



**Effect of moisture content in cowpea pods on infestation by spotted pod borer,
Maruca vitrata (fab.) (Lepidoptera: Crambidae)**

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Abstract

Fourty eight accessions of cowpea were evaluated for resistance to the spotted pod borer, M. vitrata in the Department of Agricultural Entomology, College of Horticulture, Kerala Agricultural University, Thrissur from September 2014 to June 2015. Significant variation was observed between the genotypes in terms of pod borer damage. The pod damage ranged from zero to 47.95 per cent. Eleven accessions, viz., EC 100092, Palakkadan thandan payar, IC 26048, IC39945, IC 2815, KBC – 2, EC 98668, IC 39947, IC 20645, IC 52110 and IC 52118 recorded zero damage to pods. The highest extent of pod damage (47.95%) was recorded in case of Bhagyalakshmy. The moisture content of the pods were analysed, positive and significant correlation was observed between per cent damage and moisture content (0.427) at 0.01 level.

I. 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 the world. Cowpea is used as a grain legume, vegetable and also as a fodder. However the productivity of cowpea, at 9 – 10 Kg ha⁻¹ is very low, one of the reasons being infestation by a number of pests and diseases. Among the different insect pests, the legume pod borer, *Maruca vitrata* (Fab.) (Crambidae: Lepidoptera) is the most important one causing loss of up to 60 per cent in cowpea [1].

Maruca vitrata (Fab.) occurs throughout the tropics and subtropics of Central and South America, Asia and Africa. It is an important pest of grain legumes of tropics and subtropics owing to its wide geographical distribution, broad host range and its ability to infest the young growing tips of plants, flower buds, flowers, pods and seeds. The moisture content in plants will attract the insects for instance, the moringa moth, *Noorda blitialis* Walker attack was more in succulent and younger leaves were grown after leaf harvest [2]. Similarly the early varieties with more succulent and thicker stems are more susceptible to damage by pea stem borer *Melanagromyza phaseoli* [3]. In this context the study was undertaken to identify the effect of moisture content of pods from selected accessions of cowpea to pod borer.

II. MATERIALS AND METHODS

The study was carried out by a field trial at Kerala (10^o 31' N latitude and 76^o 17'E longitude at an elevation of 40 m above mean sea level). The experimental site had a warm humid tropical climate. The details of the materials used and methods followed in the study are described below.

2.1. Field screening of cowpea accessions for resistance to *Maruca vitrata* (Fab.)

The materials for the study comprised of 48 cultivars of cowpea, and included 29 accessions collected from NBPGR, ten KAU released varieties, five accessions from UAS Bengaluru and one accession each from IIHR Bengaluru, IIVR Varanasi, HC & RI Periyakulam and VFPCCK Kochi (Table 1). The cultivars were raised in polybags in a Completely Randomized Design with ten replications. Spacing was 30cm x 15cm for bush cowpea, 45cm x 30cm for semitrailing and 150cm x 45cm for trailing. The crop was raised following the agronomic practices recommended by the Kerala Agricultural University [4]. 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*.

Table 1. Details of Accessions Evaluated

Sl. No.	Sources	No. of accessions	Accessions
1	KAU, Thrissur	10	Hridya, Kanakamony, Sreya, Vellayani Jyothika, Bhagyalakshmy, Lola, Malika, Anaswara, Sharika, Vyjayanthi
2	NBPGR, Jodhpur	29	IC 39922, EC 10092, IC 26048, EC 300039, IC 39945, IC 20720, IC 26029, IC 52107 A, IC 39921, IC 39870, IC 52105, IC 20431, IC 2918, IC 98668, IC 20645, EC 101216, IC 52110, IC 2815, IC 39916, IC 10810, IC 2196, IC 19797, IC 52118, IC 52128, , EC 101216, IC 19778, IC 39947, EC 98668, IC 52094
3	UAS, Bengaluru	5	TVX – 944, KM – 5, KBC – 2, IT – 3895 – 1, C – 152
4	IIHR, Bengaluru	1	Mysore local
5	HC & RI, Periyakulam	1	PKM – 1
6	VFPCCK	1	Palakkadan thandan payar
7	IIVR, Varanasi	1	Kashikanchan



Figure 1. Spotted pod borer



Figure 2. attacked pod

Observations on the pod borer incidence were recorded at three days interval. Five plants were selected at random from each accession and pod borer incidences on pods were recorded. The per cent

of damage was calculated based on the ratio of damaged pods to the total number of pods. The pods once counted were tagged to avoid recounting.

2.2. Evaluation of moisture of pods of the cowpea accessions on resistance to pod borer

Moisture content was determined thrice for each accession through the hot air oven method. The mean value was worked out for each observation and expressed in per cent. Ten grams of fruit was weighed and oven dried at 80⁰ C until constant weights were obtained. The reduction in weight represented the weight of moisture lost due to drying. The moisture content was calculated as given below and expressed as per cent [5].

$$\text{Moisture (\%)} = \frac{\text{Fresh weight - dry weight}}{\text{Fresh weight}} \times 100$$

III. RESULTS AND DISCUSSION

The relationship between the moisture content of fruits and spotted pod borer infestation brought out in the present study are discussed below.

Moisture content varied significantly in all the 20 accessions and it ranged from 56.90 per cent to 91.00 per cent. Highest moisture content of 91 per cent was recorded in PKM – 1 and KM - 5 had the lowest moisture content (Table 2).

Table 2. Extent of Damage by Maruca vitrata in Cowpea Accessions

Sl. No.	Accessions		Pod damage (%)	Moisture (%)
1	T1	IC 39922	1.54	75.00
2	T2	IC 52107 A	2.67	75.10
3	T3	KM – 5	8.06	56.90
4	T4	C – 152	42.65	85.80
5	T5	Kanakamony	8.24	87.61
6	T6	PKM – 1	15.00	91.00
7	T7	EC 100092	0.00	75.62
8	T8	IC 2815	1.25	88.30
9	T9	IC 39916	2.38	82.90
10	T10	IC 26029	5.88	80.90
11	T11	Palakkadan thandan payar	0.00	83.87
12	T12	IC 26048	0.00	70.70
13	T13	Anaswara	31.90	89.37
14	T14	IC 2196	9.02	74.87
15	T15	IC 10810	13.64	68.40
16	T16	IC 39870	3.70	74.00

17	T17	TVX – 944	2.08	72.30
18	T18	EC 300039	1.12	79.17
19	T19	IC 52094	15.56	71.70
20	T20	IC 39945	0.00	74.40
21	T21	IT – 3895 – 1	16.42	83.50
22	T22	Vyjyanthi	17.43	88.00
23	T23	IC 20431	5.26	82.27
24	T24	Sreya	6.25	86.80
25	T25	IC 9883	1.34	70.00
26	T26	Hridya	0.65	81.30
27	T27	IC 20720	2.35	71.90
28	T28	IC 2918	0.00	77.20
29	T29	KBC – 2	0.00	88.80
30	T30	IC 19797	10.35	81.90
31	T31	Mysore Local	12.00	71.97
32	T32	IC 7832	10.53	78.50
33	T33	IC 39921	3.70	70.80
34	T34	IC 52105	5.83	77.97
35	T35	Kashikanchan	21.84	81.43
36	T36	IC 52128	1.09	83.60
37	T37	EC 98668	0.00	79.90
38	T38	IC 39947	0.00	81.40
39	T39	IC 20645	0.00	88.87
40	T40	IC 19778	12.99	73.80
41	T41	Vellayani Jyothika	18.28	89.43
42	T42	Malika	26.61	89.37
43	T43	Sharika	35.16	89.20
44	T44	Bhagyalakshmy	47.95	86.47
45	T45	EC 101216	1.03	76.40
46	T46	IC 52110	0.00	78.40
47	T47	IC 52118	0.00	68.3
48	T48	Lola	47.47	90.53
Correlation at 0.01 level (2-tailed)			0.427	

There was a significant and positive correlation (0.427) at 0.01 level between moisture content and per cent damage, bringing out clearly the role of the moisture in plant herbivore interactions. Moisture, apart from directly influencing the nutritional quality of plant tissues also influences the

availability of nitrogen to the herbivores [6]. High moisture content has consistently been associated with higher infestation, which is expected as it makes the tissue more succulent. A positive correlation between moisture content and melon fly infestation has been reported in bitter gourd [7]. The finding of the present study is in agreement with earlier reports and suggests that higher moisture content in the pods enhances the nutritional quality of the host and therefore makes it more attractive to the borer.

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