*International Research Journal of Biological Sciences* ISSN 2278-3202
Vol. **4(8),** 49-55, August **(2015)** *Int. Res. J. Biological Sci.*

# Evaluation of the damage caused by the shoot and fruit borer : *Leucinodes orbonalis* Guenee (Lepidoptera: Pyralidae) according to the phenological stages of three varieties of eggplant in south of Côte d'Ivoire

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**Available online at: www.isca.in, www.isca.me**
Received 22nd July 2015, revised 4th August 2015, accepted 10th August 2015

## Abstract

*A study was carried out from April to December 2013 in the south of Côte d'Ivoire for to evaluate the damage of the shoot and fruit borer: Leucinodes orbonalis Guenee (Lepidoptera :Pyralidae) on three varieties of eggplant (Djamba $F_1$, Kotobi and N'drowa issia). It consisted in counting infested and healthy shoots on randomly selected 24 plants fromeachsub plot. At the fruiting stage, besides enumerating the attacked shoots, the healthy and attacked fruits were also counted. The percentages of the infested shoots varied according to the varieties and phenological stages. The highest shoot infestations were registered at the fruiting stage for each variety with 53.07 ± 0.97% (N'drowa issia); 56.29 ± 1.84% (Kotobi) and 66.59 ± 1.62% (Djamba $F_1$) respectively 159, 173 and 166 days after transplanting (DAT). The highest fruit infestations were obtained 166 DAT (N'drowa issia: 40.04 ± 1.67 %) and 173 DAT (Kotobi: 69.89 ± 1.16% and Djamba $F_1$: 82.67 ± 0.52%). Significant correlations between abiotic factors and infestations of shoots and fruits have been registered.*

**Keywords:** Côte d'Ivoire, borer, *Leucinodes orbonalis*, varieties, eggplant, phenological stages.

## Introduction

Eggplant known as "aubergine" in France and "brinjal" in India is a plant that is part of the 40 most produced and consumed vegetable species in the world[1]. It is of considerable economic importance in Asia, Africa and subtropical regions such as India and Central America[2]. *Solanum aethiopicum* called African eggplant or garden egg is one of the major vegetable crops most in West Africa[3, 4]. It has a high nutritional value. The fruits and leaves are composed of the water, energy, protein, lipid, glucid and fibres5. In Côte d'Ivoire, it is one of the most consumed vegetables. The fruits and leaves are used in various culinary techniques[6]. The production is ensured by producers living in rural and urban areas and is a source of income for these producers[7].

Unfortunately eggplant is attacked by many insects, among which the most fearsome is the shoot and fruit borer, *Leucinodes orbonalis* Guenee (Lepidoptera: Pyralidae). Larvae of this species dig tunnels in the shoots and fruits affecting plant growth and the fruit quality and causing a drop in production[8]. In Côte d'Ivoire, eggplant pests management does not effectively control the populations of this shoot and fruit borer. The quantification of damage during the cycle of the plant could be a prerequisite for the establishment of methods for effective management of this borer. Thus, the present study aims to assess the damage of the larva of *L. orbonalis* according to phenological stages of the plant in order to determine the most attacked stage and to set up an effective wrestling calendar.

## Material and Methods

The field experiment was conducted at Azaguié located of south in Côte d'Ivoire, during April to December 2013. During the study period the average temperature, relative humidity and rainfall ranged from24.3-28.8 °C, 82-89.8 % and 1239.35 mm respectively. Experiment was conducted in a Randomized Complete Block Design (RCBD) using three varieties (Djamba $F_1$, Kotobi and N'drowa issia) with three replications (blocks). Experimental plots each measuring 7.5 m x 2.6 m were prepared. Seeds of each varieties were sown to24april 2013. Forty days after germination seedlings were transplanted to the experimental plots to 03June 2013. A plant to plant distance of 0.5 m and row to row distance of 1 m were maintained in each experimental plot. Each plot was composed of 48 plants then each blocks comprised144 plants. The whole experimental plot was made up of a total of 432 plants. The experimental plots have not been treated with any pesticide during the experimentation. The infestation of eggplant shoot and fruit borer larvae on shoots of different varieties of eggplant was recorded by counting healthy and damaged shoots from twenty four randomly selected plants from each experimental unit. The data were taken regularly at weekly intervals from 03 July 2013 to 27 December 2013. The percentage of shoot damage was calculated by following formula:

$$\text{Percentage shoot infestation (\%)} = \frac{\text{Number of infested shoots}}{\text{Number of total shoots}} \times 100$$

At the fruiting stage all the fruits were harvested from 24 samples in order to count healthy and damaged fruits. The data were taken regularly at weekly intervals from 04 October 2013 to 27 December 2013. The percentage of fruit damage was calculated by following formula:

$$\text{Percentage fruit Infestation (\%)} = \frac{\text{Number of infested fruits}}{\text{Number of total fruits}} \times 100$$

All the data was subject to statistical analysis using the statistica software version 7.1. The comparison of means was performed by the test of Newman-Keulsat the threshold of 5%.the correlations were determined between shoot and fruit infestation percentage and abiotic factors (mean, maximum and minimum temperature, relative humidity and rainfall).

## Results and Discussion

**Shoot infestation at the vegetative stage (stage before flowering):** For each variety the lowest shoot infestations were obtained to 33 days after transplanting (DAT) with 6.66 ± 2.35%, 7.50 ± 3.81 % and 12.22 ± 6.18 %on N'drowa issia, Kotobi and Djamba $F_1$ respectively. The highest shoot infestations were recorded at 68 DAT with 15.01 ± 3.23% (N'drowa issia), 28.25 ± 3.63% (Kotobi) and 37.92 ± 1.76% (Djamba $F_1$). Analysis of variance showed highly significant differences between the percentage shoot infestations (F = 4.80; df = 17; P <0.001) (Table-1). The lowest shoot infestations recorded to 33 DAT at the three varieties may be explained by the fact that before this week observing, the plants are not developed enough and therefore had a reduced number of shoots that have been attacked. Our results differ of those Sing et *al.*[9] who reported in their study an high estinfestation was 73.33% in stage before flowering. However our results are similar to that of Douan et *al.*[10] who mentioned the lower attacks of *Spodoptera littoralis, Plutella xylostella* and *Hellula undalis* on the cabbage to 21 and 28 DAT during a crop in the locality of Azaguié. Goué[11] when working on the rice pests reported that tillers rate destroyed by the borer was between 4.49% and 11.95%. Pollet[12] reported in its work on corn pests that no stem was infested before flowering by larvae of *Sesamia, Eldana , Chryptophlebia, Catopyla*.

**Shoot infestation at the flowering stage:** At the beginning of flowering stage (75 DAT), N'drowa issia, Kotobi and Djamba $F_1$ recorded the lowest infestation with 16.72 ± 6.78%, 34.41 ± 3.25% and 39.50 ± 1.41% respectively. The highest infestation for the three varieties was recorded in the late flowering stage (117 DAT) with 25.65 ± 5.22% (N'drowa issia); 47.74 ± 3.04 % (Kotobi) and 54.97 ± 4.31% (Djamba $F_1$). The analysis variance showed highly significant differences between percentage shoot infestations (F = 9.89; df = 20; P <0.001) (table-2). The lowest infestations obtained at the beginning of flowering stage (75 DAT) compared at highest infestations obtained 117 DAT could explained by the fact that 117 DAT the plants were well developed compared to 75 DAT and has thus more shoots that could then probably be attacked. The results we obtained differ from those of Sing et *al.* who showed in flowering stage the lowest shoot infestation of 0%. Pollet has recorded that of stem attacked by *Eldana sp.* to flowering could go up to 60%. Humayun[13] during its work reported at flowering, moreover shoots, flowers bud and the flowers were also attacked by the larvae of *L.orbonalis.*

**Shoot infestation at the fruiting stage:** At the beginning fruiting stage (124 DAT) the infestations increased progressively from 25.41 ± 3.25% (N'drowa issia), 43.30 ± 2.04% (Kotobi) and 51.91 ± 2.02 % (Djamba $F_1$) until reaching peaks of 53.07 ± 0.97 % (N'drowa issia), 56.29 ± 1.84 % (Kotobi) and 66.59 ± 1.63% (Djamba $F_1$ ) respectively to 156, 173 and 166 DAT. These percentage infestations have progressively decreased for each variety until reaching of22.58 ± 4.90% (N'drowa issia); 35.18 ± 1.85% (Kotobi) and 38.25 ± 1.92% (Djamba $F_1$) in the late fruiting stage (208 DAT). Statistical analysis indicated significant differences between percentage shoot infestations (F = 14.24; df = 38; P <0.01) (table-3). The highest shoot infestation could be explained by the fact that at stage, the plants of each variety had reached their maximum growth and had therefore many shoots that have been attacked by larvae from eggs that were probably laid in large numbers by females. Our results differ from those of Sing et *al.* who did not observe shoot attacked at the fruiting stage. It is rather the flowers and fruits that were attacked at this stage. The progressive decrease of shoot infestations until the end of fruiting stage (208 DAT) for each variety would be due to the fact the plants were almost at the end of their cycle and have therefore less fresh shoots that could be attacked, since most of the shoot tends to grow dry. Our results are close to those of Shukla and Khatri[14] who during their study indicated that the shoot infestations have strongly decreased declined in the late of fruiting stage until reaching a 0% rate.

**Fruits infestation at the fruiting stage :** At the beginning fruiting stage (124 DAT) fruit infestations increased progressively from 23.08 ± 5.78% (N'drowa issia), 33.94 ± 1.84% (Kotobi) and 46.50 ± 0.87 % (Djamba $F_1$) until reaching peaks of 40.04 ± 1.67 % (N'drowa issia: 166 DAT), 69.89 ± 1.16 % (Kotobi : 173 DAT) and 82.67 ± 0, 52 % (Djamba $F_1$: 173 DAT). These infestations decreased progressively for to reach at 208 DAT with the rates of 14.27 ± 0.87% (N'drowa issia); 21.67 ± 2% (Kotobi) and 28.26 ± 1.08% (Djamba $F_1$). The analysis variance revealed significant differences between fruit infestations (F = 44.77; df = 38; P <0.01) (Table-4). The highest fruit infestations could justified by the fact that the plants owned the maximum fruit that were for many larvae an abundant source of food and a favorable habitat for their growth. The low fruit infestations got for the three varieties to 208 Dagwood be due to plants ageing that had thus reduced a number of fruits that would harbor less larvae. The same observations were made by Pollet on the corn. Shukla and Khatri also mentioned in their study that the highest fruit infestations were recorded at the beginning fruiting, and a low fruit infestation sat the end of fruiting stage.

**Shoot infestation on the all three stages (vegetative, flowering and fruiting) and fruits infestation on the all days after transplanting at the fruiting stage:** The highest shoot infestation on the all three stages was recorded on Djamba $F_1$ with 45.39 ± 1.5% and the lowest shoot infestation was observed on N'drowa issia with 25.46 ± 1.48 %. Kotobi recorded a shoot infestation of 37.43 ± 1.68%. Statistical analysis revealed highly significant differences between the percent infestations (F = 41.57; df = 2; P = 0.000) (Figure 2 A). On the all days after transplanting (DAT), the highest fruit infestation was recorded for Djamba $F_1$ (56.22 ± 2.48%) and the lowest fruit infestation was observed for N'drowa issia (29.87 ± 1.31%). Kotobi recorded fruit infestation of 46.32 ± 2.05%. Statistical analysis showed highly significant differences between the percentage fruit infestations (F = 43.74; df = 2; P <0.001) (figure-2 B). The variety Djamba $F_1$ recorded the attack rate most high both at the shoots at the level of fruit. The lowest attack rate of shoot and fruit infestation was observed on N'drowa issia. The highest fruit infestation on the variety Djamba $F_1$could explained that Djamba $F_1$ would attract more *L. orbonalis* or the larvae prefer more Djamba $F_1$ than the two other varieties. The similar observations were made by Humayunin its study on assessment the damage caused by the larvae *L.orbonalis*on seven varieties of eggplant (Naeelam, Long Black, Anmol, Kanha, Karishma, Ep-273, Nirala ). This author reported that the variety Naeelam recorded the highest infestation of the shoots, flower buds, flowers and fruits, whereas the lowest infestations were observed on the variety Nirala.

**Table -1**
**Shoot infestations (%) by larva of *L.orbonalis* on three egg plant varieties during the vegetative stage**

| Number of days after transplanting (DAT) | Varieties | | |
|---|---|---|---|
| | Percentage of shoots infestations (%) | | |
| | Djamba $F_1$ | Kotobi | N'drowa issia |
| 33 | 12.22 ± 6.18 $^{bc}$ | 7.50 ± 3.81 $^{c}$ | 6.36 ± 3.19 $^{c}$ |
| 40 | 15.50 ± 3.62 $^{bcd}$ | 8.33 ± 3.42 $^{c}$ | 6.66 ± 2.35 $^{c}$ |
| 47 | 27.01 ± 4.35 $^{abc}$ | 10.83 ± 5.81 $^{bc}$ | 9.10 ± 4.77 $^{bc}$ |
| 54 | 33.01 ± 1.65 $^{ab}$ | 16.48 ± 4.30 $^{bcd}$ | 14.18 ± 4.53 $^{bcd}$ |
| 61 | 37.68 ± 3.66 $^{a}$ | 20.91 ± 6.43 $^{ab}$ | 14.39 ± 4.02$^{bcd}$ |
| 68 | 37.92 ± 1.76 $^{a}$ | 28.25 ± 3.63 $^{abc}$ | 15.01 ± 3.23 $^{bcd}$ |

*The averages affected of the different letters are significantly different according Newman-Keuls test at the threshold of 5%.*

**Table -2**
**Shoot infestation (%) by larva of *L. orbonalis* on three eggplant varieties during the flowering stage**

| Number of days after transplanting ( DAT) | Varieties | | |
|---|---|---|---|
| | Percentage of shoots infestations (%) | | |
| | Djamba $F_1$ | Kotobi | N'drowa issia |
| 75 | 39.50 ± 1.41 $^{abcd}$ | 34.41 ± 3.25 $^{bcde}$ | 16.72 ± 6.78 $^{f}$ |
| 82 | 43.12 ± 1.19 $^{abc}$ | 35.37 ± 1.20 $^{bcde}$ | 20.31 ± 3.57 $^{ef}$ |
| 89 | 45.94 ± 4.53 $^{ab}$ | 36.63 ± 2.47 $^{abcde}$ | 20.92 ± 4.93 $^{ef}$ |
| 96 | 46.13 ± 0.97 $^{ab}$ | 38.88 ± 6.95 $^{abcd}$ | 21.11 ± 5.48 $^{ef}$ |
| 103 | 53.10 ± 2.98 $^{a}$ | 41.14 ± 2.16 $^{abc}$ | 22.25 ± 3.20 $^{def}$ |
| 110 | 53.71 ± 4.64 $^{a}$ | 42.27 ± 2.60 $^{abc}$ | 25.57 ± 3.86 $^{cde}$ |
| 117 | 54.97 ± 4.31 $^{a}$ | 47.74 ± 3.04 $^{ab}$ | 25.65 ± 5.22 $^{cde}$ |

*The averages affected of the different letters are significantly different according Newman-Keuls test at the threshold of 5%.*

**Table–3**
**Shoot infestation (%) by larva of *L.orbonalis* on the three egg plant varieties during the fruiting stage**

| Number of days after transplanting (DAT) | Varieties | | |
|---|---|---|---|
| | Percentage of shoots infestations (%) | | |
| | Djamba $F_1$ | Kotobi | N'drowa issia |
| 124 | 51.91 ± 2.02 bcd | 43.30 ± 2.04 cdef | 25.41 ± 3.25 jk |
| 131 | 52.63 ± 2.55 bc | 43.37 ± 2.53 cdef | 30.73 ± 5.01 ijk |
| 138 | 53.36 ± 1.01 bc | 47.51 ± 3.86 bcdef | 31.40 ± 6.80 hijk |
| 145 | 55.30 ± 2.22 ab | 47.82 ± 2.42 bcdef | 31.66 ± 2.23 hijk |
| 152 | 55.43 ± 4.48 ab | 49.53 ± 5.98 bcde | 32.74 ± 4.31 ghijk |
| 159 | 55.62 ± 2.04 ab | 49.87 ± 2.75 bcde | 53.07 ± 0.97 bc |
| 166 | 66.59 ± 1.62 a | 51.15 ± 1.50 bcd | 45.48 ± 1.52 cdef |
| 173 | 56.68 ± 2.23 b | 56.29 ± 1.84 b | 42.83 ± 0.67 cdef |
| 180 | 55.38 ± 1.18 ab | 51.80 ± 1.65 bcd | 36.47± 1.11 fghij |
| 187 | 47.50 ± 0.51bcdef | 50.09 ± 0.91 bcde | 35. 27 ± 1.21 fghij |
| 194 | 47.40 ± 1.10 bcdef | 40.26 ± 1.63 def | 34.62 ± 2.33 def |
| 201 | 44.40 ± 1.65 cdef | 38.13 ± 0.88def | 25.26 ± 1.83 jk |
| 208 | 38.25 ± 1.92 def | 35.18 ± 1.85 fghij | 22.58 ± 4.90 k |

*The averages affected of the different letters are significantly different according Newman-Keuls test at the threshold of 5%.*

**Table-4**
**Fruit infestation (%) by larva of *L.orbonalis* on the three egg plant varieties during the fruiting stage**

| Number of days after transplanting (DAT) | Varieties | | |
|---|---|---|---|
| | Percentage of shoots infestations (%) | | |
| | Djamba $F_1$ | Kotobi | N'drowa issia |
| 124 | 46.50 ± 0.87 defg | 33.94 ± 1.84 hijk | 23.08 ± 5.78 lmn |
| 131 | 48.40 ± 1.63 def | 41.74 ± 1.28 efgh | 2.13 ± 2.63 klm |
| 138 | 50.58 ± 0.06 de | 47.00 ± 1.02 def | 27.31 ± 0.96 jklm |
| 145 | 50.96 ± 1.20 de | 47.66 ± 1.06 def | 29.47 ± 1.75 ijklm |
| 152 | 53.66 ± 5.56 d | 48.13 ± 0.63 def | 31.11 ± 0.73 lmn |
| 159 | 56.67 ± 1.20 d | 48.36 ± 0.87 defg | 31.85 ± 1.37 lmn |
| 166 | 77.61 ± 3.31 ab | 57.27 ± 3.40 d | 40.04 ± 1.67efgh |
| 173 | 82.67 ± 0.52 a | 69.89 ± 1.16 c | 38.62 ± 3.11 fghij |
| 180 | 73.17 ± 2.92 bc | 56.60 ± 4.09 d | 36.59 ± 0.57 ghij |
| 187 | 68.46 ± 2.78 c | 53.95 ± 2.77 d | 35.24 ± 2.97hijk |
| 194 | 55.42 ± 1.07 d | 47.02 ± 5.05 defg | 34.95 ± 2.40 hijk |
| 201 | 38.51 ± 2.23 fghij | 28.87 ± 1.26 ijklm | 20.67 ± 2.98 mn |
| 208 | 28.26 ± 1.08jklm | 21.67 ± 2mn | 14.27 ± 0.87 n |

*The averages affected of the different letters are significantly different according Newman-Keuls test at the threshold of 5%.*

**Correlation between shoot infestations and the a biotic factors:** The correlation studies between abiotic factors and the shoots infested of the eggplant varieties revealed significant positive correlation with mean, maximum and minimum temperature. The percentage shoot damage indicated anon-significant positive correlations with rainfall. Significant negative correlations were observed between of the shoot infestation and relative humidity (table-5). Similar observations were made in India by Sunil and Senapati[15] who reported in their work that the shoot infestations were positively correlated with average, maximum and minimum temperatures. The temperatures seem to play a very important role in increasing in the shoots infestation. The studies of Shukla[16] showed a positive influence of rainfall and relative humidity on shoot damage. Our results differ from those of Humayun who obtained non-significant positive correlations between the percent shoot infestation and mean, maximum, minimum temperatures. Mathur et *al.*[17] also reported in their study that the percentage shoot insfestation was positively correlated with the maximum and minimum temperature, rainfall and wind speed while negatively correlated with mean relative humidity.

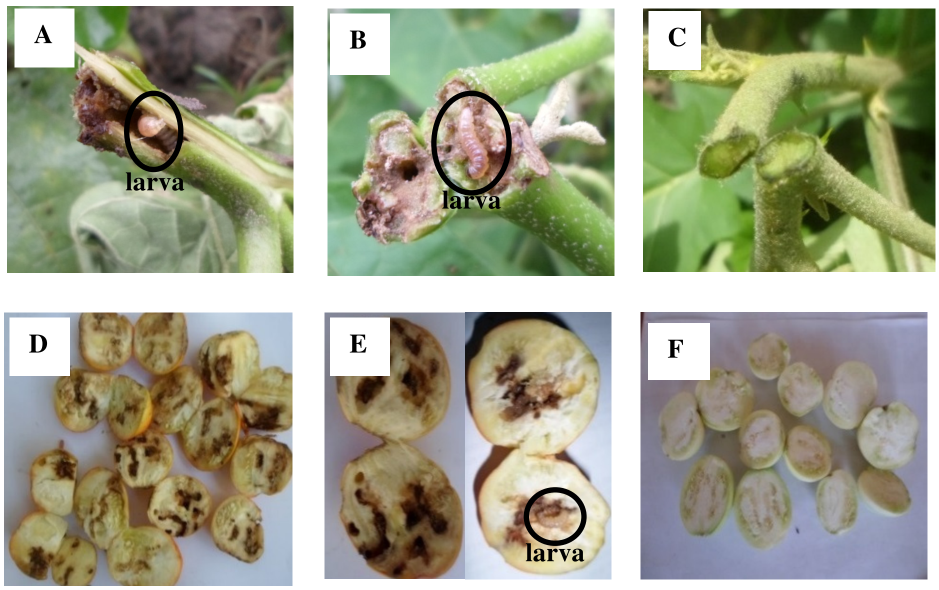


**Figure -1**
**Shoot infested by larva of *L.orbonalis* (A.B); Fruits infested by larva of *L. orbonalis* (D.E); Shoot and fruits uninfested (C. F)**

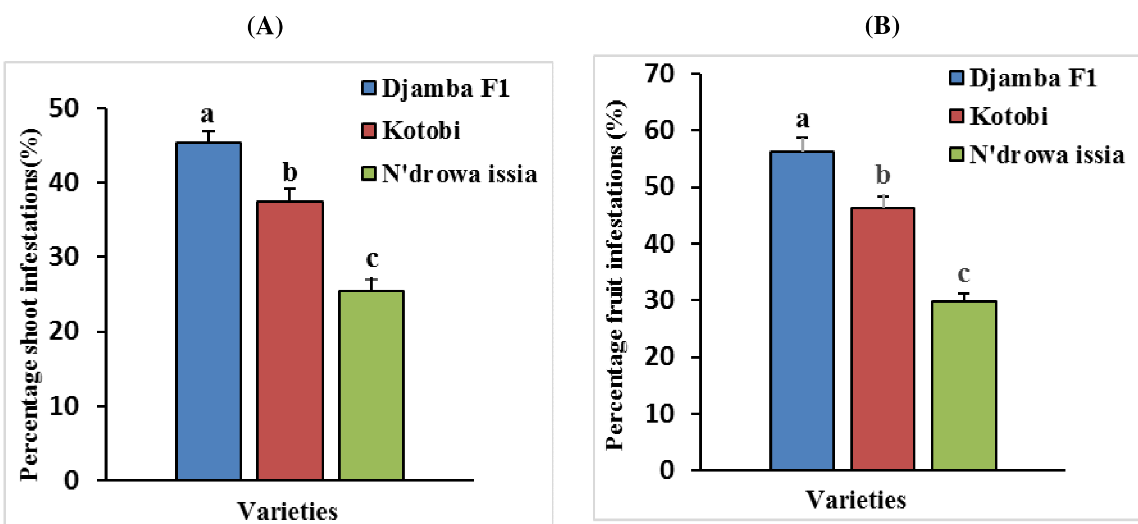


**Figure-2**
**Percentage shoot infestations on the all of three phonological stages (A) and fruit infestations on the all of days after transplanting at the fruiting(B)**

**Table-5**
**Results of the correlations between shoot in festations and the abiotic factors of the three egg plant varieties**

| Varieties | Abiotic factors | | | | |
|---|---|---|---|---|---|
| | **Mean temperature (°C)** | **Maximum temperature (°C)** | **Minimum temperature (°C)** | **Relative Humidity (%)** | **Rainfall(mm)** |
| Djamba $F_1$ | r = 0.45 | r = 0.46 | r = 0.45 | r = - 0.21 | r = 0.07 |
| | p = 0.02* | p = 0.02* | p = 0.02* | p = 0.29 ns | p = 0.67 ns |
| | y = 0.13 x + 21.20 | y = 0.05 x + 26.25 | y = 0.03 x + 22.10 | y = - 0.04 x + 89.04 | y = 0.15 x + 17.28 |
| Kotobi | r = 0.58 | r = 0.60 | r = 0.54 | r = - 0.35 | r = 0.16 |
| | p = 0.001* | p = 0.01* | p = 0.004* | p = 0.07 ns | p = 0.38 ns |
| | y = 0.15 x + 21.50 | y = 0.06 x + 26.25 | y = 0.03 x + 22.25 | y = - 0.07 x + 89.56 | y = 0.31 x + 12.66 |
| N'drowa issia | r = 0.45 | r = 0.71 | r = 0.65 | r = - 0.28 | r = 0.38 |
| | p = 0.02* | p = 0.000* | p = 0.000* | p = 0.14 ns | p = 0.06 ns |
| | y = 0.28 x + 19.98 | y = 0.09 x + 26.38 | y = 0.05 x + 22.28 | y = - 0.13 x + 90.34 | y = 0.83 x + 3.12 |

* :significant at $p < 0.05$ ; ns = non significant at $p \geq 0.05$ ; r : correlation coefficient; p : level of significance ; y = ax + b : regression equation ( a and b constants)

**Table–6**
**Results of the correlations between fruit infestations and the abiotic factors of the three eggplant varieties**

| Varieties | Abiotic factors | | | | |
|---|---|---|---|---|---|
| | **Mean Temperature (°C)** | **Maximum Temperature (°C)** | **Minimum Temperature (°C)** | **Relative Humidity (%)** | **Rainfall(mm)** |
| **Djamba $F_1$** | r = 0.04<br>p = 0.88 ns<br>y = 0.03 x + 27.89 | r = - 0.11<br>p = 0.73 ns<br>y = - 0.01 x + 30.37 | r = 0.77<br>p = 0.002*<br>y = 0.03 x + 22.27 | r = 0.12<br>p = 0.70 ns<br>y = - 0.02 x + 84.10 | r = 0.67<br>p = 0.01*<br>y = 1.34 x – 43.24 |
| **Kotobi** | r = 0.04<br>p = 0.87 ns<br>y = 0.04 x + 27.83 | r = - 0.27<br>p = 0.37 ns<br>y = - 0.02 x + 30.90 | r = 0.54<br>p = 0.001*<br>y = 0.04 x + 22.14 | r = 0.17<br>p = 0.58 ns<br>y = 0.03 x + 83.71 | r = 0.51<br>p = 0.03*<br>y = 1.30 x – 27.26 |
| **N'drowa issia** | r = 0.07<br>p = 0.81ns<br>y = 0.10 x + 26.74 | r = - 0.29<br>p = 0.33 ns<br>y = - 0.03 x + 31.03 | r = 0.66<br>p = 0.01*<br>y = 0.06 x + 22.38 | r = 0.25<br>p = 0.41 ns<br>y = 0.07 x + 82.94 | r = 0.62<br>p = 0.02*<br>y = 2.60 x – 44.80 |

* :significant at $p < 0.05$ ; ns = non significant at $p \geq 0.05$ ; r : correlation coefficient; p : level of significance ; y = ax + b : regression equation ( a and b constants)

**Correlation between fruit infestations and the abiotic factors:** The study of the relationship between fruit infested of the eggplant varieties and a biotic factors revealed significant positive correlations between the minimum temperature, rainfall and fruit infestation. While percent fruit infestation showed a non significant positive correlation with average, maximum temperature and relative humidity (table-6). Our results are close to those obtained by Humayun. Indeed this author has obtained non significant negative correlations between of the fruit infested fruit and the minimum temperature and a non significant positive correlation between fruit infestation and rainfall. Mathur et *al*. observed that fruit infestation revealed a non significant positive correlation with maximum and minimum temperature, rainfall and wind speed exhibited negative correlation with mean relative humidity. Tariq et *al.*[18] showed in their study that the fruit infestations were significatively and positively correlated with mean minimum temperature. These authors also mentioned that fruit infestations were positively correlated but not significant with maximum temperature and rainfall.

## Conclusion

The study on the assessment of damage caused by the larvae of *L.orbonalis* on three varieties of eggplant showed that shoot and fruit infestations varied according varieties and the phenological stages of the plant. The low shoot and fruit infestations at the beginning of the cycle (stage before flowering) increased progressively up to a reaching their peakat the fruiting stage. After reaching their peak, these infestations decreased progressively until reaching low percent ages by the end of the cycle the three varieties. Among the three varieties N'drowa issia recorded the lowest shoot and fruit infestations. Djamba $F_1$was the variety that registered of high shoots and fruit infestations. The abiotic factors (temperature and rainfall) seem to play a fundamental role in the shoots and fruits damage caused by *L.orbonalis*. The fruiting stage that was the most attacked should urge us to accentuate the management at this stage of the plant.

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