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To ascertain response of *H. armigera* (Hubner) population reared on different hosts to various dosage of HaNPV

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Abstract
The laboratory reared population of *H. armigera* developed on different hosts such as cotton, pigeon pea, chick pea, artificial diet was subjected to various dosages of HaNPV. The present investigation carried out to study dose determination and influence of different host to HaNPV was measured in terms of mortality of *H. armigera* observed 5th, 7th, 10th, 14th days after treatment.
The data recorded in respect of performance of different treated hosts revealed that pigeon pea substrate treated with HaNPV recorded higher mortality followed by chickpea, artificial diet and cotton. Cotton recorded lowest mortality might be due to higher presence of phenoloxidase in this food substrate.

Keywords: Days after treatment (DAT), PGI, Dr. PDKV (Dr. Panjabrao Deshmukh Krishi Vidyapeeth), Akola, HaNPV, LE (Larval Equivalent), diapauses

1. Introduction
H. armigera (Hubner) is most dominating insect pest in agriculture accounting for the consumption of 55 per cent of total insecticides used in India. The magnification of the pest problems arises due to the behavioural adaptation, fecundity, mobility, multivoltine overlapping generations with facultative diapause, nocturnal behaviour, migration, host selection, and the resistance against wide range of insecticides. It is widely distributed polyphagus, international status insect pest, which has been recorded on more than 200 hosts in India. Wide and continues availability of the host enhance the fast multiplication of the pest. This pest is also found thriving well on wild species of weed plants.
It has been observed that type of food, insect feed upon affects the growth, development and reproduction of insect. The biological attributes of *H. armigera* on several host studied by Sujlata Devi & Singh (2004) [1]. *H. armigera* inflicted upto 40-50% damage on cotton Satpute *et al.* (1986) [2], 70-90% to pre-emergence, pesticidal residue, destruction and deterioration of natural fauna with environmental pollution etc. *H. armigera* has developed resistance to the most of the chemical insecticides Arms *et al.* (1992) [6] & Kranthi *et al.* (2002) [7]. This prompted the necessity for the development of the no insecticidal alternatives that could be feasible, economically viable, socially acceptable and compatible with the environment for the effective pest management Singh *et al.* (1999) [8]. This system solely depends upon understanding of intervention between pest population, their host and possible biocontrol agents Claridge, (1989) [9]. The efficacy of the natural products depends upon the constituents with regard to its host plants Salama *et al.* (1992) [10]. The use of bio pesticides has been given major emphasis in IPM Programme. Among bio pesticides entomopathogenic viruses mainly baculoviruses reported environmentally safe potential alternatives to chemical pesticides. The Nucleo Polyhydrosis Viruses (NPV) have limited host range restricted to one host species or genus, no pathogenic to beneficial insect, lack to toxic residues unlike of stable resistance development Cunningham, (1995) [11].
The main objective of present investigation is to study the response of *H. armigera* population reared on different hosts to HaNPV on different treatment, in relation to decide the economic and effective ways of damage control. The dosage determination involves many years of field investigation in different ecological regions under various condition of insect infestation on different plants.

2. Material and Methods

The present investigation revealed the influence of different host plants on *H. armigera* and its response to different dosages of NPV. The work was carried out in lab and field of Dr. PDKV, Akola. The insect reared in laboratory under room temperature of 27±2 ^{0}C and relative humidity maintained 72±2%. The healthy *H. armigera* larvae is reared and used as test insect for present investigation. The host plants selected as cotton (Leaves, flowers, squares, bolls), pigeon pea (flowers and pods), chickpea (leaves, flowers and pods) collected from field of University for feeding the test insect as treatment materials. The pathogen used for the treatment belongs to the family Baculoviridae, bearing common name as Nucleo Polyhedrosis Viruse (*Baculoviruse heliothis*). The pathogen NPV of *H. armigera* obtained from Insect Pathology Laboratory, Department of Entomology, PGI, Dr. PDKV, Akola. The spray suspension was prepared before application in small quantity of water to reduce the clumping of polyhedra. The required quantity of standard Nuclear Polyhedrosis Viruse fed in each treatment was based on area of each treatment to be treated, considering 1LE = $1X10^9$ POBS/ml. The UV protectant Indigo in aqueous solution was added to prolong the efficiency of viruse in field. The HaNPV spray solution for respective treatment was freshly prepared at every time just before spraying. The spraying was done in morning hours with different doses in respective plots. In laboratory the treated food material was randomly collected from respective treated plots were brought to laboratory to feed the F3 generation (3rd instar larvae) reared in laboratory condition of *H. armigera* as per the treatment schedule. For every treatment ten larvae were tested in five replication for every crop substrate. The cumulative mortality was recorded for bioassay on different days like 5, 7, 10 and 14th day.

The percentage of larval mortality in each treatment was worked out by Abbots formula (1925).

$$\text{Corrected mortality} = \frac{T - C}{100 - C} \times 100$$

Where, T = Percent mortality in treatment

C = Percent mortality in control

The statistical analysis was done by transforming the data obtained in order to test the significance level as per Gomez and Gomez (1984).

3. Result and Discussion

(i) Response of *H. armigera* reared on different host of HaNPV on 5th DAT.

(a) Response of *H. armigera* to different dosage of HaNPV (Factor A)

The data presented in Table 1 in respect of studies of the effect of different dosage of HaNPV with various hosts against *H. armigera* exhibited differences on application of variable inoculum on 5th day after application. The highest average mortality obtained in the treatment of HaNPV 500 LE was 30.62 per cent which was found to be statistically superior over others, followed by HaNPV 400 LE with recorded 27.50 per cent mortality. While the next inoculum recorded average mortality of 19.37 per cent for HaNPV 300 LE and 18.12 per cent for HaNPV 250 LE whereas, HaNPV 200 LE recorded a mortality of 11.25 per cent. The least mortality of 9.53 per cent was obtained in the treatment of HaNPV 100 LE.

(b) Response of *H. armigera* to different treated hosts (Factor B)

The data depicted in Table 1 indicate the influence of different hosts on which *H. armigera* with various dosage of HaNPV. The maximum average mortality obtained in 5th day after treatment was maximum on Pigeon pea (23.75 per cent) and found at par with the treatment of artificial diet that recorded the mortality of 22.08 per cent, followed by the treatment of Chickpea (16.25 per cent), while the lowest response was noted on cotton, in which mortality of 15.41 per cent was recorded.

(c) Interaction effect of different hosts and HaNPV to *H. armigera* (Factor AXB)

The data presented in Table 1 revealed that the effect of different hosts treated with the various dosages of HaNPV viz. 100, 200, 250, 300, 400, 500 LE have influenced the mortality of insect *H. armigera*. The most effective response was obtained with the pigeon pea treated with HaNPV 400 LE and 500 LE that recorded the mortality of 40 per cent on 5th day and was at par with the treatment of artificial diet treated with HaNPV 500 LE that recorded the mortality of 32.5 per cent. It was followed by treatment of cotton with 500 LE artificial diet with 400, 300, 250 LE respectively pigeon pea with 300 LE and 250 LE, which recorded the mortality of 30.0, 30.0, 25.0, 25.0, 22.5, and 22.5 per cent respectively. However, all this treatment was observed to be at par with each other. The next inferior treatment that exhibited the mortality on 5th day were cotton with 400 LE, chickpea with 500 & 400 LE, by recording the mortality of 20 per cent in irrespective of the treatment and were statistically identical. The treatments of chickpea with 300, 250 & 200 LE exhibited the similar response of having 15.0 per cent mortality been at par with the treatment of chickpea with 100 LE (20.47 per cent), cotton 300, 250 and 200 LE and pigeon pea with 200 LE and artificial diet 200 LE which achieved the mortality of 18.44 per cent in each treatments. The least mortality of 18.44 per cent in each treatment. The least mortality was exhibited in the treatment of pigeon pea 100 LE and cotton 100 LE i.e. 7.5 per cent and both these treatment were found statistically similar with the treatments of pigeon pea 100 and 200 LE and cotton 100 LE.

(ii) Response of *H. armigera* reared on different host of HaNPV on 7th DAT.

(a) Response of *H. armigera* to different dosage of HaNPV (Factor A)

The data presented in Table 2 in respect of responses of various dosage of HaNPV on different hosts against H. armigera indicate the significant differences of among the treatments. The highest response has been obtained in the dose HaNPV 500 LE causing in 66.87 per cent mortality of the insect recorded on 7th day after treatment and proved statistically superior over others. It was followed by the treatment of HaNPV 400 LE recording 59.37 per cent mortality and proved next better treatment to produce the response. The remaining treatments have not shown adequate response in causing the mortality which was observed as 47.5, 40.5, 28.75 per cent due to the treatment of HaNPV 300, 250, 200 & 100 LE respectively. The minimum mortality was recorded in the treatment of HaNPV 100 LE i.e. 23.75 per cent.

(b) Response of *H. armigera* to different treated hosts (Factor B)

The data depicted in Table 2 regarding the influence of various hosts on causing the mortality of *H. armigera* due to HaNPV treatments revealed that there were no significant

differences among the treatments. However, the host pigeon pea has shown promising response over other treatment by recording 47.08 per cent average mortality over artificial diet, chickpea and cotton in which 44.58, 43.66 and 42.5 per cent mortality was observed, respectively.

(c) Interaction effect of different hosts and HaNPV to *H. armigera* (Factor A X B)

The results on the effect of *H. armigera* larvae fed with different food substrates viz. cotton, pigeon pea, chickpea and artificial diet with different dosage of HaNPV, on 7th day are presented in Table 2 the highest mortality of 75.0 per cent was attained in *H. armigera* larvae when fed with substrate of chickpea treated with HaNPV 500 LE, and found statistically similar with the treatments of artificial diet treated with HaNPV 500 LE and chickpea treated with 400 LE wherein the mortality of 70 per cent was observed in each of the treatment. These were followed by the treatment of the pigeon pea 500 LE and pigeon pea treated with HaNPV 400 LE by recording 65 and 60 per cent mortality respectively and found at par with each other. The next group of effective treatment were cotton treated with HaNPV 500 LE artificial diet treated with HaNPV 400 LE, pigeon pea with HaNPV 300 LE, cotton treatment with HaNPV 400 LE, cotton treated with HaNPV 300 LE in which the mortality was exhibited as 57.5, 55.0, 55.0, 55.0, 52.5 and 50.0 per cent respectively. However all these treatment were at par among themselves. The artificial diet treated with HaNPV 300 LE, cotton with 250 LE, pigeon pea with 250 LE and chickpea with 300 LE and artificial diet treated with HaNPV 250 LE the mortality observed as 47.5, 47.5, 45.0, 37.5 and 37.5 per cent respectively. The treatment of pigeon pea treated with 200 LE and chickpea with HaNPV 250 LE resulted in the mortality of 30.0, 32.0 and 35.0 per cent respectively and observed as statistically similar among themselves. The last mortality was seen in the treatment of cotton with HaNPV 100 LE attaining the mortality of 22.5 percent and found at par with the treatments of pigeon pea with HaNPV 100 LE, cotton with HaNPV 200 LE, chickpea with HaNPV 200 LE, artificial diet with 100 LE and Chickpea with 100 LE, in which the mortality of 27.5, 25.0, 25.0, 22.5 and 22.5 per cent was observed respectively and found statistically equal.

(iii) Response of *H. armigera* reared on different hosts to HaNPV on 10th DAT.

(a) Response of different dosage of HaNPV to *H. armigera* (Factor A)

The data present in Table 3 reveal the significant differences in the mortality of *H. armigera* larvae attained due to different dosage of HaNPV treated with various food substrates observed on 10 DAT. The highest mortality of 81.25 per cent was obtained due to the dose of HaNPV 500 LE and found statistically significant over rest of the treatments. It was followed by the treatment of HaNPV 400 LE, HaNPV 300 LE HaNPV 250 LE and HaNPV 200 LE which exhibit 69.37, 52.50, 45.0 and 33.12 per cent mortality, respectively. The least effective inoculum was found HaNPV 100 LE that recorded 27.5 per cent mortality.

(b) Response of *H. armigera* to different treated hosts (Factor B)

The data on mortality observed on tenth day after HaNPV application with different hosts are significant given in Table 3. The highest mortality was obtained when *H. armigera* larva fed on pigeon pea substrate i.e. 54.58 per cent, and found statistically superior over other treatments. The next treatments were artificial diet (52.5 per cent) and chickpea (51.66 per cent). The least mortality was observed in the treatment of cotton i.e. 49.55 per cent.

(c) Interaction effect of different hosts and HaNPV to *H. armigera* (Factor AX B)

The data presented in Table 3 indicate the significant effect of feeding and treating various food substrates on *H. armigera* with different dosage of HaNPV. The promising response was noted on the host of chickpea with HaNPV 500 LE that caused 87.5 per cent mortality, which was statistically similar with the treatment of pigeon pea treated with HaNPV 500 LE and artificial diet treated with HaNPV 500 LE in which mortality of 85 and 82.5 per cent was exhibited respectively. These followed by the treatments of chickpea with 400 LE, cotton with 500 LE, artificial diet with 400 LE that recorded the mortality of 75.00, 70.0 and 70.0 per cent respectively and all these treatments were found to be at par among themselves. The next effective treatments were pigeon pea treating with HaNPV 400 LE that recorded the mortality of 67.05 per cent and found at par with the treatments of artificial diet with 400 LE (70.00 per cent) and cotton with 500 LE (70.00 per cent) followed by the treatment of pigeon pea with 300 LE, artificial diet with 300 LE and cotton with 300 LE that exhibited the mortality of 60.0, 55.0 and 55.0 per cent, respectively. The treatments of chickpea treated with 300 LE, pigeon pea with 250 LE and cotton with 250 LE recorded the similar mortality of 50.0 per cent and was at par the treatments of cotton with 300 LE and artificial diet with 300 LE showing larval mortality of 55.0 per cent in both the treatment, respectively. The treatments of artificial diet caused a mortality of 42.5 per cent when treated with the dose of HaNPV 250 LE, and found to be at par with the treatment of artificial diet (37.5 per cent) and chickpea (30.0 per cent) when treated with the dose of 200 LE and observed to be at par with the treatment of artificial diet (37.5 per cent) and chickpea (30.0 per cent) when treated with the dose of 200 LE and observed to be at par with the treatment of pigeon pea with dose of HaNPV 200 LE, that recorded the mortality of 35.0 per cent. While, the treatment of chickpea 200 LE, cotton 200 LE, pigeon pea 100 LE, artificial diet 100 LE and cotton 100 LE, caused the mortality of 30.0, 30.0, 30.0 27.5 and 27.5 per cent, respectively. The least effective response was observed in the treatment of chickpea when treated with HaNPV 100 LE by recording mortality of 25.0 per cent, and observed statistically similar with the treatments of chickpea (HaNPV 200 LE), pigeon pea (HaNPV 100 LE), cotton treated with HaNPV 200 LE, artificial diet treated with HaNPV 100 LE and cotton treated with HaNPV 100 LE by recording 30.0, 30.0, 30.0, 27.5 and 27.5 per cent, mortality respectively.

(iv) Response of *H. armigera* reared on different hosts to HaNPV on fourteenth DAT.

(a) Response of different dosage of HaNPV to *H. armigera* (Factor A)

The data depicted in Table 4 indicate that an increase in inoculum of HaNPV (dosage of HaNPV) have increased the mortality of *H. armigera*. The highest mortality was recorded in the different substrates treated with the dose of HaNPV 500 LE and average mortality was attained to 89.37 per cent on fourteenth day after treatments which has been statistically superior over rest of the treatments. It was followed by treatments of HaNPV 400 LE, 300 LE, 250 LE and 200 LE that recorded the mortality of 77.5, 63.7, 53.12 and 40.62 per

cent, respectively and worked independably. The least mortality was observed irrespective of different substrate treated with dose of HaNPV 100 LE recording the mortality of 30.00 per cent.

(b) Response of *H. armigera* to different treated hosts (Factor B)

The data presented in Table 4 reveal that the highest average mortality was obtained with the pigeon pea substrate treated with different dosage of HaNPV having 61.66 per cent mortality on 14th day after treatment and found statistically superior over other treatments. The next effective response was shown by the treatment of artificial diet which recorded the mortality 58.75 per cent when treated with different dosage of HaNPV. While the next host i.e. chickpea was found effective against *H. armigera* having mortality of 58.33 per cent. The least effective inoculum potential was obtained on cotton that recorded 57.5 per cent mortality. However both these treatments were found statistically similar with each other.

(c) Interaction effect of different hosts and HaNPV to *H. armigera* (Factor A x B)

The data presented in Table 4 indicate that the response of different food substrates when treated with the response of different food substrate when treated with the different dosage of HaNPV resulted in causing variable mortality. The maximum mortality was observed on 14th day after treatment i.e. 100 per cent on pigeon pea substrate treated with HaNPV 500 LE and found statistically superior over other treatments. The next better treatment were observed as chickpea and artificial diet treated with HaNPV 500 LE, having mortality of 90.0, 87.5 per cent, respectively and both these treatments found to be at par with each other. These are followed by the treatments of cotton, artificial diet, chickpea and pigeon pea with the dose of HaNPV 500, 400, 400 and 400 LE and recorded the mortality of 80.0 per cent in each of the treatments and found statistically identical. The next treatments were observed as HaNPV 400 LE treated with cotton artificial diet treated with HaNPV 300 LE and pigeon pea treated with HaNPV 300 LE in which mortality was attained 70.0, 70.0 and 65.0 per cent respectively. The chickpea treated with 250 and 300 LE, cotton with 300 LE, cotton with 250 LE, pigeon pea with 250 LE and cotton with 200 LE have recorded the respective mortality 60.0, 60.0, 60.0, 55.0, 52.5 and 50.0 per cent and all these treatment were found statistically at par among themselves. The treatment of artificial diet recorded the mortality of 45.0 per cent, whereas the treatment of pigeon pea and artificial diet recorded 40.0 per cent mortality, in each of the treatment when treatment with the dose of HaNPV 250 LE and 200 LE respectively.

The low response was exhibited in the treatment of chickpea when treated with the dose of HaNPV 100 LE recording 27.5 per cent mortality and was at par with treatment of cotton 100 LE, artificial diet 100 LE pigeon pea 100 LE and chickpea 200 LE recorded the mortality of 30.0, 30.0, 32.5 and 32.5 per cent, respectively and found statistically similar with each other.

4. Discussion

From the above result, it is evident that the response of *H. armigera* to different dosage of HaNPV has been significantly variable and shown positive trends in terms of mortality. As the days of observation progressed, the response to HaNPV has not been found been much affected due to the progressive period of HaNPV infection and the trend of the mortality was more less consistently on increasing side, irrespective of dosage. The response on fourteenth day of observation had been to the extent of 85.93 per cent mortality of insect with the dose of HaNPV 500 LE, and lower dosage had responded in accordance with the decreasing trend and only 29.68 per cent mortality could be observed in case of HaNPV 250 LE had been just above fifty per cent (53.43) revealing that the response of *H. armigera* to HaNPV might be due to requirement of the higher amount of POB's for causing infection and subsequently achieving the mortality of insect, similar kind of observation have been documented by the workers like Ignoffo, (1965) [12], Bijjur, *et al.* (1994) [13] and Bhalkare *et al.* (2007) [14], who reported that the efficacy of *H. armigera* increased with the increasing dosage of HaNPV.

The performances of HaNPV against *H. armigera* on various hosts have been demonstrated by several workers in laboratory and field. The work Sarode *et al.* (1994) [15] have reported that the HaNPV has performed better on pigeon pea against *H. armigera*. The low response of HaNPV on cotton has been accepted by Bhamre (2003) [16] who observed the inferiority of HaNPV response on cotton. This may be due to presence of substance like phenol oxidase in cotton and also leading to lower palatability of treated hosts. So that required amount of virions are not been ingested to cause mortality.

5. Summary and Conclusions

The response of *H. armigera* assessed, subjected to various dosage of HaNPV i.e. 100, 200, 250, 300, 400, 500 LE through the treated food such as cotton, pigeon pea, chickpea, cotton and artificial diet. The response was measured in terms of mortality of *H. armigera* observed on 5, 7, 10 and 14th day after each treatment. The results concluded from amongst various dosage of HaNPV tested against *H. armigera* to HaNPV 500 LE found to most effective in causing the highest response in terms of mortality irrespective of the hosts.

While the highest cumulative mortality due to HaNPV was recorded in pigeon pea reared larvae followed by artificial diet and chickpea. While the *H. armigera* larvae reared on cotton recorded the least mortality, might be one of the reasons for lower mortality due to HaNPV on cotton is presence of higher amount of phenol oxidase in this food substrate.

Dosage of NPV	Larval mortality (%)				Factor 'A'
	Cotton T_1	Pigeon pea T_2	Chickpea T_3	Artificial diet T_4	
HaNPV 100 LE	7.5 (15.89)	7.5 (15.89)	12.5 (20.47)	10.0 (18.44)	9.53 (17.72)
HaNPV 200 LE	10.0 (18.44)	10.0 (18.44)	15.0 (22.5)	10.0 (18.44)	11.25 (19.45)
HaNPV 250 LE	10.0 (18.44)	22.5 (28.22)	15.0 (22.5)	25.0 (29.88)	18.12 (24.76)
HaNPV 300 LE	10.0 (18.44)	22.5 (28.22)	15.0 (22.5)	25.0 (29.88)	19.37 (25.77)
HaNPV 400 LE	20.0 (26.56)	40.0 (39.23)	20.0 (26.56)	30.0 (33.21)	27.5 (31.39)
HaNPV 500 LE	30.00 (33.21)	40.00 (39.23)	20.00 (26.56)	32.50 (34.71)	30.62 (33.42)
Factor 'B'	15.41(21.16)	23.75 (28.23)	16.25 (23.51)	22.08 (27.42)	-

Table 1: Response of H. armigera reared on different hosts to HaNPV on 5th day after treatment during first year (2006-07).

	Factor 'A'	Factor 'B'	Interaction A X B
'F' Test	Sig.	Sig.	Sig.
SE (m)±	0.93	0.76	1.86
CD at 5%	2.59	2.11	5.1

(Values in parentheses are arcsine transformation)

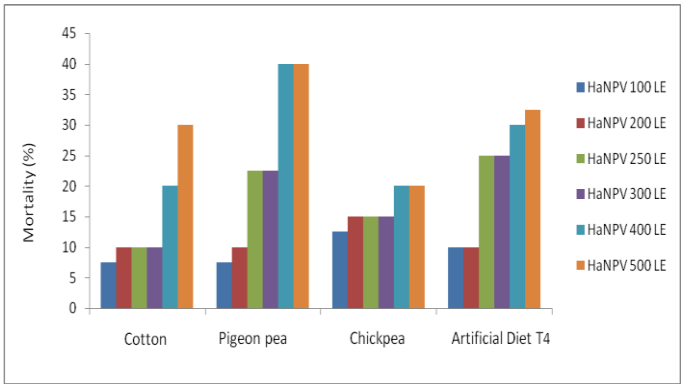

Fig 1: Response of H. armigera reared on different hosts to HaNPV on 5th day after treatment.

Dosage of NPV	Larval mortality (%)				Factor 'A'
	Cotton T_1	Pigeon pea T_2	Chickpea T_3	Artificial diet T_4	
HaNPV 100 LE	22.5 (28.22)	27.5 (31.54)	22.5 (28.22)	22.5 (28.22)	23.75 (29.05)
HaNPV 200 LE	25.00 (29.88)	30.0 (33.05)	25.0 (29.88)	35.0 (36.22)	28.75 (33.84)
HaNPV 250 LE	47.5 (43.55)	45.0 (42.11)	32.0 (34.71)	37.5 (37.76)	40.5 (39.53)
HaNPV 300 LE	50.00 (45.00)	55.00 (47.88)	37.5 (37.76)	47.5 (43.55)	47.5 (43.54)
HaNPV 400 LE	52.50 (47.88)	60.00 (50.77)	70.00 (56.79)	55.0 (47.88)	59.37 (50.83)
HaNPV 500 LE	57.5 (49.32)	65.0 (53.78)	75.0 (60.11)	70.00 (56.79)	66.87 (55.00)
Factor 'B'	42.50 (40.64)	47.08 (43.18)	43.66 (41.24)	44.58 (41.73)	-

Table 2: Response of H. armigera reared on different hosts to HaNPV on 7th day after treatment

	Factor 'A'	Factor 'B'	Interaction A X B
'F' Test	Sig.	Sig.	Sig.
SE (m)±	0.86	0.70	1.72
CD at 5%	2.39	2.00	4.78

(Values in parentheses are arcsine transformation)

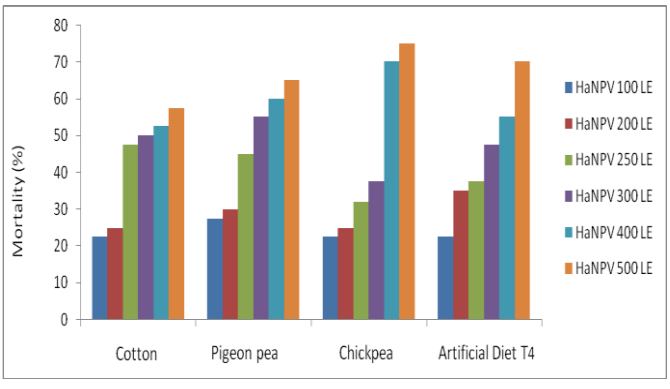

Fig 2: Response of H. armigera reared on different hosts to HaNPV on 7th day after treatment.

Dosage of NPV	Larval mortality (%)				Factor 'A'
	Cotton T_1	Pigeonpea T_2	Chickpea T_3	Artificial diet T_4	
HaNPV 100 LE	27.5 (31.54)	30.00 (33.21)	25.00 (29.88)	27.50 (31.54)	27.50 (31.54)
HaNPV 200 LE	30.00 (33.21)	35.00 (36.22)	30.00 (33.21)	37.50 (37.76)	33.12 (35.09)
HaNPV 250 LE	50.00 (45.00)	50.00 (45.00)	37.50 (37.76)	42.50 (40.67)	45.00 (42.83)
HaNPV 300 LE	55.00 (47.88)	60.00 (50.77)	50.00 (45.00)	55.00 (47.88)	52.5 (47.88)
HaNPV 400 LE	65.00 (53.78)	67.50 (55.28)	75.00 (60.11)	70.00 (56.79)	69.37 (56.49)
HaNPV 500 LE	70.00 (56.79)	85.00 (67.50)	87.50 (69.53)	82.50 (65.47)	81.25 (64.82)
Factor 'B'	49.55 (44.7)	54.58 (47.99)	51.66 (45.91)	52.50 (46.68)	-

Table 3: Response of H. armigera reared on different hosts to HaNPV on 10th day after treatment.

	Factor 'A'	Factor 'B'	Interaction A X B
'F' Test	Sig.	Sig.	Sig.
SE (m)±	0.73	0.60	1.47
CD at 5%	2.04	1.67	4.09

(Values in parentheses are arcsine transformation)

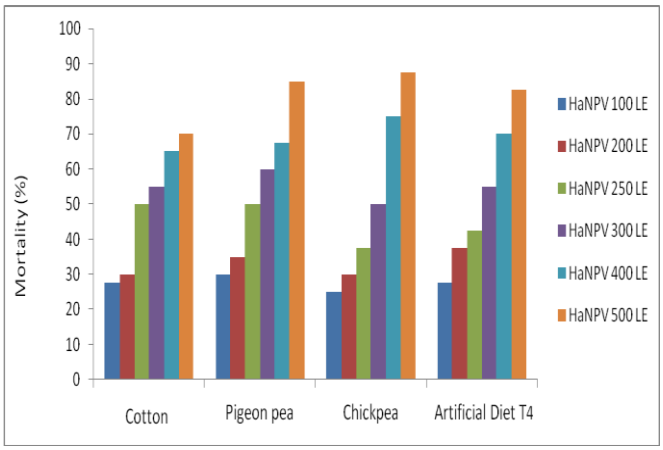

Fig 3: Response of H. armigera reared on different hosts to HaNPV on 10th day after treatment.

Dosage of NPV	Larval mortality (%)				Factor 'A'
	Cotton T_1	Pigeon pea T_2	Chickpea T_3	Artificial diet T_4	
HaNPV 100 LE	30.00 (33.21)	32.50 (34.71)	27.50 (31.54)	30.00 (33.21)	33.00 (33.17)
HaNPV 200 LE	50.00 (45.00)	40.00 (39.23)	32.50 (34.71)	40.00 (39.23)	40.62 (39.16)
HaNPV 250 LE	55.00 (47.88)	52.50 (46.44)	60.00 (50.77)	45.00 (42.11)	53.12 (46.81)
HaNPV 300 LE	60.00 (50.77)	65.00 (53.78)	60.00 (50.77)	70.00 (56.79)	63.75 (53.02)
HaNPV 400 LE	70.00 (56.79)	80.00 (63.44)	80.00 (63.44)	80.00 (63.44)	77.50 (61.77)
HaNPV 500 LE	80.00 (63.44)	100.00 (90.00)	90.00 (71.56)	87.50 (69.53)	89.37 (76.63)
Factor 'B'	57.50 (49.51)	61.66 (54.60)	58.33 (50.46)	58.75 (50.71)	-

Table 4: Response of H. armigera reared on different hosts to HaNPV on 14th day after treatment

	Factor 'A'	Factor 'B'	Interaction A X B
'F' Test	Sig.	Sig.	Sig.
SE (m)±	0.79	0.64	1.50
CD at 5%	2.19	1.79	4.39

(Values in parentheses are arcsine transformation)

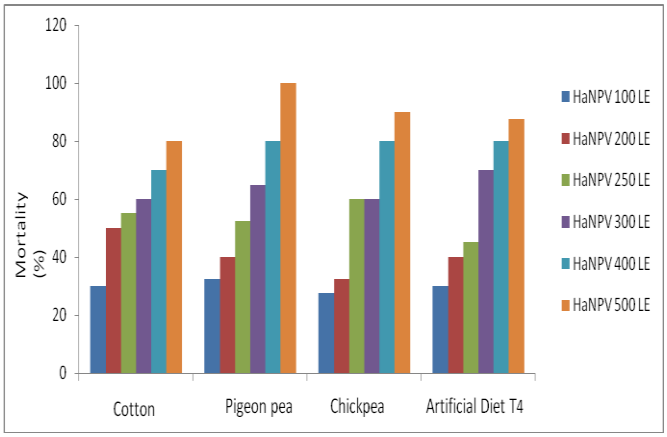

Fig 4: Response of H. armigera reared on different hosts to HaNPV on 14th day after treatment

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