



Yellowjackets

This module is intended to serve as a source of basic information needed to implement an integrated pest management program for yellowjackets. Any pest management plan or activity must be formulated within the framework of the management zones where it will be implemented. Full consideration must be given to threatened and endangered species, natural and cultural resources, human health and safety, and the legal mandates of the individual parks. Recommendations in this module must be evaluated and applied in relation to these broader considerations.

The name "yellowjacket" refers to the typical yellow and black bands of color on the abdomen of a variety of wasps common to North America and elsewhere. Some species are actually black and white, but are known by the same name. Yellowjacket management is important because the vast majority of visitors regard yellowjackets (and other stinging insects) as a threat to their health and safety, as well as impediments to their enjoyment of the location.

In terms of management, it is important to remember that all varieties of yellowjackets are beneficial to the natural environment due to their predaceous behavior and consumption of large quantities of insect pests. If a nest does not pose a real, direct threat to personnel or to the public, it is recommended that you leave it alone.

The following information is intended to provide you with a description of various species of yellowjackets, their life cycle, habitat, and nest biology, as well as management issues in monitoring and control and medical treatment of stings. For more detailed information, you should consult the recommended reading list or discuss specifics with an appropriate professional. The medical advice offered is not intended to replace professional medical care. **Be prepared to handle emergencies resulting from stinging insects by contacting specialists in the area who can offer advise in an emergency situation. Locate these resources before the emergency occurs.** Someone's life may depend upon the level of preparedness.

Like any other creature, yellowjackets can be understood, managed, even enjoyed if you know a little bit about their behavior. Proper planning can avert most of the problems commonly encountered, thus increasing everyone's enjoyment of the outdoors.

YELLOWJACKET IDENTIFICATION AND BIOLOGY

Yellowjackets (*Vespula*, *Dolichovespula*, *Vespa*) are social insects that build enclosed paper nests underground, in trees, or in other structures above ground. Of the 19 species of yellowjackets and hornets found in North America, only five are considered pests. They are commonly referred to as eastern, western, southern, german, and common yellowjackets. These types are considered pests because they are all scavengers who come into frequent contact with humans as they forage for food. Remember, though, that all yellowjackets, including those considered to be pests, are actually beneficial insects in the natural environment due to their consumption of large quantities of other insects, many of which are also agricultural pests.

It is not necessary to identify the species of yellowjacket for purposes of management; therefore, such information is not included here. If more information is desired, refer to the bibliography. Akre et al. 1981 provides detailed taxonomic keys to the yellowjackets of North America.

Newly-produced queens are the only members of yellowjacket colonies to survive the winter (except in some situations in Florida.) From late March to May, they emerge from hibernation. Having been fertilized by males the previous autumn, the queen lays approximately 45 to 70 eggs, which hatch and become the first generation of workers. The queen continues to lay eggs, forage, and care for her brood. When the first five to seven emerge, they function as workers and care for all subsequent offspring. The queen does not leave the nest again. Workers feed the young, expand the underground nest by digging, produce paper comb, and protect the nest. Yellowjackets perform all duties of the nest at all ages. Yellowjacket workers are not sterile, but are kept from laying and caring for their own progeny by inhibitory chemicals (pheromones) produced by the queen. If the queen is lost, workers will produce male offspring.

Colonies grow slowly until mid-summer, when successive worker broods emerge and growth becomes exponential. Pest species typically have 500-5,000 workers at peak population. Increased foraging activity in areas frequented by human beings, coupled with a competition-induced aggressiveness and willingness to sting, leads to a sharp upsurge in the number of stings in late summer and fall (Davis 1978). By autumn, colony size has begun to decline. New queens mate and go into hibernation, while males leave to mate and die outside the colony. With the advent of cold weather, the old queen and workers die as well. Each year's population of yellowjackets in any given area will be affected by the weather, and thus will differ from year to year. Sudden cold snaps in the spring can sharply reduce populations for the rest of the year.

MONITORING AND THRESHOLDS FOR YELLOWJACKETS

Although scientists have developed very precise ways of monitoring insect populations, a practical approach tailored to the needs of your facility seems most advisable. If visitors and employees are not frequently bothered or stung by yellowjackets, it is reasonable to conclude that your management system is adequate and little, if any, monitoring need be done. However, if yellowjackets are becoming a nuisance, you may wish to take remedial action (as described herein) and develop a monitoring routine.

For example, you could select a specific garbage can (or other site that appears to draw a large number of the pests) and count the number of foragers that visit within a certain period of time (10 minutes). It would be best to monitor at roughly the same time each day. Take remedial action and see if improvements lead to a reduction in numbers. If stings have become a problem, you may also wish to keep track of the numbers of persons stung and correlate these figures with those resulting from forager monitoring. That is, at the point where stings are very infrequent (or approaching zero), that number of foragers in a given time period may be an acceptable number, implying good management of the facility. On the other hand, frequent complaints from visitors (or the observation by park personnel of pestered patrons) should be construed as requiring additional effort. Tolerance is expected to vary from one location to another. Remember, however, it is the great outdoors--some presence of yellowjackets is natural.

Contingency Planning for Yellowjacket Problems

Plan for emergency care of sting victims who are dangerously sensitive to venom. Have first-aid facilities

or advice for non-sensitive victims. Monitor individuals who have received stings until you know they are safe. Pain or swelling at the site of a sting is a normal, non-threatening reaction; impairment of breathing, swelling of lymph nodes, dizziness, fainting, or similar extreme reactions are not normal and require expert help. Non-allergic individuals may find applications of ice, meat tenderizer or over-the-counter sting swabs helpful. If your facility wishes to assist sting victims with such remedies, include them in your first-aid kit. Be aware that only about 0.4% to 0.8% of the human population is seriously sensitive (in a life-threatening way) to wasp/yellowjacket venom. Many of these individuals already know of their allergy and carry sting kits or wear medical identification bracelets to safeguard themselves. Although anaphylactic shock can occur in as short as 10 minutes (and can cause coma or death), delayed reactions may occur up to 20 hours after the sting is received. (See Akre et al. 1981; Frazier 1976 for details). Also be aware that many individuals refer to themselves as "allergic" to stings, but do not present life-threatening symptoms--rather, they are referring to the normal swelling reaction one may get after being stung. Be sure that employees know how to question sting victims to accurately ascertain their reaction history and thereby determine whether emergency assistance is needed. An information sheet that may be helpful as a hand-out to visitors is included in this module.

Provide good public educational information on yellowjackets, other wasps, and bees at your location. To be most effective, these should include color drawings or photos that can be understood by visitors who cannot read English. Consider the advantage of making signs in both English and Spanish, or other languages common among your visitors. If possible, have knowledgeable staff available to answer questions that may arise from the information you provide.

If absolutely necessary, destroy structural nests, ground nests, and aerial nests with approved chemicals. This will be somewhat easier to do in dark or semi-dark conditions than in daylight. Be sure to dispose of all chemical containers in an environmentally-sound manner.

NON-CHEMICAL CONTROL OF YELLOWJACKETS

Non-chemical control of yellowjackets is achieved by reducing contact between humans and yellowjackets in every way possible. Displays, handouts, and other forms of communicating information should teach the visitor that stings are mainly avoidable by following certain precautions. Educational materials should emphasize the positive role wasps play in a healthy environment.

Sanitation

All refuse containers should be solid ones (no wire mesh, etc.) made of plastic or metal and equipped with wasp-tight lids to prevent foragers from gaining access to the interiors. All containers should be periodically checked for holes, cracks, etc., and repaired immediately. Refuse should be collected on a regular basis **before** containers are completely full. This may entail collection several times a day, particularly in picnic areas and during periods of heavy use of facilities, such as on weekends or holidays. Containers should be washed out regularly to reduce odors that attract yellowjackets. Use steam or soap if necessary, and hose down surrounding concrete areas as well. Plastic bag liners aid in sanitation and control of fluids that attract insects as well. Place trash cans as far as possible from picnic tables to reduce interactions between visitors and wasps. Monitor garbage cans for foraging wasps to determine local populations and spot critical areas for improvement.

Provide lids and straws on all soft drink containers sold by concessions. Be aware that yellowjackets can easily enter the openings of aluminum beverage cans if not carefully monitored by the user--and can thus present a hazard if accidentally ingested during the process of drinking from the can. For this reason,

paper cups with lids and straws are safer.

Trapping

Trapping can at best provide only temporary relief in very limited areas, due to the large nest sizes of many colonies. It should therefore be considered secondary to the previously-mentioned management strategies.

Funnel traps using synthetic lures such as heptyl butyrate have been used successfully to capture western yellowjackets to a tolerable degree (Davis et. al 1973), but lures have not proven successful with the eastern species. A problem with synthetic lures is their inability to target only yellowjackets that are presenting a pest problem, while ignoring those performing their natural beneficial function.

Traps using raw fish as bait have been used to temporarily control *Vespula pensylvanica* (Akre et. al 1982). Cut the skin to expose the fish's flesh and suspend it above pans containing water and a wetting agent (like dishwashing soap) to reduce surface tension. Yellowjackets visiting these traps typically cut large pieces of flesh from the carcass and attempt to carry them to sites where they can chew them into smaller pieces. In so doing, they fall into the water and drown. Advantages of this method include ease of construction, effectiveness, and avoidance of toxic materials. Disadvantages include the need to change the bait frequently, as yellowjackets will not scavenge spoiled flesh, and the attractiveness of the bait to dogs, cats, flies, and other wildlife. Chicken-wire cages can be placed around traps to prevent disturbance by large animals.

In a 1974 test (Akre et. al 1982), nine traps set in a resort area captured nearly 1000 foraging workers per week. Trapping combined with improved garbage management reduced active foragers in the area to tolerable levels within two weeks.

Biological Control

Biological controls against yellowjackets are not currently known. Naturally- occurring parasites and predators exist, but have little or no effect on colony dynamics. Scientists continue to experiment in this area, giving hope of successful methods for the future.

Mechanical Control

Vacuuming of nests is the chief method employed, using a canister-type vacuum cleaner. One must be prepared to work quickly and be dressed with protective clothing (such as a beekeeping outfit). Avoid cutting into the nest, as this provides more than one exit for the angry wasps. Be prepared to immediately plug the entrance to the canister bag when removing it from the vacuum, as the yellowjackets inside will not be dead. The bag can then be frozen to kill the contents. If nests are removed from structures, the outside entrance should be sealed up, if possible, to prevent re-entry.

CHEMICAL CONTROL OF YELLOWJACKETS

Due to the large numbers of colonies and workers usually present in any area, wide chemical control of foragers is impractical, if not impossible. However, individual colonies located in hazardous spots can be selected for destruction by chemical means, if other methods are deemed unfeasible. Spraying should be attempted only after dark, when all foragers are back in the nest; in addition, the exterminator should wear a protective suit and take precautions against inhaling chemical fumes.

New products are continually introduced to control yellowjackets. It is recommended that you consult with an agricultural supplies dealer or your regional Integrated Pest Management coordinator regarding products appropriate for your needs. Do not use more than the recommended amount and use only for the purpose recommended on the product. Some products require the services of a certified pesticide applicator. Be sure to dispose of all empty pesticide containers in an approved toxic waste facility or container.

Do not use gasoline or other flammable liquids to destroy ground-dwelling yellowjackets. Doing so poisons the soil and can result in explosions or serious burns. Most chemical controls for yellowjackets are aerosol products containing pyrethrins, rotenone, and a cooling agent to lower nest activity and provide rapid knock-down.

Nests in structures are the most difficult to destroy. Do not simply plug the hole of a healthy colony, or the workers will chew a new hole through the wall and possibly emerge into human living space. For suggestions on how to treat such nests, see Akre et. al (1980) and Nixon (1982), and consult your regional Integrated Pest Management coordinator on the most effective way of exterminating a specific nest.

YELLOWJACKET FACT SHEET

Yellowjackets are small yellow-and black-banded wasps that build nests in the ground or paper-like nests in trees. The colony will reach maximum size in late summer. Worker yellow-jackets are common around picnic areas where they forage for food.

YELLOW JACKETS ARE ATTRACTED TO

WAYS TO DECREASE STINGS

Perfumes and other scents

Don't go barefoot

Hairspray

Don't swat with your hands

Suntan lotion

Use lids on soft drink cups

Cosmetics

Put tight-fitting lids on trash cans

Sweet food

Empty trash frequently

STINGS

In most people, a yellowjacket sting produces an immediate pain at the site of the sting. There will be localized reddening, swelling, and itching. Ice or analgesic creams often relieve the symptoms.

IF YOU ARE STUNG

1. Remove the stinger by scraping from the side (for bees)
2. Apply cold water or ice in a wet cloth
3. Lie down
4. Lower the stung arm or leg
5. Do not drink alcohol

Some people experience an **allergic reaction** to yellowjacket venom. Allergic (anaphylactic) shock can be fatal if untreated. Symptoms usually occur 10-20 minutes after a sting but may appear up to 20 hours later. If you experience any of the following symptoms after being stung, obtain medical aid immediately.

SYMPTOMS OF ALLERGIC REACTIONS

WHAT TO DO

Hives

Lie down; victim should

not be moved

Widespread swelling of limb

Lower the stung arm or

leg

Painful joints

Apply ice

Wheezing

Do not drink alcohol

Faintness

Apply a wide cloth tourniquet

between sting and the heart

(should be able to place 2
fingers under bands); release

after 5 minutes

Get medical aid

REFERENCES

1. Akre, R.D., A. Greene, J.F. MacDonald, P.J. Landholt, and H.G. Davis. 1981. Yellowjackets of North America, North of Mexico. U.S. Department of Agriculture, Washington, D.C. Handbook #552.
2. Davis, H.G., R.W. Zwick, W.M. Rogoff, T.P. McGovern, and M. Beroza. 1973. Perimeter traps baited with synthetic lures for suppression of yellowjackets in fruit orchards. *Env. Entomol.* 2(4): 569-571.
3. Davis, H.G. 1978. Yellowjacket wasps in urban environments. *In* Frankie, G.W. and C.S. Koehler, eds. *Perspectives in Urban Entomology*. Internatl. Cong. Entomol. Acad. New York. Chapter 7, pp. 163-185.
4. Frazier, D.A. 1976. Insect stings--a medical emergency. *J. Am. Med. Assoc.* 235(22):2410- 2411.
5. Grant, C.D., C.J. Rogers, and T.H. Lauret. 1968. Control of ground-nesting yellowjackets with toxic baits--a five-year program. *J. Econ. Entomol.* 61:1653-1656.
6. Greene, A. 1982. Comparative early growth and foraging of two naturally established vespine wasp colonies. *In* Breed, M.O., C.D. Michner, H.E. Evans, eds. *The Biology of Social Insects*, Proc. Ninth Cong. of Internatl. Union for Study of Social Insects. Boulder, CO. 1982.
7. Grothaus, R.H., H.G. Davis, W.M. Rogoff, J.A. Fluno, J.M. Hirst. 1973. Baits and attractants for East Coast yellowjackets, *Vespula* spp. *Env. Entomol.* 2(4):717-718.
8. Howell, J.O., T.P. McGovern, M. Beroza. 1974. Attractiveness of synthetic compounds to some Eastern *Vespula* species. *J. Econ. Entomol.* 67(5):629-630.
9. Jacobson, R.S., R.W. Matthews, and J.F. MacDonald. 1978. A systematic study of the *Vespula vulgaris* group with a description of a new yellowjacket species in Eastern North America (Hymenoptera: Vespidae). *Ann. Entomol. Soc. Am.* 71(3):299-312.
10. MacDonald, J.F., R.D. Akre, and R.W. Matthews. 1976. Evaluation of yellowjacket abatement in the United States. *Bull. Entomol. Soc. Am.* 22(4):397-401.
11. MacDonald, J.F., R.D. Akre, and R.E. Kezel. 1980. The German yellowjacket (*Vespula germanica*) (Hymenoptera: Vespidae) problem in the United States. *Bull. Entomol. Soc. Am.* 26(4): 436-442.
12. MacDonald, J.F., R.W. Matthews, and R.S. Jacobson. 1980. Nesting biology of the yellowjacket, *Vespula flavopilosa* (Hymenoptera: Vespidae). *J. Kansas Entomol. Soc.* 53(2): 448-458.
13. MacDonald, J.F., and R.W. Matthews. 1981. Nesting biology of the eastern yellowjacket, *Vespula maculifrons* (Hymenoptera: Vespidae). *J. Kansas Entomol. Soc.* 54(3): 433-457.
14. Nixon, J. 1982. Yellowjackets in houses -- research and control. *Pest Control*. August pp. 24-25.
15. Parris, M.D., and R.B. Roberts. 1983. Insect growth regulators in baits: Methoprene acceptability to

foragers and effects on larval eastern yellowjackets (Hymenoptera: Vespidae). J. Econ. Entomol. 76(1):109-112.

16. Poinar, G.O. 1972. The use of *Neoaplectana carpocapsae* (Steinernematidae: Rhabditoidae) against adult yellowjackets (*Vespula* spp., Hymenoptera: Vespidae). J. Invert. Path. 19(3):331-334.

17. Putman, S.E., Jr. 1977. Controlling stinging and biting insects at campsites, Project Record, ED & T 2689. Control of Stinging Insects in Forest Service Campsites. USDA. Forest Service Equipment Dev. Center. Missoula, MT.

18. Reisman, R.E. 1975. Insect stings - danger season opens. U.S. News and World Report. 78(6):65.

19. Spradbery, J.P. 1973. Wasps: and account of the biology and natural history of solitary and social wasps. U. Wash. Press, Seattle.

20. Wagner, R.E. 1961. Control of the yellowjacket, *Vespula pensylvanica*, in public parks. J. Econ. Entomol. 54(4):628-630.



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