

Homeowner's Guide to

Yellowjackets, Bald-Faced Hornets, and Paper Wasps



University of Idaho
Extension



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

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YELLOWJACKETS— Wasps in the *Vespula*, *Dolichovespula*, or *Polistes* genera— unlike bees — are shiny and relatively bare of hair as compared to most bee species found in Idaho. Of eleven species of yellowjackets found in Idaho, these four are the most common. All female wasps in these genera can sting multiple times.



Western Yellowjacket



Common Yellowjacket



Golden Paper Wasp



German Yellowjacket



Aerial Yellowjacket



Bald-Faced Hornet

Table 1. Summary of the eight most commonly encountered yellowjackets, hornets, and paper wasps throughout Idaho and their attributes.

Common Name	Scientific Name	Nest Type	Nest Location	Picnic Pest	Maximum Colony Size (Adults Only)
Western Yellowjacket	<i>Vespula pensylvanica</i>	Papery	Subterranean	Yes	~5,000
Common Yellowjacket	<i>Vespula vulgaris</i>	Papery	Subterranean	Yes	~5,000
German Yellowjacket	<i>Vespula germanica</i>	Papery	Wall voids, attics, and other voids	Yes	~5,000
Aerial Yellowjacket	<i>Dolichovespula arenaria</i>	Papery	Subterranean or aerial (football-shaped)	Minor	~700
Bald-Faced Hornet	<i>Dolichovespula maculata</i>	Papery	Aerial (football-shaped)	Minor	~500
Northern Paper Wasp	<i>Polistes fuscatus</i>	Papery	Under eaves (umbrella-shaped)	No	~100
Golden Paper Wasp	<i>Polistes aurifer</i>	Papery	Under eaves (umbrella-shaped)	No	~100
European Paper Wasp	<i>Polistes dominula</i>	Papery	Under eaves (umbrella-shaped) and vertical surfaces	No	~100

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YELLOWJACKETS AND THEIR RELATIVES have well-earned reputations for inflicting painful and repeatable stings. Yet when these insects operate at safe distances from human activity, none automatically requires elimination from yards and gardens. Indeed, these insects are highly beneficial because they are predators, scavengers, and even pollinators in the home and garden.

This publication identifies and discusses the differences in the biology and sting hazard or threat sometimes posed by the most important types of yellowjackets, hornets, and wasps encountered around Idaho homes (Table 1). The information helps you to decide if control action is needed, so that you can determine your best options.

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Identification

The words *bee*, *wasp*, *yellowjacket*, and *hornet* are often used interchangeably — but incorrectly — to describe any small, 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 partially covered in fine hairs for pollination purposes with flowering plants.

Wasps differ physically from bees in that their bodies are relatively bare of hairs and generally shiny in appearance.

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 naturally persists in Idaho or any adjoining western state. In 2019, the northern giant hornet (incorrectly commonly referred to as the “murder hornet”), *Vespa mandrinia*, was introduced to the coastline of Washington as well as British Columbia, Canada. Eradication efforts to date have been successful,

with the last confirmed sighting occurring in 2021. For more information about this specific species see [No Such Thing as a Murder Hornet: Asian Giant Hornet, an Invasive Species to Monitor](https://doi.org/10.60841/000000146) (BUL 988), <https://doi.org/10.60841/000000146>.

Yellowjackets and their commonly encountered relatives — the bald-faced hornet and paper wasps — are semi-social wasps. They live as a single reproductive female (queen) and her infertile female offspring (workers) in a central nest where they cooperatively rear and vigorously defend their immature larvae and nest structure.

TRIO OF PAPERY NEST BUILDERS

Yellowjackets, bald-faced hornets, and paper wasps build grey-to-tan papery nests of fibers commonly chewed from weathered wood (Figure 1). Adult wasps often can be seen around yards, gnawing pulp from backyard fences, firewood, and even cardboard stacked outside for recycling purposes. 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 groupings. Explanations of the differences can be found within the following subsections.

YELLOWJACKETS

Four Species Pose Sting Hazards Near Idaho Homes

Yellowjackets are medium-sized (about ½-inch long) black wasps with irregular, jagged yellow band markings. They become pests at picnics and other outdoor settings where meats and sugary drinks are present (Figure 2).

Eleven different species of wasps are known in Idaho, but normally only eight species pose

sting hazards that sometimes may justify a control action:

- Western yellowjacket
Vespula pennsylvanica
- Common yellowjacket
V. vulgaris
- German yellowjacket
V. germanica
- Aerial yellowjacket
Dolichovespula arenaria
- Bald-faced hornet
D. maculata
- Northern paper wasp
Polistes fuscatus
- Golden paper wasp
P. aurifer
- European paper wasp
P. dominula

Species identification requires expert examination but is not necessary to decide if control action is needed in a home or garden landscape. If nests are constructed in highly trafficked areas, control action may be warranted



Figure 1. Western yellowjacket, *Vespula pennsylvanica*, 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.



Figure 2. 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.

regardless of the specific species of yellowjacket, bald-faced hornet, or wasp because the risk of stinging may be high.

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

These two yellowjackets almost always build subterranean nests hidden from view within natural cavities (Figures 3 and 4). Typical backyard nest sites include abandoned animal burrows, hollows under sidewalks, and crevices in retaining walls. In forested areas, the two build nests within fallen logs, old stumps, and in the soil.

Eat Insects, Meat, and Sweet Nectar

Unlike honeybees and other bee species, 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,



Figure 3. German yellowjacket, *Vespula germanica*, an aggressive scavenger of meats and sweet drinks, poses a high sting hazard. It may survive Idaho winters when nesting in wall voids and home attics. **Papery nests:** Yes, home walls and in attics. **Picnic Pest:** Yes.

which they return to the nest as chewed-up food for their own developing larvae. Yellowjacket workers kill prey by biting and maceration, not by stinging them. Adults ingest some body liquids from prey but feed primarily on plant nectar as their source of energy. Workers also may feed mouth-to-mouth on liquids produced by their larvae. As the summer progresses and insect prey becomes scarce, western and common yellowjackets increasingly feed as scavengers on nonliving proteinaceous food sources (protein) and sugary foods and drinks.

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

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



Figure 4. Aerial yellowjacket, *Dolichovespula arenaria*, mostly builds nests aboveground that grow to impressive sizes. **Papery nests:** Builds nests both under- and aboveground on roof overhangs or on protected building surfaces. **Picnic Pest:** Minor risk.

The behavior drastically increases throughout the summer, climaxing in late summer (August/September) as their normal prey population decreases or is completely eliminated.

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

German Yellowjacket in Idaho Since 1980s

The German yellowjacket is a European species that was first recorded in the northeastern United States during the 1970s and subsequently in Idaho during the 1980s. It poses a high sting hazard to people because it also aggressively scavenges meats and sweets (as well as is a voracious predator of living insects). The considerable sting hazards posed by the common, western, and German yellowjackets have caused school playgrounds and resort closings, curtailed logging operations, and interfered with commercial fruit harvests.

The German yellowjacket can be a special pest problem because it sometimes builds nests in wall voids and home attics. Although other yellowjackets naturally die out with cooler fall and winter temperatures, the nesting habits of German yellowjackets potentially allow colonies to persist year-round or for several years in the mildest areas of Idaho.

Aerial Yellowjacket Makes Aboveground Nests

The other frequently encountered yellowjacket species in Idaho is the aerial yellowjacket. It mostly builds nests aboveground, although belowground nests are not unusual. The aboveground 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 treetop 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 sizes as summer progresses and may contain as many as 700 or more workers.

Aerial yellowjackets normally prey on living insects and so are not nuisance pests around picnic foods or garbage cans like the other three species. An exception occurs in late summer, when sugary foods attract them. 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 ($\frac{3}{4}$ -inch), stout-bodied, black wasp with a whitish-yellow face and a few whitish marks near the end of its body. Like the aerial yellowjacket, bald-faced hornets build enclosed, papery aboveground nests on landscape plants and buildings (Figure 5).

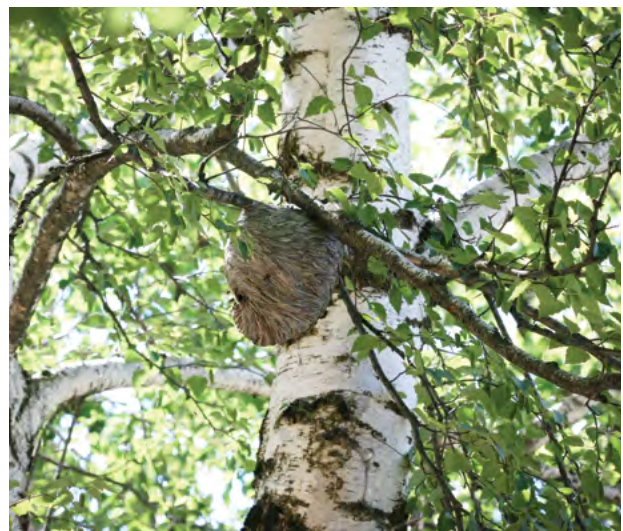


Figure 5. A bald-faced hornet's nest is similar in form to subterranean yellowjacket nests, but is always located aboveground, usually on buildings or landscape plants. They can get as large as soccer balls by early fall. Note the nest opening that appears on the outer wall (bottom third of the nest).

Bald-faced hornet nests often have leaves and twigs in the outer nest wall, whereas nests of aerial yellowjackets generally do not. Nests also may be colorful or unique. The coloration depends upon the wood that is being scavenged for the nest building (like stained fences).

Reduced Sting Hazard

Despite their large size, bald-faced hornets pose a substantially reduced sting hazard compared to yellowjacket species in Idaho. They almost entirely feed on other living insects, including yellowjackets, and so do not typically become nuisances at outdoor events where food is served. The potential for stinging encounters reduces because bald-faced hornets often build nests high up in trees or at roof peaks, often 30 feet above the soil level. Workers sting when provoked (by someone bumping the nest or squeezing hornets against the skin) but are not as aggressive in defending nests as are yellowjackets.

PAPER WASPS

Idaho's Most Common Stinging Pests

Paper wasps resemble yellowjackets but have a slimmer, elongated body shape with a characteristic long-legged appearance. Their legs even dangle below the body in flight, making identification quite easy if they are flying around an open landscape.

The northern paper wasp, *Polistes fuscatus* (Figure 6), and the golden paper wasp, *P. aurifer*, both yellow-to-reddish-brown wasps with yellow banding, were the two most common types of paper wasps throughout Idaho until the late 1990s. Although these native species still occur in rural areas of Idaho, they have largely been displaced in Idaho ecosystems and urban habitats by the European paper wasp, *P. dominula*. The northern and golden paper wasp should be considered as native Idaho wasp species and thus efforts to retain their population are strongly encouraged.

The non-native European paper wasp was first observed in Massachusetts in 1981. It expanded westward, reaching the Pacific Northwest in 1999. Today it is found statewide in Idaho and ranks as our most commonly encountered stinging wasp. Because of its relative abundance, range, and nesting tendencies, it has the greatest risk of encountering humans in home and garden landscapes. Hence, even though it's relatively docile as compared to other wasps, it is the one most likely to be accidentally disturbed or encountered in Idaho.

Umbrella-Shaped, Open Nests

Paper wasps build distinctive umbrella-shaped paper nests (Figure 7) seen hanging upside-down from doorframes, eaves, and other protected places. Nests are **open-combed**, meaning cells



Figure 6. The northern paper wasp (*Polistes fuscatus*).



Figure 7. A paper wasp resting upside-down.

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 yellow-jackets and hornets, paper wasps are social insects.

Despite their high sting hazard, paper wasps are beneficial predators in Idaho landscapes. They do not scavenge on nonliving foods as do nuisance yellowjackets but instead prey on caterpillars and other soft-bodied, leaf-feeding insect pests. Adults also feed on nectar and thus can be seen foraging on flowers throughout the season. During summer, they often are found around a yard's water puddles and ponds.

Fairly Docile

Compared with yellowjackets, paper wasps are relatively docile. They don't aggressively attack people but 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 Build 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 a 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 thus people frequently encounter them. Common nest sites around the home include the following:

- Inside outdoor light fixtures, mailboxes, cable TV/home-utility boxes, exterior door chimes, covered barbeque grills, birdhouses, and bird feeders
- Fenders, bumpers, and other exterior surfaces of vehicles parked outside or 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 or clay shingles with adequate space for nest building

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 or early winter as indoor decorations or curiosities.

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

You can wait until the hard freezing days of winter to collect a nest, but papery ones are delicate and disintegrate quickly during the harsh winter weather.

Other native paper wasp species 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 forty or fewer cells. Nests with hundreds of cells are possible in warmer parts of Idaho where hot, dry weather allows for prolonged reproduction (the majority of southern Idaho).

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, except German yellowjackets, who occasionally nest within attics/homes or in very mild microclimates. All of the other wasp species mate in the late fall and these reproductive female wasps instead overwinter outdoors under loose tree bark or on the ground in weedy areas that provide adequate cover.

An exception to outdoors overwintering is the golden or northern 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; indeed, wasps may even escape into household living quarters. Those flying around windows inside Idaho homes during winter are typically *Polistes* paper wasps.

SPRING: NEST BUILDING; 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 can be readily observed around home landscapes on flowering plants or at water sources.

Yellowjackets, bald-faced hornets, and paper wasps build new nests each spring. None of these species reuses nests from year to year. Yellowjackets and bald-faced hornets work as individual queens to construct their own nest each spring. 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 hexagonal cell in the comb (Figure 8). The queen, being a beneficial predatory insect, cares for her larvae by feeding them chewed-up insects that she captures from backyard plants.



Figure 8. A yellowjacket wasp, displaying its black-and-yellow-banded abdomen.

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 infertile (non-egg-laying) females. Males of all species are not produced until September or even October and are only produced for mating purposes.

The spring weather largely determines if wasps will be problematic or not in any given year in Idaho. Cold, rainy weather during April and May reduces the likelihood that queens can build a nest and collect enough food to feed immature offspring, while warm, dry weather through June enhances nest success and population.

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 the larvae. The sole function of the queen becomes egg laying; consequently, she remains within the nest for the rest of the summer. A single yellowjacket queen lays tens of thousands of eggs during the summer, depending upon the species.

Yellowjacket workers that emerge during early summer have a relatively short lifespan, only living for 16–32 days; those emerging in late summer have a 10 to 20–day lifespan. Successive generations of workers emerge throughout the 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 in size and population, seldom exceeding one hundred individuals and often comprising fewer than twenty.

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 afterward and the colony begins to die out. Only the new mated queen survives the winter; all workers and males die with the first freezing temperatures. Abandoned, empty nests remain in place until the weather destroys them.

Sting Hazards

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

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

Only female insects sting, because an egg-laying tube (ovipositor) modified over the course of evolutionary time to inject venom as a defense mechanism. Males cannot sting; they (obviously) lack an egg-laying structure.

VIBRATIONS, SHADOWS, AND STINGS

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

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

when 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 for the next generation.

MULTIPLE STINGS

Stingers of yellowjackets, hornets, and paper wasps are smooth, sharp needles that the insects repeatedly push into the skin of a victim, which allows each to sting many times. Multiple stings by one individual wasp are especially likely when insects become trapped under clothing against bare skin.

Pain associated with stinging insects comes not from the sting itself but rather from the venom it delivers. Wasp and bee venoms are complex mixtures of enzymes, proteins, and other organic chemicals. Some venom chemicals cause intense pain, others kill cells and cause swelling or other symptoms, 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 localized swelling immediately surrounding the sting site. Usually, symptoms go away without treatment in a few hours to several days. Sometimes delayed reactions — such as the hot, red swelling of a leg or arm — can last a week or more.

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

ALLERGIC REACTIONS TO STINGS

Systemic (whole-body) allergic reactions to sting venoms occur in 1%–3% of the population and cause about 72 deaths on average annually in

the United States (Centers for Disease Control and Prevention 2023). Allergic reactions to stings involve the body’s immune response and require at least two sting episodes: the first sensitizes a person and the next causes a dangerous overreaction of a person’s entire immune system.

Venoms contain foreign proteins (antigens) that cause a body to produce its own protective proteins (antibodies) called immunoglobulin E (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 bloodstream.

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. But 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 serious respiratory distress. Hypersensitization to venom proteins only requires a single sting.

Sting venoms of yellowjackets, bald-faced hornets, and paper wasps share enough chemical similarities that some people have allergic cross-reactions to all of these species. Because individuals are unique and can be allergic to the specific venom of a species and nonallergic to the venom of others, always consult with a primary care physician or allergist. 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 should be especially careful around hornets and vice versa.

Honeybee venom differs enough from the other stinging insects to generate its own IgE

allergic reaction, so even hypersensitive people usually — but not always — are only allergic to honeybees or only to yellowjackets, hornets, and paper wasps. **If you have ever suffered a**

severe allergic reaction to stinging insects, consult your primary care physician about allergen testing and venom-desensitizing immunotherapy options.

ADVICE FOR ACCIDENTAL ENCOUNTERS WITH YELLOWJACKET, BALD-FACED HORNET, AND PAPER WASP NESTS

Walk Backward/Move Slowly

If you have not agitated the insects into attack, calmly walk backward 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.

Don't Swat; Flick; Don't Crush Bodies

Do not swat at flying workers; they release airborne chemicals — called alarm **pheromones** — that stimulate a stinging attack from other workers. If a wasp lands on you, quickly flick it away with your finger. Never crush the bodies of workers, especially near a nest; crushing also releases alarm pheromones that may induce an 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 the wasps stop their pursuit. (Agitated yellowjackets may chase you several hundred feet.) Brushy trees or shrubs are not safe shelters because stinging insects can surround and trap you.

First Aid for Stings

Always consult your primary physician or allergy specialist about pain medicines and other first-aid advice; the information presented is not a substitute for professional medical recommendations.

Immediately seek physician or medical emergency services if the victim

- Is stung around the head, neck, or inside the mouth.
- Is stung several times.
- Was stung during the previous week.
- Is very young or very old.
- Cannot breathe easily, has difficulty swallowing, or feels dizzy. These symptoms are often associated with a severe life-threatening anaphylactic allergic reaction.
- 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 a physician if reddish streaks develop from the sting; this may be a sign of a secondary infection.



Yellowjacket, Hornet, and Wasp Management Strategies

Although yellowjackets and their relatives are beneficial insects, they pose dangers when nest placement or worker feeding habits put them 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 the insects to backyards.

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 any control action at all. Keep in mind that these insects are considered beneficial and that nests can be left to naturally die out during the fall.

PERSONAL PROTECTION

You and your family can take several common-sense steps to reduce unintentional contact 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 are expected or encountered; these scents are 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.
- When picking caneberries (raspberries, blackberries), grapes, and tree fruits such as apples, peaches and pears, look for foraging workers before reaching in unseen; these plants are 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.

REPELLENTS

Mint oil and other plant oil advertisements tout their products' ability to repel yellowjacket workers, but data is limited and sparse on their actual effectiveness. Also, commercial mosquito/tick repellants don't work against stinging insects. Indeed, it is possible that the scents of some repellants actually 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 or inside the mouth.
- Keep lids on trash cans and dumpsters; clean trash cans to remove attractive odors or use disposable can liners; rinse cans and bottles before placing them 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 periods of summer. Water puddles attract workers.
- Clean up rotting apples and peaches that fall from trees; pick caneberries before they overripen.
- Replace late-flowering landscape plants around decks and patios with nonflowering 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, dislodge the aerial nests of yellowjackets, bald-faced hornets, and paper wasps by forcefully spraying the nests with a garden hose at a safe distance. 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 dusk or night, when temperatures are cooler; at that time, flight activity is minimal and sting hazard is greatly reduced. Stand away at a safe distance too.

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

Subterranean nests. Nests of ground-dwelling yellowjackets are more difficult to physically destroy than those aboveground. First, early season subterranean nests are hard to find; second, by the time you notice flight activity around nest entrances, the 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 an opening, neither method is effective. Depending on the landscape terrain, the actual nest combs may be located above the surface entrance or distantly from it, thus escaping destruction.

Soil coverage. Covering nest entrances with soil is ineffective; trapped wasps dig new exit and entrance holes.

Never pour kerosene or gasoline into subterranean nests. This practice poses a very high explosive hazard (fire), plus soil contamination and groundwater pollution.

Vacuum removal is a job only for pros or exterminators. 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 the fall and winter months has no impact on populations the next year because wasps neither overwinter in old nests nor reuse 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 can be captured readily and killed in a variety of commercial and homemade traps. All traps work similarly: Yellowjacket workers that scavenge for nonliving protein and carbohydrate foods are captured inside 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 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 a yard at least 20 feet away from people are enough for most home yards in average-sized municipal lots or small-acreage landscapes. Don't hang traps on a patio deck or other places where people congregate (Figure 9); traps placed where people gather increase the potential sting hazard by attracting even more yellowjackets than otherwise would be present naturally.



Figure 9. A yellowjacket trap (upper left), hung too close to a site frequented by people. Incorrect trap placement increases the sting threat because it draws wasps to an area.

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 three-quarters of a mile in search of food. It is thus impossible to trap 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 prevent nests beyond an individual yard from surviving. Research also shows that overwintering queens are notoriously unresponsive to traps in the spring.

About commercial traps. Commercial traps include both baited and unbaited devices as well as disposable and reusable designs (Figure 10). Traps baited with fruity-smelling synthetic attractants, often of the chemical heptyl butyrate, acetic acid, or 2-methyl-1-butanol, are highly attractive to our most common species, the western yellowjacket, but are less attractive to the common yellowjacket and the German yellowjacket.

Unbaited traps require that you add protein and carbohydrate foods. Baits like canned, cat food, luncheon meats, and fruit juices attract yellowjackets, but usually not as many as synthetic heptyl butyrate.



Figure 10. Yellowjacket workers scavenge food from meat scraps.

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 (e.g., Mountain Dew, Minute Maid Orange soda) have proven highly attractive to German yellowjackets in the Midwest.

Disposable traps. Disposable traps reduce sting hazards by eliminating any need to handle traps containing live yellowjackets. Reusable traps must be emptied and reprovisioned periodically with food baits or chemical lures. Some reusable traps directly kill captured insects by drowning them in soapy water while other traps restrain living yellowjackets until they die. Yellowjackets respond to food odors from the trap by flying to and crawling through the opening in the inverted top. Once inside the cylindrical bottom piece, most yellowjackets cannot find their way back through the funnel opening.

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, it was legal for homeowners to add an insecticide to protein food baits. Foraging yellowjacket workers would carry these baits back to their nests and poison the entire colony. This insecticide was removed from the market without replacement in late 2002. Although out-of-date recommendations about homemade poison baits can be found via internet searches, all such tactical use violates federal and state pesticide laws.

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

Commercially available, microscopic-sized predatory nematodes could potentially be applied as drenches to subterranean yellowjacket nests. But because it takes days for lethal infections to develop, application is limited to only subterranean 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 the soil. Hence, this biological control approach is not very practical or effective.

Extreme sting hazard during its application further argues against nematode drenches. Effective control of aerial nests with nematode suspensions seems unlikely because nematodes are aquatic organisms and will 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 an insecticide treatment. Choosing the right insecticide can be confusing, however, because the same insect-killing chemical typically is sold under dozens of different retail trade names. Consequently, the following discussion refers to products by the name of the insect-killing active ingredient rather than by their many retail trade names. The common names of active ingredients appear on a pesticide container's label under the section marked "active ingredients."

We do not recommend insecticide application to landscape plants where yellowjackets and related wasps forage for food; we only advise direct treatment of active nests around doors or other places where the sting hazard is high. Treatment of trees, shrubs, and other yard and garden plants at best only temporarily reduces wasp presence and may have indirect effects on other beneficial arthropods in the landscape.

Indeed, many repeated applications to landscape plants are likely required.

Important. Unless the label specifically says the insecticide can be used for yellowjackets, hornets, or wasps around residential yards and gardens, it is the wrong product. Many products are intended for use **ONLY** outdoors, so never use those inside buildings. As always, read the entire product label before purchasing, before

SAFETY PRECAUTIONS BEFORE YOU SPRAY

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

- **Read the entire label before purchase, use, and storage.** Read the entire insecticide label before purchasing, applying, or storing any pesticide. Always follow the pesticide label and the directions for use for all pesticide products.
- **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 spraying. **DO NOT SPRAY** unless you can see the entrance; otherwise, the insects that escape contact with the killing spray will sting you.
- **Only spray nests after dark.** Wasps are less active after dark in cool temperatures and most (but not all) foraging workers are present in the nest.
- **Do not shine a flashlight directly at the nest, for it may provoke an attack.** Do not hold the flashlight in your hand; agitated wasps fly to the light. Illuminate the nest from the side or back with a light placed on the ground some distance from where you intend to stand.
- **Wear heavy clothes, proper pesticide personal protective equipment (PPE), 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. Protect yourself from potential pesticide nontarget effects by following the directions for use on the label, including wearing proper PPE for your health.
- **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 a 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.

usage, **and** before storage. Selection of the best product for outdoor 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 knockdown, meaning they rapidly paralyze an insect through a nerve-system mode of action. Both natural pyrethrin and human-synthesized pyrethroids are nerve poisons — they kill by interfering with the nervous system — and so they 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 US Environmental Protection Agency (EPA) as only slightly toxic to people. To judge the relative toxicity of any pesticide to people, look for one of the following special “signal words” printed on a pesticide label:

- **CAUTION.** Designates “slightly toxic” products; the lowest (least toxic) pesticide category.
- **WARNING.** A few of the more concentrated wasp killers are classified by the EPA as moderately toxic; these products always say “warning” on the pesticide label and are toxic to people at smaller doses than the signal word, “caution.”
- **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 that are of low-risk contain naturally occurring plant oils (clove oil, phenethyl propionate, peppermint, rosemary, or wintergreen oils) that are eaten by people in foods and so pose low risk to people.

Control-Effectiveness Considerations

Wet versus 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 11). They 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 they control. Although these products kill insects that contact a granule, sprays, liquids, and aerosol insecticides are better choices.



Figure 11. Ready-to-use aerosol jet sprays and liquid pump-trigger sprays are suited for direct application to wasp nests.

Knockdown versus 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 active ingredient (pyrethroid) lasts a few days to several weeks and kills any returning foraging workers that later return to the nest. The 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 have been foraging away from the nest during pesticide application eventually 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.

Treating aboveground nests. For aerial yellowjackets and bald-faced hornets, direct an insecticide stream into a 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. Scrape off dead nests from buildings after two or three days so that they do not discolor exterior surfaces.

Treating belowground 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 the scavenged food. Foraging yellowjacket workers generally fly in a straight line back to their nest.

Second, 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 dusk to treat the nest.

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

Treating yellowjacket nests in wall voids.

Leave this task to pest professionals for both the insecticide application and subsequent nest removal. If you prefer 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 chew a new opening through interior walls and emerge en masse into home living quarters.

Further Reading

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Trade Names — To simplify information, trade names may have been used. No endorsement of named products is intended nor is criticism implied of similar products not mentioned.

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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