

## Observations on the Light-Trap Catch of Insects during Hurricanes

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**Abstract**

The paper deals with light trapping of insects during hurricanes. The light-trap is located in Lenoir County, North Carolina, in the United States of America. The geographical coordinates are 35°54'50"N and 81°32'20"W, elevation is 1,171 ft. (357m).

We found that on the night of hurricane the catch is zero, or very low, but during the next night, the catch is again high. The same species were caught in the light-traps after the hurricane retreat as in the days before the hurricanes.

**Keywords:** Hurricanes; Insects; Light-Trap

**Introduction and Survey of Literature**

Light-traps are used in several states in the USA to help forecast the most important pest insects, and catch data is published every year on the web. There are several studies on the impact of hurricanes on insects. However, they did not investigate the results of trap catches.

A report by Obermeyer and Foster [1] is of equal interest, claiming that the consequences of hurricane Erin swirling in the bay area could be felt in the mid-west. Cornfields were contaminated by masses of the corn earworm moths brought there by the fronts arriving from the south-east of the United States. Hurricane Bertha (12<sup>th</sup> July 1996) perhaps helped to bring both Velvetbean Caterpillars (*Anticarsia gemmatilis* Hbn.) and Soybean Loopers (*Pseudoplusia includens* Walker) to North Carolina this year [2]. Harrison [3] on the other hand, argues that in a hurricane, moths perish, having been swept out of the storm centre by the strong wind. A smaller than usual population will be observed for 7 - 10 days after the storm in the area affected by its passage.

Although fortunately, the effect of hurricanes in modifying light-trap catch cannot be monitored in Hungary, we had a possibility to do so on the basis of data released on the internet [4]. There are used light-traps for the forecast of harmful insects in the USA. The light-trap catch data can be found on the web. In addition to the results of a light trap in the state of North Carolina in Lenoir County, the time of the hurricane passage was also indicated. We examined the effect of hurricanes in modifying the behaviour of insects.

**Material and Method**

For a description of the catch results of the light-trap operated in Lenoir, North Carolina indicated the time of the passage of hurricanes (Figure a-d) Bertha (13<sup>th</sup> July 1996), Bonnie (27<sup>th</sup> August 1998), Denis (5<sup>th</sup> September 1999) and Floyd (16<sup>th</sup> September 1999).

**Figure a:** Hurricane Bertha.

**Figure b:** Hurricane Bonnie.

Figure c: Hurricane Denis.

Figure d: Hurricane Floyd.

We had at our disposal the daily catch data of the following taxa

Hemiptera species:

- Green Strink Bug (*Chinavia hilaris* Say, 1832)
- Brown Strink Bug (*Halyomorpha halys* Stål, 1855)

Lepidoptera species:

- **Crambidae:** European Corn-borer (*Ostrinia nubilalis* Hübner, 1796)
- **Sphingidae:** Hornworms (*Manduca sexta* Linnaeus, 1763)
- **Noctuidae:** Corn Earworm (*Heliothis zea* Boddie, 1850.

Tobacco Budworm (*Heliothis virescens* Fabricius, 1777)

- True Armyworm (*Pseudaletia unipuncta* Haworth, 1809),
- Fall Armyworm (*Spodoptera frugiperda* J.E. Smith, 1797)

We added up by species the number of specimens caught 2-2 nights before and after the hurricanes (-2, -1, 0, +1, +2 nights), that is, then expressed the catch results of the individual days in the percentage of the total number of specimens. First, we examined by species the effect of hurricanes on the catch. As we found no significant difference, we published the combined catch results of the species considered in percentage in the  $\pm 2$  days vicinity of hurricanes.

We performed the t-test calculations with our own program. This program can process any number of data. The figures were edited using EXCEL 2016.

Results and Discussion

Our results are shown in Figure 1-7.

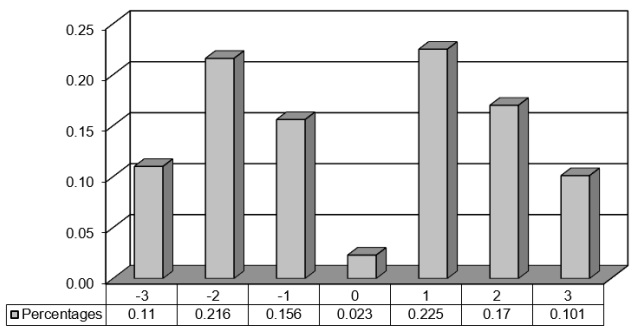


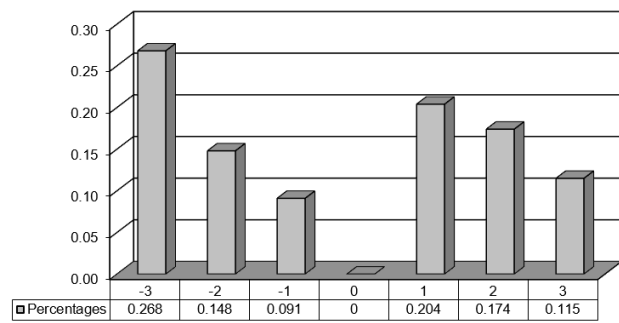
Figure 1: Percentage of light trapped Hornworms (*Manduca sexta* Linnaeus) in nights before and after of hurricane Bertha.

The Hornworms (*Manduca sexta* L.) had minimal catch on the night of Hurricane Berta's arrival. The previous and the following night, however, was not impeded.

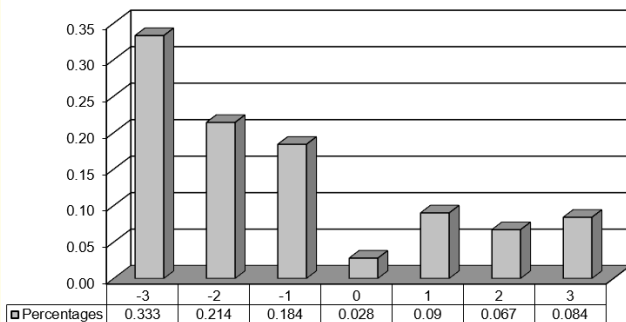
On the night of Hurricane Bonnie's arrival, none of the examined species were caught by the light trap. The following night, however, even exceeded the previous day's catch.

On the night of Hurricane Denis's arrival, collection dropped to levels as low as Hurricane Berta. In the following days, the number of captured moths increased only slightly.

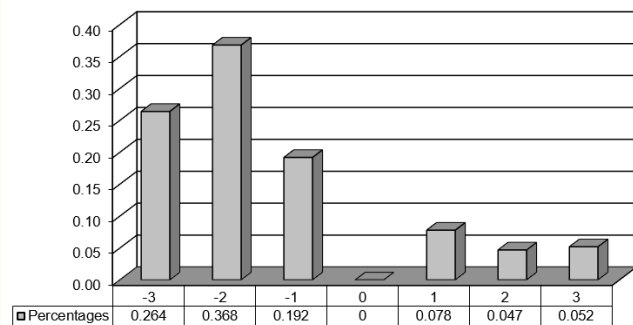
The effect of the Hurricane Floyd is similar to Hurricane Denis on light-trapping.



**Figure 2:** Percentage of light trapped moth species in nights before and after hurricane Bonnie.



**Figure 3:** Percentage of light trapped moth species in nights before and after hurricane Denis.

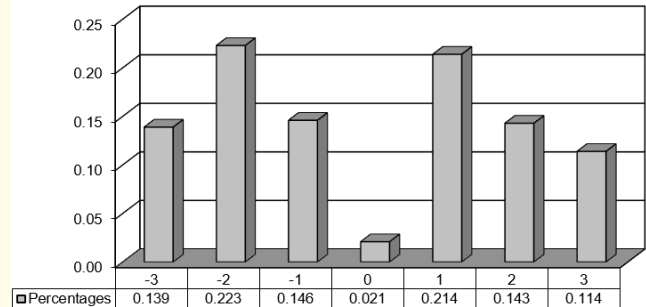


**Figure 4:** Percentage of light trapped moth species in nights before and after hurricane Floyd.

The light-trap catch of the *Manduca sexta* L. is the same during the four hurricanes as in the time of the Berta hurricane.

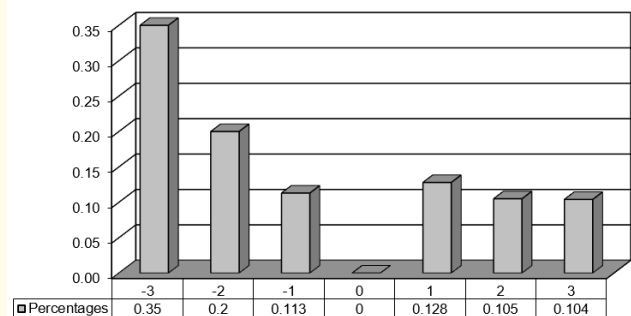
The catch of *Heliothis zea* Boddie is completely the same during the four hurricanes as the catch of *Manduca sexta* L.

The European Corn-borer (*Ostrinia nubilalis* Hbn.) catch ceased completely on the night of the four hurricanes, and it was less on the following nights than before the hurricanes.



**Figure 5:** Percentage of light trapped Hornworms (*Manduca sexta* Linnaeus) in nights before and after hurricanes. (Bertha, Bonnie, Denis and Floyd).

**Figure 6:** Percentage of light trapped Corn Earworm (*Heliothis zea* Boddie) in nights before and after hurricanes. (Bertha, Bonnie, Denis and Floyd).



**Figure 7:** Percentage of light trapped European Corn-borer (*Ostrinia nubilalis* Hübner) in nights before and after hurricanes. (Bonnie, Denis and Floyd).

## Discussion

The arrival of hurricanes is likely to be felt by insects the day before. On the day of the hurricane passage (day 0), obviously there is no collection or the catch is very low, but during the next night, the catch is usually high. So the insects don't die, they survive the hurricane.

The same species were caught in the light traps after the hurricane retreat as in the days before the hurricanes. From this, we conclude that it was not the hurricanes that brought the moths captured after the hurricanes. Our hypothesis is confirmed by the study of Ries, *et al.* [5]. They focus on the Monarch Butterfly (*Danaus plexippus* L.), whose fall migratory pathway goes through Texas during hurricane season. Like birds, monarchs may be able to avoid direct damage from hurricanes. The catch results, shown in the figures, contradict the investigations reported by Obermayer and Foster [1] and also Van Duyn [2]. Our observations seem to confirm that the moths in the Lenoir area do not die, as they are trapped again in the following nights. In our opinion, moths anticipate the arrival of dangerous storms and conceal the hurricane. Because trap logs did not contain species that were not included in the previous days. Our observations cannot confirm Harper's results.

## Conclusion

It is not possible to draw general conclusions from the results presented in our figures, of course. Therefore, it is recommended that data from light traps operating in areas affected by hurricanes be further investigated.

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