

# The Effect of UV Light on Two Species of Nematodes

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## Introduction:

Nematodes are the most abundant animals on earth. Yet we know little about them. Some are harmful and some are harmless. Many live in soils and some live in sediment and eat bacteria. Some, like the kind I am using, are parasites of insect larva. My question is, "how much UV light can the two species take before they are not able to infect the grubs?" My null hypothesis is that UV light has no effect. My alternative hypothesis is that UV light has an effect. A second alternative hypothesis is that if UV light does have an effect on insect pathogenic nematodes, some species may be more susceptible to UV light than others.

## Materials and methods:

Twenty individual nematodes of *Steinernema carpocapsae* and *Heterorhabditis bacteriophora* in 1.0 ml water were put on 5.5 mm filter paper with a micropipettor into a 5.5 mm Petri dish. The dishes were placed in a UV light box (Spectronics Corporation Spectrolinker XL cross linker). The dishes were divided into six different treatments of exposure periods. The times for the replications were 0 sec., 5 sec., 10 sec., 30 sec., 60 sec., and 120 sec. Each treatment was replicated three times. The UV intensity was 120 mJ/cm<sup>2</sup> UV at 254 nanometers. Then mealworms (larval *Galleria mellonella*) were placed in the dishes in a dark drawer for one week. After 7 days, the mealworms were probed with forceps to determine if they were still alive. The number of mealworms that were killed by nematodes were counted as were the number of nematodes killed in other ways. Data were entered into a spreadsheet program (Microsoft Excel). The average response to each treatment was calculated by dividing the total number of grubs (mealworms) in each treatment by the numbers that were killed by nematodes.

## Results:

Both nematode species were negatively affected by UV light exposure. *Steinernema carpocapsae* killed all the grubs in the control group, but averaged only 2 dead grubs after 5 seconds of exposure. Exposure to UV light for 10 seconds or more resulted in zero infected grubs. *Heterorhabditis bacteriophora* exposed to any amount of UV light were unable to kill grubs. However, the control group only killed an average of 1.67 grubs (see figure 1).

## Conclusions:

The insect pathogenic nematodes *Steinernema carpocapsae* and *Heterorhabditis bacteriophora* are very susceptible to UV light, so I reject my null hypothesis in favor of my alternative hypothesis. UV light does have an effect on nematode activity. My second alternative hypothesis is also favored because the data shows that *Steinernema carpocapsae* is more resistant to UV light than *Heterorhabditis bacteriophora*. However, because *Heterorhabditis bacteriophora* showed poor effectiveness in killing the grubs in the control group, something else may have contributed to their inability to kill grubs after exposure to UV light. For example, they may not have been as healthy as the *Steinernema carpocapsae* nematodes. Perhaps the *Heterorhabditis bacteriophora* were

older. To test for these effects I would use a shorter exposure time and use nematodes that are the same age. There are still many questions to be answered such as how they evolved and how well they socialize.

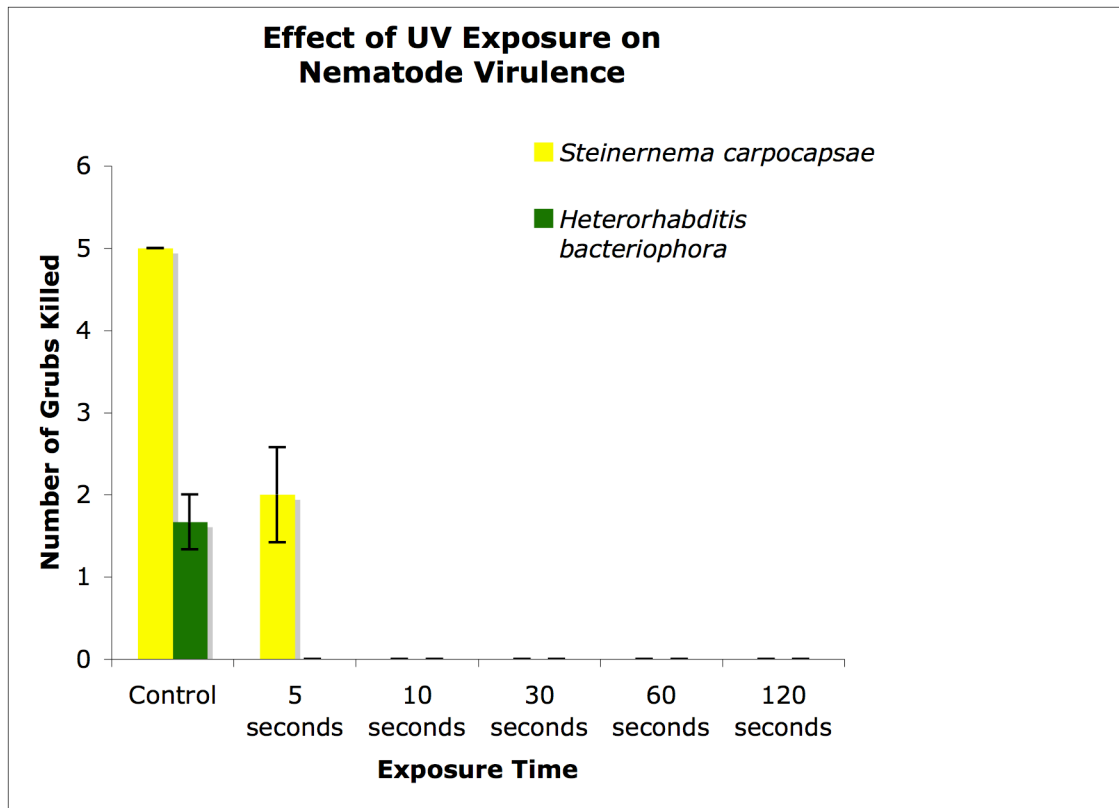


Figure 1. Effect of UV exposure on nematode virulence. *Steinernema carpocapsae* (yellow bars) is more resistant to UV light than *Heterorhabditis bacteriophora* (green bars). Both are very susceptible to UV radiation. As you can see the error bars in the yellow at 5 seconds and the green control overlap, so there is no significant difference between *Heterorhabditis bacteriophora* control and *Steinernema carpocapsae* exposed for 5 seconds.

### Bibliography:

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