

# Preferences of *Nezara viridula* (Hemiptera: Pentatomidae) (Linnaeus) Food Based on Nutrient Content

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**Abstract:** The southern green stinkbug, *Nezara viridula* (Hemiptera: Pentatomidae) (Linnaeus) is a pest of a wide variety of crops, including corn and green beans, across the southern United States. Information on its preference of food choosing from corn or green beans is limited. Ten *N. viridula* stinkbugs were allowed to choose whether to feed upon corn or green beans through a network of containers connected by piping. Eight trials were conducted over a period of four days. Results show *N. viridula* chose green beans more often than corn, which could be contributed to the difference in the nutritional content of the green beans and corn. However, further research could be conducted to test if other variables may add to this preference.

**Key words:** *Nezara viridula*, stinkbug, corn, green beans

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The Southern Green Stinkbug, *Nezara viridula*, is an invasive, phytophagous Hemipteran in the family Pentatomidae that is thought to have originated in Ethiopia (Todd 1989). It is now present along the western hemisphere and the tropical areas of Europe.

*Nezara viridula* is specifically found in Southern parts of the United States, including but not limited to regions spanning from Virginia to Florida, and present in Ohio, Arkansas, and Texas. It is also found in Hawaii and California (Davis 1964). *Nezara viridula* are known to be a pest to a wide variety of plants and crops. These insects have the ability to cause significant damage even in low populations and reproduce quickly, producing three to four generations per year. They feed upon okra, squash, tomatoes, peaches, cotton, soybeans, peas, wheat, cabbage, and are especially damaging to corn and green beans (Todd 1989).

Crop damage can be a direct result of *N. viridula* and other types of stinkbugs feeding. *Nezara viridula* have piercing/sucking mouthparts with which they can puncture fruit and vegetables with. These insects utilize their needle-like proboscis to suck sap for nutrients. As a result of the stinkbug draining the plant of its fluid, the fruit or vegetable is left covered with brown-black, dark spots. These spots are a result of the *Nezara viridula* vectoring plant microorganism, such as yeast and other bacteria (Ragsdale et al. 1979). In addition, in younger fruit the damage can manifest in white spots and result in death, rather than the yellow spots seen in mature fruit. All of these physical deformities renders crops to become inedible to consumers (Capinera 2004). In general, stinkbugs of various species are known to cause three different types of damage to the plants they feed upon. They kill small seedlings, stunt growth, and

produce tillers, which leads to a decrease in profitability and production. Specifically in corn, signs of stinkbug infestation can be detected by yellow bordered, oval holes that run the span of unwrapped leaves of damaged plants. This indicates that the stinkbugs have been able to penetrate the intact leaves, suck the fluid out of the corn, and have left a slimy decaying patch of corn within the plant (Negrón and Riley 1987). Similarly, in green beans, dry white or dark patches will appear at the site of stinkbug feeding.

The damage to these plants places a huge toll on the agricultural industry as corn and green beans are a major part of US agricultural production. Both possess very high nutritional contents with corn having a slightly higher amount of protein at five grams per cup of corn, and green beans at two grams of protein per cup. Both provide high levels of vitamins and minerals such as iron,

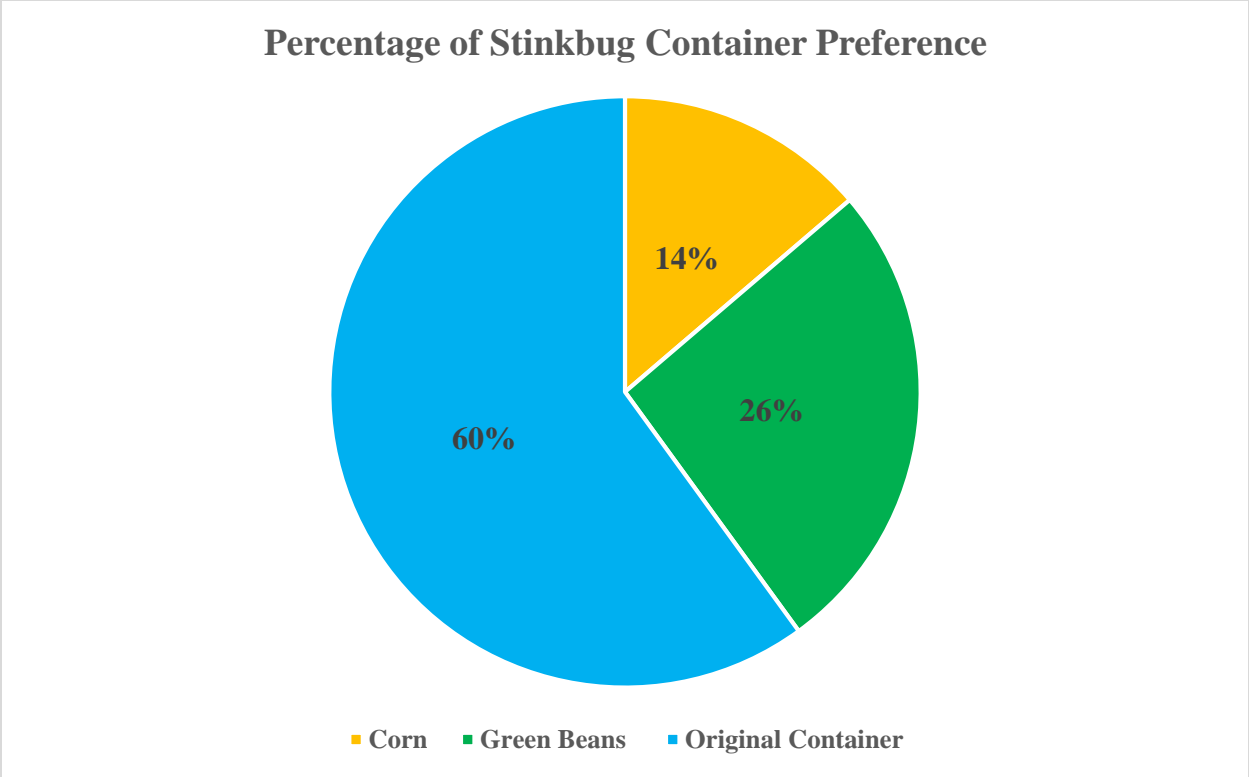
potassium, B vitamins and antioxidant flavonoids and are a good source of dietary fiber. However, both differ in the amount and type of carbohydrates they possess. A cup of cooked corn contains forty-one grams of complex carbohydrates per ear and is considered a starchy vegetable. Green beans only possess eight grams per one cup serving and are considered non-starchy. *Nezara viridula* possess five segmented antennae, which act as olfactory stations allowing them to sense potential food and mates. These antennae may play a role in nutrient preference (Rani and Madhavendra 1995). Corn and green beans are nutritious for humans and for stinkbugs. Except, no known studies have been conducted determining which food source they prefer. Using containers possessing corn and green beans, attached by pipping, a preference for these insects may be determined

## Materials and Methods

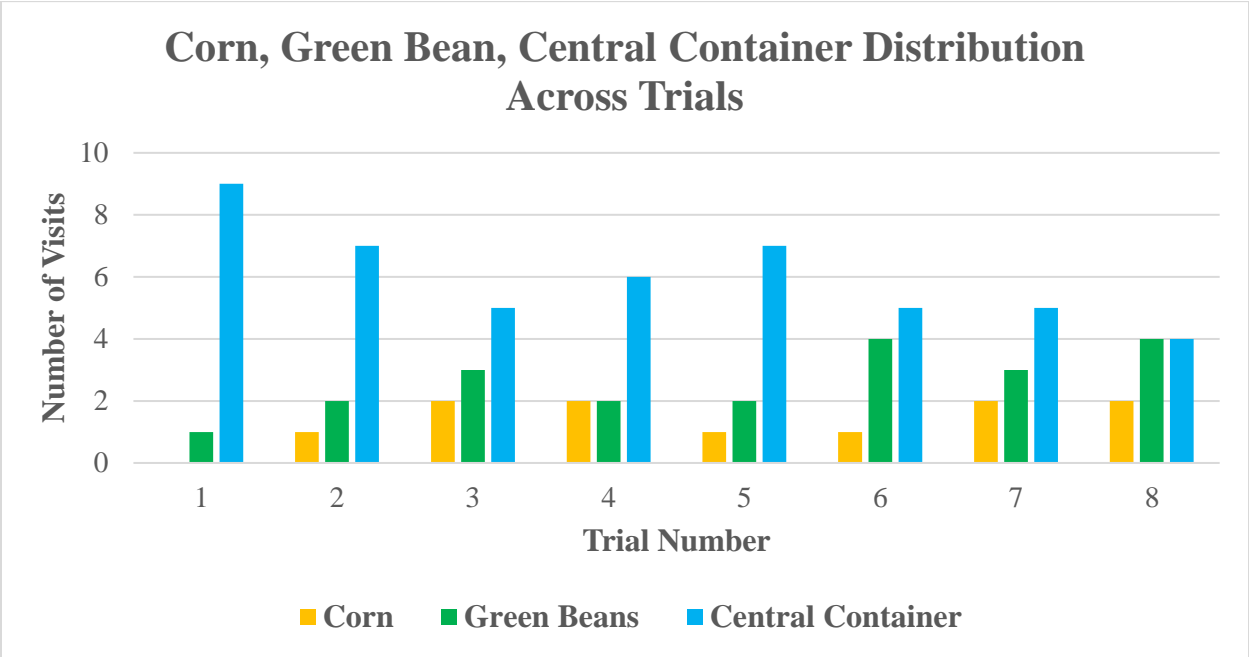
Ten stinkbugs were utilized in this study that was conducted at the Insect Control and Cotton Research Disease Unit at Texas A&M University. Three plastic Ziploc containers (S. C. Johnson and Son, Racine, Wisconsin) with one press seal lids with dimensions, 6-1/8" x 6-1/8" x 3-3/8". Each container had air holes made in the lid, connected by a 1 inch O.D. x 3/4 inch I.D. x 10 feet. Polyvinyl Chloride clear tubing (Home Depot, Missouri City, Texas) was cut into 3x3 feet, and were connected by a 3/4 inch Polyvinyl Chloride T connector (Home Depot, Missouri City, Texas). The central container had ten *N. viridula* stinkbugs and were connected to two other containers. One had green beans, the other corn. A total of eight trials were conducted using the same ten *N. viridula* stinkbugs to eliminate any confounding variables. The *N. viridula* stinkbugs were placed in the central container and were observed to determine which nutrient source they preferred, corn or green beans. The experiment took place over four days with two trials being run each day.

## Results

Of the *Nezara viridula* that left the original container, 65.62% of the visits were made to green beans. Only 34.38% of visits were made to corn. Lastly, 56.16% of specimen failed to leave the original container (Figure 1). A small 4% of the stinkbugs remained inside the polyvinyl chloride tubing and did not travel to either container (Figure 2). During the first trial, one stinkbug died and by the eighth trial seven out of the nine had died.



*Figure 1: Percentage of Stinkbug Container Preference*



*Figure 2: Trial Distribution*

## Discussion

Corn and green beans both possess different nutritional qualities of which *N. viridula* may be more inclined to feed upon. Based upon the data collected in this study, *N. viridula* chose to feed on green beans rather than corn when given this choice. However, there are numerous variables that could have impacted these results and these were attempted to be accounted for. These include, but are not limited to, lighting differences on each container, different scents that may have been present in the lab, or the type of tubing that was used.

*Nezara viridula* could have been attracted to green beans solely due to the fact that there was more light covering the green bean container. Although, with this experiment it is highly unlikely since each container containing the different nutrient sources had equal amounts of lighting. The tubing that was used was polyvinyl chloride piping and could be easier for them to travel through on one side compared to the other. The results of each trial were consistent with *N. viridula* preferring green beans over corn each time. Thus it can be deduced that they are more attracted to green beans

possibly due to the phytochemicals green beans emit. Further research may need to be done in order to determine what chemicals are present in green beans and corn, and if *N. viridula* are truly inclined to a specific chemical.

Based on the differences in the chemical and nutritional makeup of the corn and green beans, *N. viridula* may have been attracted to the higher fiber and lower fat content of the green beans. This is not definitive as more research should be conducted to see how *N. viridula* utilize each of the nutritional components comprising corn and green beans and which ones they have a tendency to seek out. This study did not take in to account the sex of the *N. viridula* used, which could be a contributing factor in the attraction to a specific nutrient source. Another short coming of this experiment was that many of the specimen died throughout the trials. This made it to where there were different number of specimen for each trial. The information obtained from the experiment not only can be a basis for future experiments, but allow farmers to properly take precautions for their crops to be defended against the *N. viridula*.

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