

Short Communication

Effect of configuration of calyx in cowpea flowers on infestation by spotted pod borer, *Maruca vitrata* (Fab.) (Lepidoptera: Crambidae)

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ABSTRACT

Twenty cowpea accessions were evaluated for resistance to the spotted pod borer, *Maruca vitrata* in the Department of Agricultural Entomology, College of Horticulture, Kerala Agricultural University, Thrissur. The calyxes of the flowers were examined and the accessions were categorized into two groups, partially free (major portion of the sepals free, the basal portion tight) and semi tight (major portion of the sepals tight, only the tip free). Significant variation was observed in terms of damage to cowpea flowers due to spotted pod borer. The highest extent of flower damage (50.39 %) was recorded in case of Bhagyalakshmy. Categorization of the different accessions on the basis of the configuration of calyx indicated that EC 100092, Palakkadanthandanpayar, TVX – 944, EC 300039, IC 20645 and IC 52110 had semi tight calyx characterized by tight sepals with tips alone being free. All these accessions had consistently low levels of infestation ranging from zero to 3.16 per cent. The accessions C – 152, Kanakamony, PKM – 1, Anaswara, IC 20431, Sreya, Hridya, Mysore local, IC 52105, Kashikanchan, Vellayani Jyothika, Malika, Bhagyalakshmy and Lola had major portion of sepals free with their basal portion tight. Hence, they were grouped as partially free. Free sepals would provide the first instar borer larvae some extent of concealment as well as enable it to bore into the flower more easily. Tight calyx, thus, could possibly have a deterrent effect on the first instar larvae entry.

Key words: Calyx, resistant, cowpea, pod, *Maruca vitrata*

INTRODUCTION

Cowpea, *Vigna unguiculata* (L.), is an important legume of the tropics and subtropics. It is an important source of dietary protein in the predominantly cereal based diet followed across Asia. Cowpea is used as a grain legume, vegetable and also as a fodder.

The legume pod borer, *Maruca vitrata* (Fab.) is the most important insect pest of cowpea, causing yield loss of up to 60 per cent. It occurs throughout the tropics and subtropics of Central and South America, Asia and Africa. The wide geographical distribution, broad host range and ability to infest different plant part like flower buds, flowers, pods and seeds make it a formidable pest.

The destructiveness at flowering and pod development constitutes a significant constraint to the productivity of cowpea.

Maruca vitrata attacks cowpea during the reproductive phase. The female moth lays eggs on or near the flower buds (Sharma, 1998). The larvae feed on buds, flowers and pods. Flowers, pods and leaves are often webbed together. Being an internal feeder, management of the pest through conventional chemical means is difficult, though application of insecticides remains the primary strategy. Exploitation of host plant resistance, which is among the most effective and durable strategies has hardly been attempted in case of cowpea. Configuration of calyx was an important morphological attribute in conferring resistance to the borer.

The present investigation was carried out as a field trial at College of Horticulture, Kerala Agricultural University, Thrissur (10° 31'N latitude and 76°17'E longitude at an elevation of 40 m above mean sea level) from December 2014 to June 2015. All agronomic practices were followed as per Package of practices recommendations (KAU, 2011). The data were collected from two crop seasons. The experimental site had a warm humid tropical climate.

The experiment was laid out in Completely Randomized Design (CRD) with 20 treatments and 10 replications, with one polybag containing one plant constituting one replication. Field evaluation of twenty cowpea accessions was carried out by raising cowpea plants in polybags at a spacing of 30 x 15 cm, 45 x 15 cm and 2 x 2 m for bush, semi trailing and trailing types, respectively. Two weeks prior to planting, the variety Lola was sown along the border

around the plot to serve as multiplication foci for the test insect, *M. vitrata*. Further, neonate larvae of *M. vitrata* were collected in large numbers from infested cowpea fields and released on the border plants at early flowering phase to ensure adequate pest population. Observations on the pod borer incidence were recorded at three days interval starting from first flowering up to two months after flowering. Five plants were selected at random from each accession and pod borer incidence was observed. The calyx of the flowers was examined and the accessions were categorized into two groups as follows.

1. Partially free - major portion of the sepals free, the basal portion tight.
2. Semi tight - major portion of the sepals tight, only the tip free. (**Figure 1 & 2**)



Fig 1. Partially free



Fig 2. Semi tight

Categorization of the different accessions on the basis of the configuration of calyx indicated that EC 100092, Palakkadanthandanpayar, TVX – 944, EC 300039, IC 20645 and IC 52110 had semi tight calyx characterized by tight sepals with tips alone being free. The accessions C – 152, Kanakamony, PKM – 1, Anaswara, IC 20431, Sreya, Hridya, Mysore local, IC 52105, Kashikanchan, VellayaniJyothika, Malika, Bhagyalakshmy and Lola had major portion of sepals free with their basal

portion tight. Hence, they were grouped partially free. The accessions viz., EC 100092, Palakkadanthandanpayar, TVX – 944, EC 300039, IC 20645 and IC 52110 had semi tight calyx having tight sepals with tips alone being free. All these accessions had consistently low levels of infestation ranging from zero to 3.16 per cent (**Table 1**).

The remaining 14 accessions, which had free sepals, suffered higher borer infestation. Free sepals

Table 1. Configuration of calyx among cowpea accessions

Accession	Percent damage to cowpea flowers	Configuration of calyx
C – 152	36.89	Partially free
Kanakamony	1.91	Partially free
PKM – 1	9.75	Partially free
EC 100092	0.00	Semi tight
Palakkadanthandanpayar	4.88	Semi tight
Anaswara	4.88	Partially free
TVX – 944	5.80	Semi tight
EC 300039	1.96	Semi tight
IC 20431	9.88	Partially free
Sreya	6.60	Partially free
Hridya	1.11	Partially free
Mysore local	10.75	Partially free
IC 52105	8.39	Partially free
Kashikanchan	29.46	Partially free
IC 20645	1.02	Semi tight
Vellayani Jyothika	15.43	Partially free
Malika	20.28	Partially free
Bhagyalakshmy	50.39	Partially free
IC 52110	0.00	Semi tight
Lola	31.76	Partially free

would provide the first instar borer larvae some extent of concealment as well as enable it to bore into the flower more easily. Tight calyx, thus, could possibly have a deterrent effect on the first instar larvae oviposition, which, however, need to be confirmed. Anithakumari (1992) also had reported that free configuration of calyx had a significant positive influence on the level of pod borer infestation.

Anithakumari (1992) observed the configuration of calyx as an important morphological attribute in conferring resistance to the spotted pod borer *M. vitrata* and reported that accessions under the moderately resistant group (V98, V30, V95, V61 and V75) possessed tight or semi tight calyx. Those accessions under the moderately susceptible group (V13, V41, V90, V89 and V2) were with partially free calyx and the calyx was free for five of the

accessions under the highly susceptible group (V12, V1, V57, V86 and V100). It was thus found, that the accessions had some inherent defense mechanism at varying levels when the different groups were compared.

In this experiment significant variation was observed in terms of damage to cowpea flowers due to spotted pod borer. The highest flower damage (50.39 %) was recorded in case of Bhagyalakshmy. Categorization of the different accessions on the basis of the configuration of calyx indicated that EC 100092, Palakkadanthandanpayar, TVX – 944, EC 300039, IC 20645 and IC 52110 had semi tight calyx characterized by tight sepals with tips alone being free. All these accessions had consistently low levels of infestation ranging from zero to 3.16 per cent. The accessions C – 152, Kanakamony, PKM – 1, Anaswara, IC 20431, Sreya, Hridya,

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