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Companion Planting: Effects of Radishes on Squash Bugs

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Companion Planting: Effects of Radishes on Squash Bugs

An Undergraduate Thesis

by

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Abstract

Throughout history, humans have continuously looked for easier and improved ways of growing our food. Over centuries of hybridizing crop varieties and more recently the invention and implementation of genetically modified (GM) seeds, we have created a food system that is dependent on chemical and seed companies to provide protection from environmental pests. The purpose of this thesis is not to discredit or dissuade someone from using GM seeds, but to take a look at some methods that could protect crops from environmental pests naturally, either for organic farmers or home gardeners. Specifically this review will examine methods of controlling squash bugs (*Anasa Tristis*) organically among zucchini bushes using radishes as a companion plant.

Introduction

Squash bugs are insects that lay their eggs on the undersides of leaves. They are among the most prevalent garden bugs and can do an enormous amount of damage to squash plants and other cucurbits (Smith, 2017). The eggs will hatch in about ten days and over the next four to six weeks, the young squash bugs (nymphs) will grow into adults. They feed on the leaves by piercing the leaf and sucking out the sap. This causes yellow spots that turn brown as the leaf dies. This also interrupts the flow of water and nutrients which causes wilting and can kill younger plants (Burkness & Hahn, 2007). Many farmers and gardeners growing zucchini and other squash varieties have their crops seriously damaged or wiped out due to squash bugs. An organic method of control could be beneficial to backyard gardeners and organic farmers alike. According to *Carrots Love Tomatoes*, icicle radishes planted near squash will help to prevent insect damage on squash and cucumbers if planted slightly before the

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squash. Similarly, nasturtiums are said to repel squash bugs specifically (Riotte, 2004). This method of pest control is known as companion planting and it has been used throughout history as a method of warding off pests, "trapping" pests (Shelton et al, 2006), increasing yield, improving flavor of produce, and increasing disease resistance. Essentially companion planting is just planting two or more different species of plants nearby so they help each other in one or more of these ways. In the past, Native Americans took advantage of companion planting when planting squash, corn, and beans (Old Farmer's Almanac, n.d.). The corn provided stalks for the beans to climb, the beans provided nitrogen for the corn and squash, and the squash provided ground cover to keep weeds from becoming a problem. However, this method of planting has become less common due to the invention of pesticides and the Green Revolution post World War II.

Today you see the explosion of the organic movement and a push back against the use of pesticides. There is no doubt about the effectiveness of the most common pesticides in conventional agriculture such as Roundup and Atrazine. However, increasing resistance against these pesticides biologically and culturally, doesn't answer the question; How can organic agriculture maintain yields while resisting pests? Researchers are finding or rediscovering the benefits of biodiversity in agriculture. One study hypothesized that aromatic plants had an effect against the cabbage root fly but discovered that it was simple biodiversity that was effective rather than a specific companion plant (Finch, Billiald, and Collier, 2003). That's not to say that specific companion plants don't have desired benefits. Trap cropping is designed to entice pests away from your primary plants to a companion that appears more attractive such as using Pacific gold mustard to attract pests such as pollen beetles away from broccoli (Parker et al., 2013). Planting crops that are repellant to pests is also quite successful when you surround your primary plants with alternative plants that pests find repulsive such as planting onions around

broccoli (Parker et al., 2013). Another method of companion planting is to plant crops that will attract natural predators such as mantises, ladybugs, and lacewings, which will feed on common garden pests such as aphids.

Methods

For this experiment four zucchini bushes were planted in a garden in west Lincoln. Two of the zucchini plants were planted with 15-20 icicle radishes placed randomly as a method of deterring squash bugs. Radishes were planted a week before zucchini and replanted approximately 25 days later before harvesting mature radishes. The other two zucchini bushes were planted by themselves as the control. The zucchini and the radish/zucchini plots that were in the same garden bed had clear plastic sheeting between plots. This was to remove potential airborne effects from the radishes contaminating the control groups while not blocking sunlight. Plants were watered regularly, equally and without mulch since that would provide habitat and cover for squash bugs (Cartwright et al., 1990). Plants were checked every two days for eggs by carefully overturning leaves and searching. If eggs were found, they were noted and carefully removed from the plant and destroyed.

Lincoln was hit with a severe hailstorm 6/12/2017 and nearly the entire crop was shredded. Approximately a week later as crops were just starting to recover, another hailstorm hit and decimated the rest of the crop. Mid-June the entire crop was replanted in the same method as the original.

Results

During the summer, radish plot 1 had a total of four egg clusters and radish plot 2 had

Photo of Squash Bug eggs by Daniel DeJong

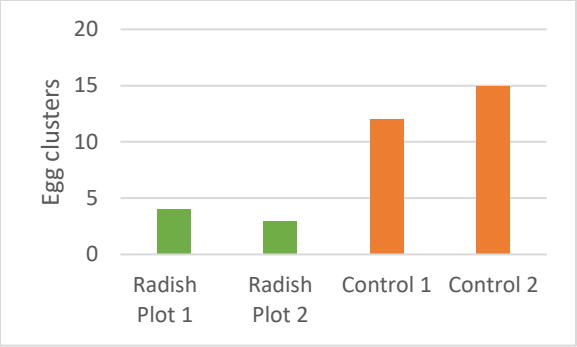

Figure 1

only three. Control plot 1 had 12 egg clusters while control plot 2 had 15 (Figure 1). Control plot 2, which was furthest away from the experimental plots, had the most number of egg clusters. By mid-August however, the entire crop was wilting due to the squash vine-borer and plants died shortly after.

Discussion

Overall, the evidence shows that there could be an association between planting radishes and a reduced number of squash bug eggs found in neighboring plants as indicated by data in Figure 1. There was a significant pest reduction of 75% with only natural control methods. This is comparable to results seen using non-natural control methods such as the insecticide Sevin (Granett and Reed, 1960). While there were limiting factors such as sample size, extreme weather, and additional pests, radishes could potentially have a significant effect on squash bugs in larger settings. When doing this experiment, it would have been ideal to have ten or more, larger garden plots to ensure the results could be reproduced. However, there is much research out there that analyzes more than just one method of natural controls. It would be interesting to see the effects of multiple methods of control in place and the practicality of implementing multiple controls on a large scale. But for the purposes of this study, one specific method of control was selected to determine the effectiveness of that individual method. Other pests need to be taken into account as well. This experiment could have

Photo of Squash Vine-borer damage by Daniel DeJong

continued another month or more had the crop been monitored for the squash vine-borer as well. The plants could have been saved if signs of this pest were identified early enough by cutting the larvae out of the base of the plant and burying the wound in soil (Hahn & Burkness, 2007). The garden could have also seen another month of growth if it hadn't been destroyed by the hailstorms. Another two months of growth could have shown dramatic changes in squash bug egg numbers in both control and test plots, which would have been beneficial to see a comparison from beginning to end of summer. Gardeners should consider using other methods that could prove as effective such as trap cropping. If trap crops are combined with crops that are repellent to pests, this could reduce squash bug numbers even further.

Conclusion

The evidence indicates that there could be an association between radishes and decreased numbers in squash bug egg clusters, although more research is needed to be conclusive. Future research would need to include several more garden plots or even fields and would need to account for both squash bugs and squash vine-borers to ensure survival for a full growing season to collect an appropriate amount of data. These types of natural control practices may be necessary in the future if we wish to sustainably grow our food organically and without limiting biodiversity as experienced with monoculture.

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