

Stinging Insect Pest Management – Pilot IPM Project in New York State

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Introduction: In many parts of the U.S., stinging insects are reported to be one of the most common complaints in public places and especially in schools. A variety of problematic species of stinging insects can invade parks and school grounds, including paper wasps, cicada killers, ground-nesting bees, and yellowjackets. The fierce and numerous varieties of yellowjackets generally pose the most threat to children in such locations. Severe allergic reactions can result from a few stings, potentially leading to anaphylactic shock and death in a few individuals. Approximately 40 deaths occur every year in the U.S. due to severe reactions to yellowjacket stings¹. This is a risk most parents do not want to take. Equally important is the risk of exposure to pesticides used to control dangerous and nuisance insect pests. Increased public awareness of the potentially harmful effects of pesticides has led many schools, towns, counties and states to enact laws to reduce or eliminate pesticide use within schools.

This project was designed to acquaint us with social stinging insects and test a program of non-toxic monitoring, and management in such a way as to promote integrated safe techniques to schools and other institutions.

Objectives:

1. Monitor and identify stinging insect pests at sites
2. Remove nests with water or by hand
3. Use plant oil-based spray, and cultural or mechanical techniques for control after hand removal
4. Use traps for capturing yellowjackets
5. Evaluate results of managed versus unmanaged sites
6. Report results

¹ Reisman, R. 1995. Hymenoptera. *Immunology and Allergy Clinics in North America*. 15(3): 567-574

Results:

Monitoring: Inspection and monitoring were the first steps of the program of each individual in this project. Each site was evaluated at some point in the spring after wasps became active (earlier in the two northern regions, later in the two LI portions, due to a very cool spring). It was consistently found that paper wasps are the earliest visible pests around buildings and early in the summer, yellowjackets are difficult to find. During mid-summer, bald-faced hornets become more obvious, as paper wasp nests continue to grow. At the end of summer and through the warm days of fall, the most serious problem lies with yellowjacket nests, which have secretly become enormous.

Various structures were used by paper wasps for nest building; the most common requirement seemed to be warmth. Paper wasps will nest in metal tubes, even if nest size is limited. An old metal tractor sitting in full sun had numerous nests and wasps swarmed the defunct vehicle if it was bumped. Another old tractor only feet away from the first, but located in almost total shade, had no signs of wasp nests. Sunnier sides of buildings, facing south and east or sometimes west were prime locations for paper wasps and yellowjacket nests.

The timing of inspections was evaluated and it was determined that weekly visits were no better than semi-weekly or even monthly visits. However, there was some build-up in wasp numbers during absences. Since yellowjackets are difficult to find in low densities, it might be wise to devote more time to yellowjacket monitoring during late spring, using traps or other attractive bait and visual inspection. Early detection of yellowjacket nests will be the biggest challenge in monitoring and prevention of stinging insect pest problems in early and mid fall when school is in session.

Removal: In all locations, nest removal was the second step in stinging insect management. Paper wasp nests were the most obvious and easy to find. Each investigator got a feel for predicting the locations favored for nest building, and was able to uncover hidden paper wasp nests. Water sprays and hand removal were used to knock down nests and this was reported to be effective. One investigator used a 12-foot pole with a hand made hook on the end to pull down wasp nests after treating them with water or mint-oil spray (see low-toxic controls).

Wall and ground-nesting yellowjacket nests were nearly impossible to remove. In one case, an investigator treated and dug up an underground yellowjacket nest. He reported that this was a difficult task. Although digging up the nest was highly effective for elimination of the problem, the process was probably unrealistic.

In two cases at the Suffolk County Educational Farm, bald-faced hornets were encountered and nests needed to be removed. One was apparently treated with a can of pesticide before we got to it. A bee suit was recommended for nest removal and in both cases, a clear plastic bag was slipped over the nest and the nest was cut out of the foliage. An effective way of dealing with a plastic bag full of hornets in summer is to carefully tie off the bag, place it into another plastic bag, and place the whole thing in a sunny location, away from human activity. The wasps will eventually be killed from excessive heat.

Low-toxic pest control: All chemical and cultural or mechanical control tactics are included in this section and there were a variety employed in this project by each of

the investigators. Each individual was given a supply of mint-oil wasp spray. This was a reliable line of defense for all situations involving stinging insects. Wasps could be knocked down from nests in a variety of situations without the risks associated with pyrethroids or organophosphate insecticides. Yellowjackets could be temporarily suppressed at the nest entrance, though this did not work for very long. Another formulation of plant-based oil was available in a dust formulation and was used by one investigator for wall void yellowjacket problems. This appeared to be very successful and will be used again.

In the case of the old tractor infested with paper wasps, time and patience were needed to repeatedly spray mint oil, then remove nests and seal up openings used by wasps. A combination of steel wool and expanding foam spray were used to block the many entrances into this favored nesting site. Care was then taken to improve the appearance of the tractor after sealing. Spray foam can be unsightly and usually needs to be cleaned up and disguised. The end result was successful. Sealing up nesting locations will be extremely useful on the playground and in fences in any areas where wasps build nests.

In the case of one school with a significant yellowjacket nest in a window casing near the playground (highly sensitive site) staff of the school attempted to block the opening with silicone caulk. Yellowjacket workers quickly chewed their way through the caulk leaving behind a pile of silicone rubble. It was recommended that this school employ a professional and do what is necessary to kill the insects before closing up the nest entrance. They were told of the potential that wasps could make their way inside the school if the outer entrance were totally blocked.

Another technique commonly referred to is the use of a glass jar or bowl over a yellowjacket ground nest entrance to fool the wasps into starving the nest. It is said that wasps that can see daylight will not attempt to create a new entrance and will therefore starve. We attempted this at the SCEF with a ground nest in a large empty lawn. We found that while the yellowjackets became confused (and not especially agitated) they did dig a new entrance in two days. Repeating this experiment by covering the new entrance with sand worked very slowly, took several weeks to suppress, and therefore would not be recommended as a means of controlling ground-nesting yellowjackets. Other techniques will need to be evaluated in the coming season for ground nests, including the use of a vacuum or large volumes of sand only.

Other issues, including landscape management, play a significant role in stinging insect management. At one location, milkweed plants growing outside the classroom were attracting wasps foraging on honeydew from pest aphids. Removing aphids and honeydew did not work completely due to the foraging memories of wasps still patrolling the area. Eventually the milkweed plants were removed. Many schools and educational facilities have gardens and flowering landscapes that will attract foraging insects of all kinds. However, to date, no issues have come up regarding stinging insect problems associated with gardens.

Of great concern, and probably the most important factor in stinging insect pest problems is waste management and sanitation. Garbage residues attract wasps for many reasons. Sanitation is the most difficult challenge, especially regarding commercially provided dumpsters. Each investigator made several recommendations for cleaning, requesting clean dumpsters, waste residue management, and use of lids on containers.

This will be an ongoing challenge and several tactics will be evaluated in the coming project year.

Trapping: Although each investigator used trapping for wasp control, and found great numbers of wasps trapped at most locations, this technique was the most difficult to evaluate. We quickly learned that 1. Traps do not work in shady locations, 2. Traps mainly catch yellowjackets and smaller numbers of other species, and 3. Traps need to be serviced at least once a week for best effectiveness. We do not know whether traps simply attract more foragers to the area or if they are attractive enough to draw attention away from other food sources, such as garbage.

All investigators used the same type of trap that included a pre-made single-use tube of bait. The formulation was meant to attract yellowjackets but it only lasted about a week. To save on resources, we each filled traps with different combinations of fruit juices. Citrus juices, apple, and pineapple juice were very effective, although trap location and weather were usually more important factors. One trend became obvious, the more traps placed in a heavily infested location, the more wasps were caught. Numbers caught were in the thousands per location during the project period. However, we were not able to assess whether the foraging population had actually dropped. In one location, the Suffolk County Minimum Security Facility, inmates and Officers did report that they were very pleased with the noticeable reduction in wasp numbers on their loading dock, which is closely flanked by five dumpsters. Over 20 traps were placed on the perimeter fence surrounding the jail yard.

Overall, trapping appeared to be an accessory tactic in stinging insect control and fine-tuning of bait choice and trap placement will be necessary to maximize the usefulness and strength of this tool.

Impact: The impact of this pilot project was significant. As a new endeavor, each investigator was able to learn the nuances of working with stinging social insects, as well as the practicality of using several methods to manage them. In many cases, building staff followed us around to point out nests or to observe the efforts of our team. Each participant took the opportunity to explain the purpose of the project and made recommendations for non-toxic approaches to stinging insect management. This project has helped the team identify priorities, parameters, recommendations, and warning signs of wasp problems. Reports and recommendations were sent to each of the facilities that participated in the study and follow up visits will be made in the coming months to prepare for the next season.

The reduction of pest problems as a result of the work done in this project was visible as compared to no management; however, we do not know how these efforts compare to conventional stinging insect control.

Conclusions:

1. Monitoring should be done on a semi-weekly or monthly schedule from a date in early to mid spring through the fall, with added emphasis on location of yellowjacket nests in late spring or early summer.

2. Nest removal is extremely helpful, but established wasps are persistent and follow-up visits are a must to prevent nest re-building.
3. There are a variety of low-toxic control methods available and more to come. Mint oil spray, although effective on contact, has no residual effect and therefore was not as effective as we had hoped. Use of tree-oil dust will be very handy for wall void nests.
4. Landscape alteration and waste management handling are important issues that can be investigated further for practical solutions.
5. Trapping may be limited in usefulness, especially when preferred food sources are available.

Future Efforts:

1. Look at methods that help improve trap usefulness, such as timing and location of placement, especially in regards to nest location.
2. Learn more about the biology of these stinging insect pests.
3. Identify realistic, low-toxic solutions for wasp control in the vicinity of dumpsters that will work in addition to cleaning such areas.
4. Increase the number of comparison sites (managed vs. unmanaged buildings).
5. Expand efforts in exclusion and sanitation, and use of vacuuming as a tool.
6. Look into an experimental use permit (from NYS DEC) for tree oil dusts on ground nesting yellowjackets.