) bean weevil (*Acanthoscelides obtectus*), bean thrips (*Caliothrips fasciatus*) and bean aphid (*Aphis rumicis*) (Liebenberg, 2000). Nyirenda (2000) in a similar study recorded several species of insect pests attacking beans in Malawi, Tanzania and found that jassids, thrips, and aphids were present in the highest levels. Besides, *Mylabris*, *Ootheca*, and *Ophiomyia* were also widespread and present in over 80% of the fields sampled and caused relatively high mortality of beans.

Perusal of the literature reveals that bean weevil, *Alcidodes signatus* and blister beetle *Cyaneolylta coerculea* attacking red kidney bean (*Phaseolus vulgaris*) have not been recorded from India as well as any part of the world. Evidently, their presence with red kidney bean constitutes new record in the world.

Conclusions

In conclusion, extensive studies are required to identify and manage the emerging new insect pests hitherto unknown from India attacking the crop. Detailed studies on biology of insect pests could be useful for their efficient management.

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Literature cited

Anonymous, 2005. Package of practices for kharif crops. Directorate of extension Education, Sher- e -Kashmir University of Agricultural Sciences & Technoloy, Jammu, Jammu & Kashmir, India. 70p.

Arnett, R.H., Jr., M.C. Thomas, P.E. Skelley & J.H. Frank. (editors). 2002. American Beetles, Volume II: Polyphaga: Scarabaeoidea through Curculionoidea. CRC Press. 861 pp.

Booth, R.G, M.L Cox and R.B, Madge.1990. Guides to Insects of Importance to Man. 3. Coleoptera, C.A.B. International, Wallingford, 384pp.

Carvalho, R. P. L. DE and C. J. Resseto. 1968. Biology of *Zabrotes subfasciatus* (Boheman) (Coleoptera: Bruchidae). Revista Brasileira de Entomologia **13**: 195-197.

Flood, B., G, Hein and W. R. Beans. 1995. In "Vegetable Insect Management with Emphasis on the Midwest" (ed. R. Foster, B. Flood), Meister Publishing Co., Willoughby, Ohio, pp. 41-54 (1995).

Golob, P. and A. Kilminster. 1982. The biology and control

of *Zabrotes subfasciatus* (Boheman) (Coleoptera: Bruchidae) infesting red kidney beans. Journal of Stored Products Research 18: 95-101.

Greathead, D.J.1963. A review of the insect enemies of Acridoidea (Orthoptera). Transactions of the Royal Entomological Soc. London, 114(14): 437-517.

Liebenberg, A.J. (Ed.) 2000. Dry bean production Department of Agriculture Directorate Agricultural Information Service, Private Bag X144, Pretoria 0001 South Africa

Nyirenda, G.K.C. 2000. Preliminary results of bean insect pests in Karonga Agricultural Development Division and some parts of Lilongwe and Shire Valley Agricultural Development Divisions in Malawi. Proceedings: Bean Seed Workshop Arusha, Tanzania January 12-14, 2000., Bunda College of Agriculture, Lilongwe, Malawi

Pajni, H. R. and A. Jabbal. 1986. Some observations of *Zabrotes subfasciatus* (Boh.) (Bruchidae: Coleoptera). Research Bulletin of the Panjab University Science 37: 11-16.

Rizvi, S.M.A, and A.K. Singh.1994.Succession of insect pests infesting Rajmash in eastern Uttar Pradesh. Indian J.Plant. Prot.22 (2):226-227.

Sandsted, R. 1980. Energy inputs in snapbean production. p.127-128. In: Pimentel, D. (ed.), Handbook of energy utilization in agriculture. CRC Press, Inc., Boca Raton, FL.

Sansone, C. 2002. Blister Beetles, Texas Agricultural Extension fact sheet B-1401, Integrated Pest Management Guide for Texas Forage Crops. 41 p

Selander, R.B. 1987.Behavioural observation in *Cyaneolytta* and a description of the triungulin larva of *C. fryi* (Col.: Melodae). J. Kansas Entomol. Soc. 60 (2): 288-304.

Srivastava, C and M. Agarwal. 2004. Relative toxicity of some insecticides tothe adults of rajma beetle *Zabrotes subfasciatus* (Boh.). Indian J. Entomol. 66 (1): 40-41.

Sundramurthy, V.T. and K. Chitra. 1992. Integrated pest management in cotton. Indian J. Pl. Prot. 20: 1-17.