

HOMEOWNER Guide to

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# Yellowjackets, Bald-Faced Hornets, and Paper Wasps



“ . . . spring weather largely determines if we will have wasp problems or not in any given year. Cold, rainy weather during April and May reduces the likelihood”



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**YELLOWJACKETS**—WASPS IN THE *VESPULA* OR *DOLICHOVESPULA* GENERA—UNLIKE BEES—ARE SHINY AND BARE OF HAIR. THEY'RE ALSO SLEEKER THAN BEES. OF 11 SPECIES FOUND IN IDAHO, THESE FOUR ARE THE MOST COMMON. ALL CAN STING MULTIPLE TIMES.



**WESTERN YELLOWJACKET**, *Vespula pensylvanica*, Idaho's most abundant species, builds underground nests in abandoned animal burrows, hollows under sidewalks, and crevices in retaining walls. **Papery nests:** Underground. **Picnic pest:** Yes.  
Photo from [www.worsleyschool.net](http://www.worsleyschool.net)



**COMMON YELLOWJACKET**, *Vespula vulgaris*, also builds underground nests around the yard. It feeds on insects but scavenges from picnics as insect prey becomes scarce. **Papery nests:** Underground. **Picnic pest:** Yes.  
Photo © Neil Miller/Papilio/Corbis



**GERMAN YELLOWJACKET**, *Vespula germanica*, an aggressive scavenger of meats and sweet drinks, poses high sting hazard. It may survive Idaho winters when nesting in wall voids and home attics. **Papery nests:** In home wall voids and in attics. **Picnic pest:** Yes.  
Photo © Andy Wehrle/bugguide.net



**AERIAL YELLOWJACKET**, *Dolichovespula arenaria*, mostly builds nests above ground that can grow to impressive sizes. **Papery nests:** Builds nests both underground and above ground on roof overhangs or on protected building surfaces. **Picnic pest:** Not usually. Photo © Craig Persel



**BALD-FACED HORNETS**, *Dolichovespula maculata*, are heavy-bodied, black-colored wasps with pale yellow-white marks on the head and at the end of the abdomen. **Papery nests:** Often high in trees or at roof peaks; soccer-ball-sized nest is not unusual by fall. **Picnic pest:** Little risk. They're not aggressive.  
Photo © Dennis Schotzko, University of Idaho



**PAPER WASPS**, *Polistes*, in color are similar to yellowjackets, but they have a slimmer, elongated body shape and a long-legged appearance. Legs hang down even during flight. **Papery nests:** Resemble an open umbrella with individual comb cells open to view from below. **Picnic pest:** No.  
Photo © Dennis Schotzko, University of Idaho

YELLOWJACKETS AND THEIR RELATIVES have well-earned reputations for painful stings. Yet when these insects occur at safe distances from human activity, none automatically requires elimination from yards and gardens. All instead should be considered beneficial pollinators, predators, or scavengers.

This publication will help you understand differences in the biology and sting threat posed by the most important types of yellowjackets, hornets, and wasps encountered around Idaho homes. Information here will help you decide first if control action is needed. Then it will help you determine your best options.



Photo © Terry Thormin/Royal Alberta Museum

## IDENTIFICATION

The words bee, wasp, yellowjacket, and hornet often are used interchangeably—but incorrectly—to describe any medium-to-large, yellow-and-black stinging insect. **Bee** is a broad term that describes a diverse group of insects whose body is at least partly covered in fine hairs. **Wasps** differ physically from bees in that their bodies are almost bare and shiny.

**Yellowjacket** technically only refers to wasps in the scientific genera *Vespula* or *Dolichovespula*. Names are even more confusing because **hornet** is used informally in the United States to describe certain large species of *Dolichovespula* yellowjackets that build aerial nests. Biologically speaking, the only true hornets are members of a still different genus, *Vespa*, none of which occurs in Idaho or any adjoining western state.

Yellowjackets and their commonly encountered relatives—the bald-faced hornet and paper wasps—are social wasps. They live as a single reproductive female (the queen) and her infertile female offspring (the workers) in a central nest where

they cooperatively rear and vigorously defend their immatures.

### TRIO OF PAPERY NEST BUILDERS

Yellowjackets, bald-faced hornets, and paper wasps all build grey-to-tan papery nests of fibers chewed from weathered wood. Adult wasps often can be seen around yards, gnawing pulp from backyard fences, firewood, and even cardboard stacked outside for recycling. Nests consist of hexagonal-shaped cells arranged side-by-side into horizontal layers of comb. Nest shape, size, and placement distinctly differ among these three major insect groups. These differences are explained in the following sections.

### YELLOWJACKETS—4 SPECIES POSE STING HAZARDS NEAR IDAHO HOMES

Yellowjackets are medium size (about 1/2-inch long) black wasps marked with irregular, jagged yellow bands. They become pests at picnics and other outdoor settings where meats and sugary drinks are present (Figure 1).

Eleven different species of yellowjackets are known in Idaho, but normally only four species pose sting hazards that sometimes justify control action: (See photos on p. 3.)

- western yellowjacket  
*Vespula pensylvanica*
- common yellowjacket  
*Vespula vulgaris*
- German yellowjacket  
*Vespula germanica*
- aerial yellowjacket  
*Dolichovespula arenaria*

Species identification requires expert examination but is not necessary to decide if control action is needed.

The **western yellowjacket** is our most abundant species. It shares many biological features with another frequently encountered species, the **common yellowjacket**. Both are native to Idaho. Their natural habitat is dry grass and wooded areas, but they readily nest around home landscapes.

These two yellowjackets almost always build subterranean nests hidden from view within natural cavities (Figures 2, 3a, 3b). Typical backyard nest sites include abandoned animal burrows, hollows under sidewalks, and crevices in landscape retaining walls. In forested areas, these two yellowjackets build nests within fallen logs, old stumps, and in the soil.

### YELLOWJACKETS EAT INSECTS, MEAT, SWEET NECTAR

Unlike honey bees, yellowjackets do not produce honey, nor do they store floral nectar in nest cells. The western yellowjacket and the common yellowjacket primarily feed as predators on living insects, especially during the spring and early summer. Workers search out caterpillars, beetle grubs, grasshoppers, flies, spiders, and other soft-bodied prey, which they return to the nest as chewed-up food for their own developing larvae. Yellowjacket workers kill prey by biting, not stinging. Adult yellowjackets themselves ingest some body liquids from prey but mainly feed on plant nectar. Workers



**Figure 1.** Yellowjacket workers scavenge food from meat scraps. Photo © Whitney Cranshaw, Colorado State University, [www.insectimages.org](http://www.insectimages.org)



**Figure 2.** Yellowjacket workers hover near opening to nest located in hidden cavity behind brick wall. Photo © Whitney Cranshaw, Colorado State University, [www.insectimages.org](http://www.insectimages.org)

also feed mouth-to-mouth on liquids produced by their larvae. As summer progresses and insect prey becomes scarce, western and common yellowjackets increasingly feed as scavengers on non-living proteinaceous (protein) and sugary foods.

Workers naturally feed on carrion, nectar, and honeydew (the sugary liquid secreted by aphids and scale insects). Landscape trees with yellowjackets flying about during late July and August usually indicate the trees are infested with honeydew-producing aphids or scale insects.

Scavenging feeding behavior increases human sting hazard because it places yellowjackets in close contact with people.

Meats and carbohydrate drinks at picnics or inside garbage cans attract large numbers of yellowjackets that readily sting. Overripe fruit that fall from backyard fruit trees also attract large numbers of foraging workers.

#### GERMAN YELLOWJACKET IN IDAHO SINCE 1980S

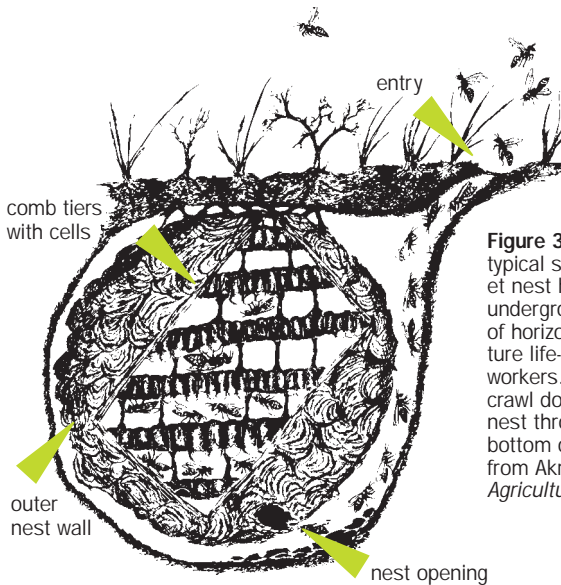
The German yellowjacket is a European species first recorded in the northeast U.S. during the 1970s and subsequently in Idaho during the 1980s. It poses a high sting hazard to people because it is another aggressive scavenger of meats and sweets (as well as a voracious predator of living insects). The sting hazards posed by the common, the western, and the German yellowjackets have closed school playgrounds and resorts, curtailed logging operations, and interfered with commercial fruit harvest.

The German yellowjacket can be a special pest problem because it sometimes builds nests in wall voids and attics of homes. Other yellowjackets naturally die out with cool fall temperatures, but the nesting habits of German yellowjackets potentially allow colonies to persist year-round in the mildest areas of Idaho.

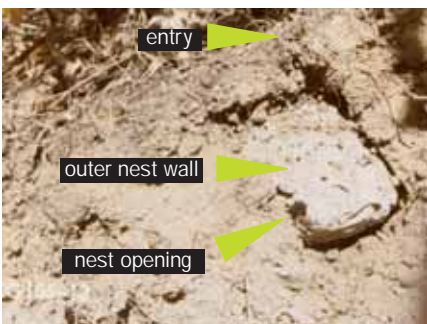
#### AERIAL YELLOWJACKET MAKES ABOVE-GROUND NESTS

The other frequently encountered species is the aerial yellowjacket. It mostly builds nests above ground, although below-ground nests are not unusual. The above-ground nests are similar in form to subterranean nests of the common, western, and German yellowjackets. Nests consist of layers of papery comb wrapped by an outer envelope with an entry hole. Nests occur from ground-level to tree-top heights on all types of vegetation.

Aerial yellowjackets also commonly build nests from roof overhangs or other protected exterior surfaces of buildings. Nests grow to impressive



**Figure 3a.** Cross-section of a typical subterranean yellowjacket nest hanging within an underground cavity shows tiers of horizontal comb where immature life-stages are reared by workers. Worker yellowjackets crawl down soil cavity and enter nest through an opening at the bottom of the outer wall. Figure from Akre et al. 1980 *USDA Agriculture Handbook 552*



**Figure 3b.** Compare diagrammatic illustration 3a with actual yellowjacket nest exposed by digging away surrounding soil. In late season, one nest can house thousands of workers. Photo from Ken Gray slide collection, Oregon State University

sizes as summer progresses and may contain as many as 700 workers. Aerial yellowjackets normally prey on living insects and so are not nuisance pests around picnic foods or garbage cans like the other three. An exception occurs in late summer when aerial yellowjackets are attracted to sugary foods. Control of aerial yellowjackets is warranted only if people or pets routinely pass near nests or people with known allergies to wasp venoms are present.

#### BALD-FACED HORNETS BUILD LARGE AERIAL NESTS

The bald-faced hornet, *Dolichovespula maculata*, is a large (3/4-inch), stout-bodied, black wasp with a whitish-yellow face and a few whitish marks near the end of the body (see p. 3). Like the aerial yellowjacket, bald-faced hornets build enclosed, papery above-ground nests on landscape plants and buildings (Figure 4).

Bald-faced hornet nests often have leaves and twigs in the outer nest wall, whereas nests of aerial yellowjackets do not.

**Reduced sting hazard.** In spite of their large size, bald-faced hornets pose a substantially reduced sting hazard compared to yellowjackets. Bald-faced hornets almost entirely feed on other living insects, including yellowjackets, and so do not become nuisances at outdoor events where food is served. Potential for stinging encounters also is reduced because nests of bald-faced hornets often are located high in trees or at roof peaks. Workers will sting when provoked (by someone bumping the nest or squeezing hornets against the skin), but are not as aggressive in defending nests as yellowjackets.

#### PAPER WASPS—IDAHO'S MOST COMMON STINGING PESTS

Paper wasps resemble yellowjackets but have a slimmer, elongate body shape with a characteristic long-legged appearance (see p. 3). Their legs even dangle below the body in flight.

The golden paper wasp, *Polistes fuscatus aurifer*, a yellow-to-reddish-brown wasp with yellow banding, was



**Figure 4.** Bald-faced hornet nest is similar in form to subterranean yellowjacket nests but always is located above ground, usually on landscape plants or buildings. They can get as large as soccer balls by early fall. Note two nest openings through the outer wall on the left side, bottom third. Photo by University of Idaho



**Figure 5.** Paper wasps build nests that resemble an open umbrella with individual comb cells open to view from below. Photo from Ken Gray slide collection, Oregon State University

the most common type of paper wasp throughout the Gem state until the late 1990s. Although this native species still occurs in rural areas of Idaho, it largely has been displaced in urban habitats by *Polistes dominulus*, the European paper wasp.

The non-native European paper wasp was first observed in Massachusetts during 1981. It expanded westward reaching the Pacific Northwest

during 1999. The European paper wasp now occurs statewide in Idaho and ranks as our most commonly encountered stinging pest.

#### Umbrella-shaped, open nests

Paper wasps build distinctive umbrella-shaped paper nests (Figure 5) seen hanging upside-down from doorframes, eaves, and other protected places. Nests are open-combed, meaning cells are not enclosed by an outer envelope like nests of yellowjackets and bald-faced hornets. Individual cells can be seen when viewed from below (looking up into the nest). Like yellowjackets and hornets, paper wasps are social insects.

Paper wasps are beneficial predators. They do not scavenge on non-living foods as do nuisance yellowjackets but instead prey on caterpillars and other soft-bodied, leaf-feeding insects. Adult paper wasps also feed on nectar, so can be seen foraging on flowers. During summer you'll often find them around your yard's water puddles and ponds.



### SAVING YELLOWJACKET AND BALD-FACED HORNET NESTS

The large papery nests that aerial yellowjackets and bald-faced hornets build in landscape trees and shrubs can be brought into homes safely during late fall as indoor decorations or curiosities.

On cool November days, clip abandoned nests from branches, then bag and place in the freezer one or two days. Freezing kills any remaining workers or other insects—like earwigs—that sometimes live in old nests. Physically shake any dead insects and other debris from the nest; otherwise, nests can become an odor problem.

You could wait until the hard freezing days of winter to collect the nest, but papery nests are delicate and disintegrate quickly under harsh winter weather.

**Fairly docile.** Compared with yellowjackets, European paper wasps are relatively docile. They don't aggressively attack people, but will sting to defend their nest when provoked. People are stung when they accidentally contact a hidden nest, such as inadvertently touching a nest with a bare hand while gardening.

#### **European paper wasp nests—almost anywhere**

European paper wasps are pests but not because they aggressively sting. Unless you accidentally physically contact the nest itself, wasps often respond to disturbance by flying about the nest rather than stinging. However, European paper wasps have become statewide sting threats because they readily build nests in just about any protected backyard site and so frequently are encountered by people. Common nests sites around the home include:

- Inside outdoor light fixtures, mailboxes, cable TV/home-utility boxes, exterior door chimes, covered barbecue grills, bird houses, and bird feeders
- Fenders, bumpers, and other exterior surfaces of vehicles parked for long-term storage
- Exterior walls of homes—especially those covered by ivy or other creeping vines
- Limbs and foliage of landscape shrubs, particularly dense evergreen shrubs
- Under stone ledges in rock gardens and within crevices between landscape timbers
- In home attics, wall voids, and similar spaces where vents or holes allow wasp entry
- Under eaves, shutters, patio decks, and similar overhanging places
- Inside folded outdoor umbrellas, under seats and armrests of patio chairs, and under tables
- Within hollow-framed outdoor furniture or hollow fencing
- On roofs under cedar-shake shingles

Other paper wasps only build nests that hang horizontally from protected places, but the European paper wasp also builds nests attached vertically to protected surfaces. This nesting behavior, together with their high relative abundance, places European paper wasps in routine contact with people.

European paper wasp nests often are golf-ball size and consist of 20 or fewer cells. Nests with hundreds of cells are possible in the warmer parts of Idaho where hot, dry weather allows for prolonged reproduction.

## SEASONAL LIFE CYCLE

### WINTER—MATED QUEENS SURVIVE OUTDOORS

Yellowjackets, bald-faced hornets, and paper wasps survive Idaho

winters as solitary but mated females called queens. None of these species overwinters within their nests. These reproductive female wasps instead overwinter outdoors under loose tree bark or on the ground in weedy areas that provide cover.

An exception to outdoors overwintering is the golden paper wasp, which sometimes overwinters in home attics or other unheated parts of buildings. They can become stinging pests inside homes during late winter when sunny days raise temperatures in attic spaces, and wasps escape into household living quarters. Wasps flying around windows inside Idaho homes during winter usually are *Polistes* paper wasps.

### SPRING—NESTBUILDING; WEATHER DETERMINES WASP PROBLEMS

Overwintering queens emerge from hibernation during the first warm days of spring in March and April. They immediately begin to feed on nectar and readily can be observed around home landscapes on flowering plants or at water sources.

Yellowjackets, bald-faced hornets, and paper wasps build new nests each spring. None re-uses nests from year to year. Yellowjackets and bald-faced hornets work as individual queens to construct their own nest. European paper wasps sometimes work together as cooperating overwintering queens to make a single shared nest.

In all of these species, the queen lays a single egg in each cell. Eggs hatch into small, legless, whitish grubs, each occupying one cell in the comb (Figure 6). The queen cares for her larvae by feeding them chewed-up insects that she captures from backyard plants.

Grubs develop through several successively bigger stages, eventually transforming into pupae and emerging as adult worker wasps about one month after eggs are laid. Workers are entirely comprised of



**Figure 6.** Eggs (bottom two cells) and larva (middle cell) are visible within nest cells; capped cells (upper right and lower left) contain wasp pupae. Photo © Dennis Schotzko, University of Idaho

infertile (non egg-laying) females. Males are not produced until September.

It is important to know that spring weather largely determines if we will have wasp problems or not in any given year. Cold, rainy weather during April and May reduces the likelihood that queens can build a nest and collect enough food to feed her immature offspring, while warm, dry weather through June enhances the nest success.

#### **SUMMER—WORKER WASPS ABOUND**

Once the first brood of adult worker wasps is produced, they assume from the queen all tasks of maintaining the nest, foraging for food, and tending to larvae. The sole function of the queen becomes egg laying; she remains within the nest for the rest of the summer. A single yellowjacket queen can lay tens of thousands of eggs during the season.

Yellowjacket workers that emerge during early summer live for 16 to 32 days; those emerging in late summer have a 10- to 20-day lifespan.

Successive generations of workers emerge throughout summer and enlarge the nest. By late August or early September, a nest initially founded by one overwintering yellowjacket or bald-faced hornet queen can consist of hundreds, if not thousands, of living workers.

Paper wasp nests in Idaho are substantially smaller, seldom exceeding 100 individuals and often comprising fewer than 20 individuals.

#### **FALL—NEW QUEENS DEVELOP; SUMMER COLONIES DIE**

In early fall, workers build special nest cells where new reproductive males and queens are produced. When new queens and males emerge they leave the nest and mate. The old queen dies shortly afterwards, and the colony begins to die out. Only the new fertilized queens survive the winter; all workers and males die with the first freezing temperatures. Abandoned, empty nests remain in place until destroyed by weather.

### **STING HAZARDS**

“Sting” and “bite” commonly—but incorrectly—are used as equivalent terms. Some wasps do bite; they defend themselves by nipping at attackers with their jaws. But the painful welt that results from a wasp attack properly is called a sting, not a bite.

Stinging insects deliver venom into their victims by means of a needle-like apparatus—the sting—located at the tip of the abdomen.

Only female insects can sting. This is because the sting is an egg-laying tube that through the course of evolutionary time became modified for injecting venom. Males cannot sting; they obviously lacked an egg-laying structure that evolutionary selection could alter into a sting.

#### **Vibrations, shadows, and stings**

Yellowjackets, bald-faced hornets, and paper wasps are alerted into stinging by vibrations next to their nests. Dangerous attacks can occur when lawn mowers or weed trimmers unwittingly move over underground nests of yellowjackets.

Visual disturbances—such as dark, moving silhouettes—around nest openings also cause stinging attacks by yellowjackets. Yellowjackets are more readily provoked into stinging during late summer as natural foods

become scarce and workers aggressively scavenge picnic food scraps; they also more vigorously defend their nest as new reproductive queens and males are produced.

**Multiple stings.** Stings of yellowjackets, hornets, and paper wasps are smooth, sharp needles that repeatedly can be pushed into the skin of a victim, allowing each individual insect to sting many times. Multiple stings by one individual wasp are likely especially when insects become trapped under clothing against bare skin.

Pain associated with stinging insects comes not from the sting itself but rather from venom it delivers. Wasp and bee venoms are complex mixtures of proteins and other organic chemicals. Some venom chemicals cause intense pain, others kill cells and cause swelling, and still other chemicals spread venom beyond the initial sting site.

Most people react to sting venoms with moderate to intense pain, itching, redness, and swelling immediately surrounding the sting site. Usually symptoms go away without treatment in a few hours to several days. Sometimes delayed reactions—such as hot, red swelling of a leg or arm—can last a week.

Multiple simultaneous stings can deliver enough venom to cause toxic injury even in people not considered “sensitive” to venom. Human deaths from mass stinging are physiologically possible but extremely rare.

#### **Allergic reactions to stings**

Systemic (whole-body) allergic reactions to sting venoms occur in 1 to 3 percent of the population and cause about 50 deaths annually in the United States. Allergic reactions to stings involve the body’s immune response and require at least two sting episodes: the first sensitizes the person, and the next sting causes a dangerous over-reaction of the person’s immune system.



Venoms contain foreign proteins (antigens) that cause a body to produce its own protective proteins (antibodies) called immunoglobulin E, or IgE. After the first sting, the body “remembers” the venom and more quickly produces IgE. Venom antigens bind together with IgE antibodies, causing body tissues to release histamines into the blood stream.

Histamines cause blood vessels to open wider, capillary walls to become more permeable to fluids (so as to flush the venom away), and lung air passages to constrict. For most people, the reaction to histamines is local swelling and itching around the sting site.

Hypersensitive allergic people release large amounts of histamine all at once throughout their entire body, lowering their blood pressure and causing respiratory distress. Hypersensitization to venom proteins only requires a single sting. “Hay fever” allergens do not sensitize people to wasp or bee venoms.

Sting venoms of yellowjackets, bald-faced hornets, and paper wasps share enough chemical similarities that some people have allergic cross-reactions to all these species. Venoms of yellowjacket and bald-faced hornets (*Vespula* and *Dolichovespula* species) more closely resemble each other than venoms of paper wasps (*Polistes* species). People sensitive to yellowjackets especially should be careful around hornets and vice versa.

Honey bee venom differs enough from these other stinging insects to generate its own IgE allergic reaction, so even hypersensitive people usually—but not always—are only allergic to honey bees or only to yellowjackets, hornets, and paper wasps. **Anyone who ever has suffered a severe allergic reaction to stinging insects should consult with his/her physician about allergen testing and venom desensitizing immunotherapy.**

## YELLOWJACKET MANAGEMENT STRATEGIES

Even though yellowjackets and their relatives are beneficial insects, they can pose dangers when nest placement or worker feeding habits put these insects in close proximity to people. Reducing sting probability around the home often is a matter of avoiding places where encounters are likely and eliminating foods that attract these insects to backyards.



### ADVICE FOR ACCIDENTAL ENCOUNTERS WITH NESTS OF YELLOWJACKETS, BALD-FACED HORNETS, PAPER WASPS

You and your family can take several common-sense steps to reduce unintentional contacts with foraging wasps and colony nests, including:

**Walk backwards/move slowly.** If you have not agitated the insects into attack, calmly walk backwards from the nest, keeping your eyes on the nest in case you need to take evasive action. Move slowly because wasps especially respond to rapidly moving dark silhouettes.

**Flick, don’t swat, don’t crush bodies.** Do not swat at flying workers; they will release air-borne chemicals—called alarm pheromones—that stimulate a stinging attack from other workers. If a wasp lands on you, flick it away with your finger. Never crush the bodies of workers, especially near the nest; crushing also releases alarm pheromones that induce a mass attack.

If you hear loud buzzing, **RUN! But NOT to trees or shrubs.** If you hear loud buzzing or if you already have been stung, run quickly away from the nest, covering your eyes, nose, and mouth with your hands or shirt for protection from stings. Take shelter in a building or vehicle, or keep running until wasps stop their pursuit. Agitated yellowjackets may chase you several hundred feet. Brushy trees or shrubs are not safe shelters because you can be surrounded and trapped by stinging insects.

#### FIRST AID FOR STINGS

Always consult your physician about pain medicines and other first-aid advice; the information presented here does not substitute for professional medical recommendations.

#### Immediately seek physician or medical emergency services if the victim

- Is stung around the head and neck or inside the mouth
- Is stung several times
- Already has been stung during the previous week
- Is very young or very old
- Cannot breathe easily, has difficulty swallowing, or feels dizzy
- Develops hives that spread over the body or has a very large swollen welt
- Has a known hypersensitivity to stings

#### STING RELIEF STRATEGIES

- Apply ice compresses to reduce swelling and pain.
- Try over-the-counter oral pain medicines and antihistamines, which may provide relief from pain and itching.
- Wash the sting area with soap to reduce the chances of subsequent infection. Confer with your physician if reddish streaks develop from the sting; this may be a sign of secondary infection.

**Colony destruction—a last resort.** Colony destruction is a last resort for nests in places where people routinely visit. Nests in secluded spots at safe distances from human activities do not necessarily require control action. Those nests can be left to naturally die out during fall.

#### PERSONAL PROTECTION

You and your family can take several common-sense steps to reduce unintentional contacts with foraging wasps and colony nests.

- **Minimize use of perfumes,** colognes, soaps, or other scented body lotions when yellowjackets, bald-faced hornets, and paper wasps can be expected; these scents can be highly attractive to foraging wasps.
- **Wear white or tan clothes** rather than light blues or bright pinks, reds, and oranges; close-fitting shirts and pants are better than loose-fitting clothes because wasps are less likely to become accidentally trapped against the skin.
- **Look for foraging workers** before reaching unseen when picking caneberries (raspberries, blackberries), grapes, and tree fruits such as apples, peaches, and pears; these can be highly attractive to yellowjackets.
- **Inspect for nests** before doing yard work and home maintenance during mid-to-late summer, especially when trimming hedges, mowing dry overgrown weedy areas, weeding rock gardens, or working around eaves and roofs.
- **Wear leather gloves** if you must reach into likely nest sites.
- **Teach children to stay away** from (and to tell an adult about) any nests they discover.
- **Don't block the return flights** of foraging workers by standing in front of nests; workers may interpret your presence as a threat.

#### REPELLANTS

Mint oil and other plant oils are said to repel yellowjacket workers, but

no research data are available to support these claims. At least one commercial product line of plastic picnic tablecloths and trash bags (BugAWAY!) impregnated with citronella, geranium oil, rosemary, and peppermint is marketed as repelling wasps and other nuisance insects.

**Commercial mosquito/tick repellants don't work against stinging insects.** Indeed, it is possible that the scents of some products attract yellowjackets and other wasps.

#### REDUCE ACCESS TO FOOD AND WATER

To minimize numbers of wasps foraging for sugary liquids, meats, and other resources near people and picnics:

- **Cover serving dishes** at outdoor picnics; clean up spilled drinks and food scraps; clear away dirty plates.
- **Do not leave soft drink cans** or beer bottles open and unattended; yellowjackets can crawl unseen into opened containers and sting painfully around the mouth.
- **Keep lids on trashcans** and dumpsters; clean to remove attractive odors or use disposable can liners; rinse cans and bottles before placing in outdoor recycling bins.
- **Move food garbage** away from patios or places where people congregate.
- **Don't leave moist pet foods** outside.
- **Control infestations** of aphids and scale insects that produce honeydew on landscape trees and shrubs.
- **Eliminate drips** from faucets, sprinklers, and garden hoses, especially during the dry parts of the summer. Puddled water attracts workers.
- **Clean up rotting apples** and peaches that fall from trees; pick caneberries before they over-ripen.

- **Replace** late-flowering landscape plants around decks and patios with non-flowering ornamentals.

#### DESTROY EARLY-SEASON AERIAL NESTS IN PROBLEM AREAS

During April and May, while nest size is small and colonies consist of a lone founding queen (Figure 7), you can dislodge the aerial nests of yellowjackets, bald-faced hornets, and paper wasps by forcefully spraying with a garden hose.

This simple tactic is most effective during cool rainy weather when the queen cannot quickly start another nest. Watch the general nest site to see if the queen returns and tries to construct a replacement nest.

You can safely dislodge early-season paper wasp nests anytime the queen is foraging off-site and not visible on the open comb. But only approach the closed nests of aerial yellowjackets and bald-faced hornets at night when temperatures are cool; flight activity will be minimal and sting hazard reduced. Stand away at a safe distance.

Never physically knock down, cut-and-bag, or otherwise disturb large nests. The sting hazard is too high.

**Subterranean nests.** Nests of ground-dwelling yellowjackets are more difficult to physically destroy than above-ground nests. For one thing, early-season subterranean nests are hard to find. By the time you notice flight activity around nest entrances, colonies probably have grown to dangerous sizes that defy physical destruction.

**Flooding rarely works.** Some people recommend flooding underground nests with a garden hose or even pouring boiling water into nest openings. But unless the nest is located directly below the opening, neither method is effective. Depending on landscape terrain, the actual nest combs may be located above the surface entrance or distantly located from the entrance and so escape destruction. Covering nest entrances with soil is not effective; trapped wasps will dig new exits.



**Figure 7.** Bald-faced hornet queen begins springtime nest construction. Reduce sting hazard by destroying early-season nests in problem areas while the colony consists solely of the overwintering queen. Photo from Ken Gray slide collection, Oregon State University

**Never pour kerosene or gasoline into subterranean nests.** This practice poses high hazard of explosive fires plus soil contamination and groundwater pollution.

**Vacuum removal is a job for pros.** Nest removal by vacuuming is effective, especially in sensitive areas where insecticides cannot be used. But vacuuming is too hazardous for homeowners. Contact a local professional pest management company for such services.

**Fall-winter nest removal**  
Eliminating aerial or subterranean nests during fall and winter months has no impact on populations the next year because wasps neither overwinter in old nests nor re-use them the following spring. Still, it is a good practice to destroy large abandoned aerial nests attached to homes. Old nests can shelter earwigs, carpet beetles, and other potential insect pests.

#### TRAPPING NUISANCE YELLOWJACKETS

##### Uses and limitations

Yellowjackets readily can be captured and killed in a variety of commercial and home-made traps. All traps work on the same principle: yellowjacket workers that scavenge for non-living protein and carbohydrate foods are captured inside



**Figure 8.** Yellowjacket trap is hung too close to a site frequented by people. This incorrect trap placement can increase sting threat by drawing wasps to the area. Photo by Edward Bechinski

containers baited with meats, sugary foods, or synthetic chemicals that smell like food.

Yellowjacket traps do not capture paper wasps. Paper wasps primarily feed on living prey and so do not respond to the same odors as yellowjackets. Traps can temporarily reduce nuisance problems by attracting yellowjacket workers away from patios or other backyard areas where people congregate. Four to six traps hung around the perimeter of the yard at least 20 feet away from people are enough for most home yards. Don't hang traps on your patio deck or other places where people congregate (Figure 8); traps placed where people gather may increase sting hazard by attracting even more yellowjackets than otherwise would be present.

Traps capture impressive numbers of yellowjackets but do not eliminate colonies. Workers commonly forage several hundred yards from their nest and are known to fly 3/4 mile in search of food. It is not possible to entirely trap-out every worker from

all the nests that potentially occur within that range. Theoretically, one could eliminate yellowjacket nests in a single yard by trapping the initial overwintering queen during the spring, but this would not stop problems from nests surviving beyond an individual yard. Research shows that overwintering queens are notoriously unresponsive to traps.

##### About commercial traps

Commercial traps include both baited and unbaited devices as well as disposable and re-usable designs (Figure 9). Traps baited with a fruity-smelling synthetic attractant named heptyl butyrate are highly attractive to our most common species, the western yellowjacket, but are less attractive to the common yellowjacket and the German yellowjacket.

**Table 1** on page 13 summarizes features of some widely-available commercial traps and their attractants.

Unbaited traps require that you add protein and carbohydrate foods. Baits



**Figure 9.** A variety of yellowjacket traps are widely available from retail stores for backyard use. Photo by author Edward Bechinski

like canned, fishy cat food, luncheon meats, and fruit juices attract yellowjackets, but usually not as many as synthetic heptyl butyrate.

Natural food baits must be replaced at least every other day during the heat of summer so they stay moist but do not spoil. Citrus-flavored carbonated soft drinks (eg., Mountain Dew, Minute Maid Orange Soda) have proven highly attractive to German yellowjackets in the midwest.

**Disposable traps.** Disposable traps reduce sting hazard by eliminating any need to handle traps containing live yellowjackets. Re-usable traps periodically must be emptied and re-provisioned with food baits or chemical lures. Some re-usable traps directly kill captured insects by drowning them in soapy water while other traps restrain living yellowjackets until they die.

**Make your own yellowjacket trap.** You can construct your own yellowjacket traps from large (2-liter) plastic soft drink bottles.

*Cut horizontally through the bottle 4 or 5 inches below the top.*

*Place natural food baits in a small disposable drinking cup located inside the bottom piece of the bottle. Invert the top piece into the larger bottom part so that it makes a funnel, and then secure the two pieces with tape.*

*Add an inch of soapy water in the bottle to drown trapped yellowjackets.*

Yellowjackets respond to food odors from the trap by crawling through the opening in the inverted top. Once inside the cylindrical bottom piece, most yellowjackets will not be able to find their way back through the funnel opening.

**You can make another simple trap** by hanging a chunk of fish or meat by a string an inch or so above a dishpan filled with soapy water. Yellowjackets feeding on the bait occasionally bite off more than they can carry back to the nest so fall into the water and drown.

#### **BIOLOGICAL CONTROL—NOT MUCH FOR HOMEOWNERS**

A surprisingly diverse community of predators, parasitoids, and pathogens prey on yellowjackets and their relatives. Unfortunately there is not



#### **POISONED FOOD BAITS ARE HAZARDOUS AND ILLEGAL**

It is illegal and highly hazardous to make poisoned baits for yellowjackets by lacing foods with insecticides. There are no insecticides that legally may be added to yellowjacket food attractants.

Prior to 2002, homeowners legally could add an insecticide called Knox-Out 2FM to protein food baits. Foraging yellowjacket workers would carry these baits back to their nests and poison the entire colony. Knox-Out insecticide was removed from the market without replacement during 2002.

Out-of-date recommendations about home-made poison baits readily can be found by Internet searches, but all violate federal and state pesticide law.

much that homeowners can do to enhance the impact of these naturally-occurring enemies of yellowjackets. Nor are there any biological control agents that can be purchased for mass release.

Commercially available microscopic-size predatory nematodes potentially could be applied as drenches to subterranean yellowjacket nests. But because it takes days for lethal infections to develop, application would be limited to yellowjacket nests where slow-to-develop, partial reductions in colonies are acceptable. California research showed some nests recovered even when massive volumes (2 gallons) of nematodes were injected directly into nests that had been exposed by digging away soil.

Extreme sting hazard during application further argues against nematode drenches. Effective control of aerial nests with nematode suspensions seems unlikely because nematodes are aquatic organisms and would quickly dry out and die.

## INSECTICIDES

Active nests of yellowjackets, bald-faced hornets, and paper wasps located in areas where people routinely pass may justify insecticide treatment. Choosing the right insecticide can be confusing because the same insect-killing chemical typically is sold under dozens of different retail trade names. Here we discuss products by the name of the insect-killing active ingredient rather than by their many retail trade

names. You always can find the common names of active ingredients by reading the label on the pesticide container. Every pest-killing chemical will be listed on the label under the section marked "active ingredients."

We do not recommend insecticide application to landscape plants where yellowjackets and related wasps are foraging for food; we only advise direct treatment of active nests around doors or other places

where sting hazard is high.

Treatment of trees, shrubs, and other yard and garden plants at best only temporarily reduces wasp presence. Many repeated applications to landscape plants would be required.

**IMPORTANT.** Unless the label specifically says the insecticide can be used for yellowjackets, hornets, or wasps outside around residential yards and gardens, you have the wrong product. Many products are intended for use only outdoors; never

**Table 1.** Commercial traps and attractants for yellowjackets: Traps that use heptyl butyrate are highly attractive to our most common species, the western yellowjacket.

COMMERCIAL PRODUCT	COMPONENTS	ATTRACTANT*
Advantage Yellow Jacket Trap for Southern, Eastern, Common, German Yellowjacket	bucket trap + liquid attractant	vinegar
ADVANTAGE Yellow Jacket Trap for Western Yellowjackets	bucket trap + liquid attractant	heptyl butyrate
Oak Stump Farms Yellow Jacket and Wasp Trap	bucket trap + liquid attractant	heptyl butyrate (protein + carbohydrate baits to be added by homeowner)
Oak Stump Farms Yellow Jacket and Wasp Lure	liquid attractant refill	heptyl butyrate
Raid Disposable Yellow Jacket Trap	bucket-type trap + liquid attractant	confidential**
Rescue Yellowjacket Trap Rescue Yellowjacket Trap Attractant (4-wk) Rescue Yellowjacket Trap Cartridge (10-wk)	cone/funnel trap + attractant liquid attractant refill liquid attractant cartridge	heptyl butyrate heptyl butyrate heptyl butyrate
Safer Deluxe Yellowjacket/Wasp Trap	bucket/funnel trap + liquid attractant	heptyl butyrate
Victor Yellow Jacket Magnet Victor Yellow Jacket & Flying Insect Trap Victor Yellow Jacket Trap Bait	disposable bag trap + liquid attractant reusable jar trap + liquid attractant liquid attractant refill	fruit juice concentrate fruit juice concentrate fruit juice concentrate
Xcaliber Reusable Yellow Jacket Trap Xcaliber Disposable Yellow Jacket Trap Xcaliber Reusable Yellow Jacket Bait	bucket trap + liquid attractant bag trap + liquid attractant liquid attractant refill	heptyl butyrate heptyl butyrate heptyl butyrate

### TABLE NOTES

\* Reference source: Material Safety Data Sheets and personal communication (P. Landolt USDA)

\*\* Non-toxic plant-based attractant not specifically identified by manufacturer



## SAFETY PRECAUTIONS BEFORE YOU SPRAY

Follow these precautions if you decide to spray a yellowjacket, bald-faced hornet, or paper wasp nest:

- **Inspect the nest.** Inspect the colony from a safe distance (at least 10 feet) during the day so that you know exactly where the nest entrance of yellowjackets or bald-faced hornets is located before you spray. DO NOT SPRAY unless you can see the entrance; otherwise, you will be stung by insects that escape contact with the killing spray.
- **Only spray nests after dark.** Wasps are less active after dark in cool temperatures, and most (but not all) foraging workers will be present in the nest.
- **Do not shine a flashlight directly at the nest.** You may provoke an attack. Do not hold the flashlight in your hand; agitated wasps will fly to the light. Illuminate the nest from the side or back with a light placed on the ground some distance from where you will be standing.
- **Wear heavy clothes and eye protection.** Protect yourself from stings by wearing heavy clothing, a hat, and goggles or other eye protection; some yellowjackets temporarily blind victims by spraying venom from their sting into the eyes.
- **Take care when spraying around sensitive areas** like vegetable gardens, pet kennels, and windows. Some wasp and hornet killers specifically prohibit application to plant foliage. NEVER EAT any vegetables or fruits that might have accidentally been sprayed.
- **Contract with a professional pest control operator** when dealing with:
  - Large aerial nests of hornets
  - Late-summer nests of ground-dwelling yellowjackets
  - German yellowjackets in home wall voids
  - Nests in attic spaces where potential escape from stinging attack is limited. These types of nests can house dangerous numbers of workers that pose high sting hazards.
  - Nests in wall voids present an additional problem: After colonies have been killed, dead workers, larvae, and nest materials must be physically removed from the wall void; otherwise, they generate an intolerable rotting stench.

use these inside buildings.

Selection of the best product for out-of-doors nest treatment around home landscapes depends on balancing human safety with control effectiveness.

## HUMAN TOXICITY CONSIDERATIONS

**Conventional insecticides interfere with the nervous system.** The insect-killing active ingredients in almost all off-the-shelf hornet and wasp insecticides are one of two types: pyrethrin and pyrethroids. Pyrethrin is a natural insect-killing chemical extracted from chrysanthemum flowers, while pyrethroids are human-synthesized compounds similar in chemical structure to natural pyrethrin. Both are widely used because of their quick knock-down, meaning that they rapidly paralyze the insect.

Both natural pyrethrin and human-synthesized pyrethroids are nerve poisons—they kill by interfering with the nervous system—and so pose at least some hazard to humans, pets, and wildlife via accidental exposure.

Virtually all conventional wasp and hornet insecticides for homeowners are considered by the U.S. Environmental Protection Agency (EPA) as only slightly toxic to people. You can judge the relative toxicity of any pesticide to people by looking for one of the following special “signal words” printed on the pesticide label:

- **CAUTION** designates “slightly toxic” products; this is the lowest (least toxic) pesticide category.
- **WARNING** A few of the more concentrated wasp-killers are classified by EPA as moderately toxic; these products always say “warning” on the pesticide label and are toxic to people at smaller doses than pesticides that say Caution on the label
- **DANGER** None of the retail wasp insecticides for homeowners carries the signal word “danger” that designates highly corrosive pesticides that can permanently injure eyes or burn skin.

### Low-risk insecticides

Insect-killing chemicals in two products—the EcoEXEMPT product line and Victor Poison-Free Wasp & Hornet Killer—generally are considered by EPA as entirely safe for people. These products contain naturally-occurring plant oils (clove oil, phenylethyl propionate, peppermint, rosemary, or wintergreen oils) that are eaten by people in foods and so pose no risks to people.

## CONTROL EFFECTIVENESS CONSIDERATIONS

### Wet vs. dry insecticides

The most useful homeowner products for treating outdoor nests of yellowjackets, bald-faced hornets, and paper wasps are the ready-to-use aerosol jet sprays and liquid pump-trigger sprays that propel insecticidal streams or foaming sprays 20 feet or more into nests (Figure 10). These are especially useful for treating small aerial nests (golf ball size or smaller) that contain relatively few individuals. Treat underground nests of

yellowjackets with ample volumes of liquid insecticides that penetrate and saturate the entire colony.

Only a few dry-dust insecticides are available; these are best suited for yellowjacket nests in wall voids. The labels of some granular insecticides list stinging insects as pests controlled. Although these products would kill insects that contact a granule, sprays are better choices.

**Knock-down vs. residual killing action.** Some wasp and hornet killers combine an especially quick-acting but short-lived pyrethroid insecticide (or natural pyrethrin) with a longer-lasting pyrethroid insecticide. The first ingredient immediately paralyzes the insect but lasts less than a day before degrading into inactive chemicals. The second insecticide lasts a few days to several weeks and kills any returning foraging workers that later return to the nest. These combination products often are labeled "quick knockdown" and "residual kill."

Short-residual pyrethroid insecticides for yellowjackets, bald-faced hornets, and paper wasps include allethrin, bioallethrin, bioresmethrin, phenothrin, resmethrin, sumithrin, and tetramethrin. Again, these names are the active ingredients that kill the insects; each active ingredient is available in many different commercial trade-name products. By themselves, these chemicals—as well as natural pyrethrin—may not provide satisfactory control; any workers that had been foraging away from the nest during pesticide application eventually will return and remain agitated around the nest site for several days.

Longer-lasting pyrethroid insecticides for yellowjackets, bald-faced hornets, and paper wasps include beta-cyfluthrin, bifenthrin, cyfluthrin, lambda-cyhalothrin, deltamethrin, permethrin, and tralomethrin. These provide excellent control by themselves as well as in ready-to-use mixtures with short-residual ingredients.



Figure 10. Ready-to-use aerosol jet-sprays and liquid pump-trigger sprays are suited for direct application to wasp nests. Photo by Edward Bechinski

#### Treating above-ground nests

For aerial yellowjackets and bald-faced hornets, direct the insecticide stream into the nest entrance. For paper wasps, spray across the surface of exposed nest comb. Foaming spray insecticides are especially effective against paper wasps.

Spray until nests are soaked. Leave treated nests in place for a day or two; not all workers return to the nest at night, so any workers foraging away from the nest during spray application will be killed by insecticide residues when they return to the nest. Scrape off dead nests from buildings after two days so that they do not discolor exterior surfaces.

#### Treating below-ground yellowjacket nests.

Locating subterranean nests of soil-nesting yellowjackets requires patience. First, bait the yellowjackets with cat food or tuna fish, and then watch an individual wasp as it flies back to its nest with scavenged food. Foraging yellowjacket workers generally fly in a straight line back to their nest.

Then go to where you lost sight of the insect, wait until another flies by, and repeat the process until you see the nest hole in the ground. Look from a

safe distance for workers flying in and out of the entrance. Don't approach too closely because you may provoke attacks from yellowjacket workers that guard the entrance. Mark the area and come back after dark to treat the nest.

Direct the insecticide stream into the opening of subterranean yellowjacket nests. You can plug the entrance hole with soil after treatment to seal workers inside, but be sure to spray the soil plug to kill any foraging workers that later return to the nest.

#### Treating yellowjacket nests in wall voids.

Leave to professionals both insecticide application and subsequent nest removal. But if you do decide to apply your own treatments, use aerosols or dusts that can be blown into the entire expanse of the nest. After application, plug the nest opening with fiberglass building insulation; treat the plug with insecticide to kill any foraging workers that later return.

Never plug nest entrances as an alternative to insecticide application. Trapped workers can chew a new opening through interior walls and emerge in mass into living quarters.

#### TO ORDER

For more copies of this publication, or to order *BUL 854 Homeowner Guide to Bees* or *BUL 853 Homeowner Guide to Minor Stinging Insects*, contact the University of Idaho College of Agricultural and Life Sciences Publications Warehouse at (208) 885-7982, or e-mail [calspubs@uidaho.edu](mailto:calspubs@uidaho.edu).

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#### PESTICIDES DISCLAIMER

ALWAYS read and follow the instructions printed on the pesticide label. The pesticide recommendations in this UI publication do not substitute for instructions on the label. Due to constantly changing pesticide laws and labels, some pesticides may have been cancelled or had certain uses prohibited. Use pesticides with care. Do not use a pesticide unless both the pest and the plant, animal, or other application site are specifically listed on the label. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock. Trade names are used to simplify the information; no endorsement or discrimination is intended.

#### Pesticide Residues

Any recommendations for use are based on currently available labels for each pesticide listed. If followed carefully, residues should not exceed the established tolerances. To avoid excessive residues, follow label directions carefully with respect to rate, number of applications, and minimum interval between application and reentry or harvest.

#### Groundwater

To protect groundwater, when there is a choice of pesticides, the applicator should use the product least likely to leach.

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