USING FLOWERING PLANTS TO HELP PARASITIC WASPS ATTACK STINK BUG EGGS

By

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Parasitic wasps are beneficial wasps that generally lay their eggs inside the egg, immature or adult stage of another insect commonly called its *host*. Eggs of these wasps then hatch, leaving the larval wasp which resembles a maggot to consume the contents of the host egg. After consuming the host, parasitic wasps complete their development within the host and later chew their way out and emerge as adult wasps. Parasitic wasps that attack stink bugs and other insect hosts typically consume nectar during their adult life. Studies have shown that the *longevity* (lifespan) and *fecundity* (reproductive capacity) of some parasitic wasps are enhanced when they are allowed to feed on nectar from flowering plants. This need for nectar suggests that the maintenance of nectar producing plants that can be readily assessed by stink bug and other insect parasitoids will support their conservation. Conservation of parasitoids through the provision of nectar increases the likelihood that insect pest eggs will get parasitized and consumed by developing wasps. Plants that are grown near crops for the purpose of attracting and providing a nutritious food source for beneficial insects are often called *insectary plants*. Thus, we hypothesize that parasitism of stink bug eggs can be increased in crops containing *insectary plants* along their periphery.

Our current study focuses on the use of insectary plant strips planted along crop borders for managing the invasive brown marmorated stink bug (BMSB) *Halyomorpha halys* and other stink bug pests [e.g., brown stink bug (*Euschitus servus*), rice stink bug (*Oebalus pugnax*), green stink bug (*Acrosternum hilare*), etc.] in conventional soybean and organic field corn plantings. Using a *conservation biological control* strategy, we developed an experimental design to determine if nectar-producing plants, French marigold (*Tagetes patula*) “Single Gold” also sold under the brand name Nema-Gone, or buckwheat (*Fagopyrum esculentum*) and a purple tansy (*Phacelia tanacetifolia*) + buckwheat mixture when planted on the perimeter of soybean and corn plots,

respectively, can attract and increase the effectiveness of predators and wasp parasitoids mainly belonging to the Scelionidae family (please see corn study design, **Fig. 1**). These beneficial wasps are very small, approximately 1/16 to 1/2 inch in length. Wasps from this family of insects are known to parasitize stink bug eggs including the BMSB and by doing so, effectively eliminate members of the stink bug population. We hope to provide these beneficial wasps a food source by planting these flowering strips, and subsequently increasing the suppression of stink bug populations within corn and soybean plantings.

Marigold is mostly known for its ability to suppress populations of plant-parasitic nematodes. Limited studies have been conducted on its ability to serve as an *insectary plant.* However, laboratory experiments have shown that the life span of one Scelionid wasp, *Trissolcus basalis* can be enhanced when they are allowed to feed on nectar from French marigold flowers. Thus, we hypothesize that French marigold flowers may benefit other parasitic wasps in the family Scelionidae. On the other hand, purple tansy and buckwheat flowers have been found to attract beneficial wasps; and in Maryland, purple tansy has been shown to specifically attract Scelionid wasps. Our goals include establishing whether the presence of these *insectary plants* will have a significant impact on the fauna of insect pests and beneficial arthropods (insects and spiders) associated with corn and soybean plantings. Additional objectives include determining whether these insectary plants will impact final crop yield and quality.

Though data is still being collected and has not been analyzed, from casual observation it is relatively apparent that buckwheat attracts a number of “hungry wasps”. However, purple tansy may be incompatible with MD climate as we noticed that the majority of plants were unable to flourish under field conditions. Most appeared to senesce or die within a few weeks following transplanting and displayed limited flowering. Thus, future plans include replacing the purple tansy + buckwheat mixture with partridge pea (*Chamaecrista fasciculate*).

Field studies conducted in Maryland showed that partridge pea have some of the characteristics of a good *insectary plant*. It is compatible with MD growing conditions, flowers for the entire growing season given enough water and attracts beneficial parasitoids and predators. Partridge pea is a native annual legume found throughout the eastern United States. It is additionally reported to be drought tolerant and grows in disturbed and sandy areas such as roadsides, suggesting hardiness. Partridge pea produces yellow flowers and is considered an important contributor to honey production. The nectar source of partridge pea is found in glands

at the leaf base called *extrafloral nectaries* (EFN), not in the flowers. Extrafloral nectaries are nectar-producing glands on a plant that is physically separate from the flower. Beginning with the third or fourth true leaf, a saucer shaped extrafloral nectary can be found at the base of each petiole of the partridge pea. These nectaries are very small (0.5–4 mm across), secrete up to three microliters of nectar a day, and almost every leaf has one nectary. In addition to other arthropods, partridge pea plants are visited by many different ant species which can only obtain nectar from the plant's EFN. Though partridge pea attracts beneficial insects, it has been reported to be an important summer and fall host plant for the brown stink bug suggesting that partridge pea can serve potentially as both an *insectary plant* and *trap crop*. *Trap cropping* involves planting a plant species that is known to attract a pest near a crop susceptible to that pest, in order to lure it away from the crop. Next field season, we will investigate the potential of partridge pea to serve concurrently as an *insectary plant* and *trap crop* in organic field corn plantings.

The corn research project is being conducted in collaboration with Dr. Anne Nielsen at Rutgers University and is funded by a USDA National Institute of Food and Agriculture (NIFA) grant (2012-51300-20097) that was awarded through the Organic Research and Extension Initiative (OREI) program. This program focuses on helping producers and processors who have already adopted organic standards to grow and market high quality organic agricultural products. The soybean research project is made possible through funding by the Maryland Soybean board. If there are any questions regarding these projects and the use of insectary plants feel free to email Lauren, Armando or Cerruti. Their email addresses can be found under personnel at "cerrutirrhookslab.umd.edu/".