

Hawkweed

IDENTIFICATION

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Introduction

Hawkweeds belong to the genus *Hieracium*, which is derived from the ancient Greek word for hawk. The taxonomy and nomenclature of hawkweeds is very complex. Hawkweeds are known for agamospermy, a form of single parent vegetative reproduction through seed formation without pollenization. This asexual reproduction can allow the evolution of a large number of potential species. A small genetic change brought about by rare sexual reproduction can result in many populations of plants that maintain this single change because of agamospermy. European botanists have named over 700 hawkweed species (Tutin et al. 1976) although taxonomists concede that this level of ascribed speciation includes many cases of different names being assigned to single species (synonymy), and excessive splitting of variation within single species that would more appropriately be described as varietal or subspecies differences. The classification of hawkweeds is confounded by these nomenclatural and taxonomic irregularities written into the existing floras. Consistent and accurate identification of the species level is challenging even for professional botanists because the species determinations within the genus are based primarily on vegetative characteristic that have considerable overlap between species.

All hawkweeds, exotic or native, share some similar characteristics. If the actively growing stem or leaves are broken they will usually exude a milky sap. The flowerheads are of

the composite form that is found on dandelion. This flowerhead is composed of numerous small individual flowers, each with a single strap-shaped (ligulate) petal which is often called a ray flower. The tips of these ray flowers are slightly notched (Figure 1). Although the individual hawkweed flowerheads with their many strap-shaped ray flowers have an appearance similar to common dandelion, the hawkweed inflorescence has numerous flowerheads (Figure 2). All the hawkweed species are perennials that regrow from rhizomes.

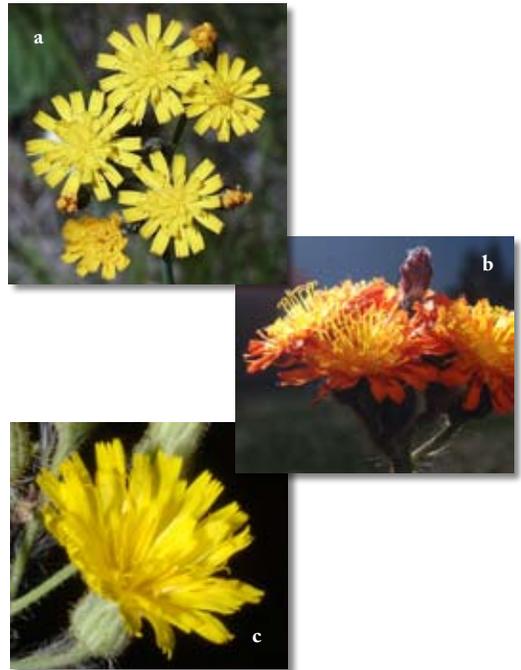


Figure 1. All hawkweeds have similarly shaped composite flowerheads consisting of numerous strap-shaped ray flowers with notched tips
a. meadow hawkweed (exotic), b. orange hawkweed (exotic), c. woollyweed (native)

The exotic hawkweeds in the Pacific Northwest are relatively new invaders from Europe. These exotics were only

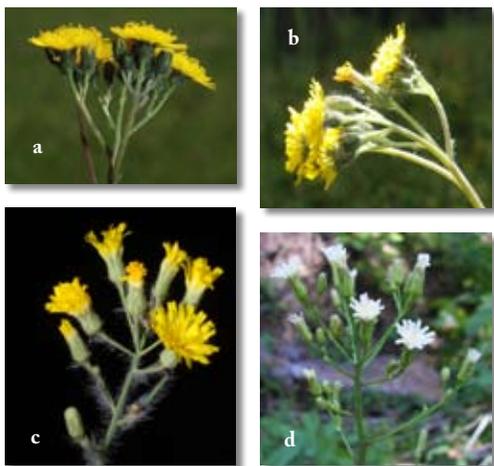


Figure 2. The hawkweed inflorescence (flowering stalk) has numerous flowerheads; a. meadow hawkweed (exotic) & b. kingdevil (exotic) inflorescences are flat-topped-to-rounded and compact, c. woollyweed (native) inflorescence is elongated and more open, d. white hawkweed (native) inflorescence is also more open and tends to be elongated.

detected in this region starting in the second half of the last century. Wilson (2006) recognizes fourteen native and fourteen exotic hawkweed taxa in western North America. This new practical identification bulletin treats numerous previously named hawkweed species as varieties or subspecies of single species and focuses on only the species that have been confirmed as present in Montana. This revised nomenclature is simplified to 3 exotic and 4 native hawkweeds for Montana (Table 1). A principal goal is to enable the user to definitively separate the yellow-flowered exotics from the native hawkweeds. And although the scientific binomials used for hawkweeds have been inconsistently applied in published flora, the common names in this genus are in even greater disarray. Kingdevil, queendevil, and yellowdevil are among the common names that are applied in an indiscriminate manner to the hawkweed taxa.

Table 1: Simplified hawkweed nomenclature for Montana

Revised Nomenclature	Previous Nomenclature
Native Yellow Flowered	
<i>H. scouleri</i> woollyweed	<i>H. albertinum</i> western hawkweed
	<i>H. cynoglossoides</i> hounds tongue hawkweed
	<i>H. scouleri</i> Scouler's hawkweed
<i>H. umbellatum</i> narrowleaf hawkweed	<i>H. umbellatum</i> narrowleaf hawkweed
	<i>H. canadense</i> Canada hawkweed
<i>H. gracile</i> slender hawkweed	
Native White Flowered	
<i>H. albiflorum</i> white hawkweed	
Exotic Yellow Flowered	
<i>H. caespitosum</i> (synonym <i>H. pratense</i>) meadow hawkweed	
<i>H. praealtum</i> kingdevil	previously determined in Montana as: <i>H. floribundum</i> yellow-devil hawkweed and/or <i>H. piloselloides</i> kingdevil hawkweed
Exotic Orange Flowered	
<i>H. aurantiacum</i> orange hawkweed	

Species Descriptions

Meadow hawkweed (*H. caespitosum*) and kingdevil (*H. praealtum*)

These two species are very similar in appearance. Most plants are only 8 to 30 inches tall, but some roadside wet site infestations have grown to a height of five feet. The upright flowering stem rarely has more than three leaves, except in the case of extremely tall plants. Many flowering stems will have a single leaf or only two leaves, and these leaves will be on the lower one third to one half of the stem. The higher leaves, if

present, are greatly reduced in size such that the upper stem may appear leafless from a distance. The lack of stem leaves, and their diminutive size distinguishes these exotic hawkweeds from the native woollyweed and narrowleaf hawkweed (Figure 3).

There are numerous persistent leaves at the base of the exotic plants, as many as eight to ten basal leaves may be present on larger plants. The stem and basal leaves are much longer than wide. The range in length is typically 1½ to 5



Figure 3. The number and size of leaves on the flowering stem is diagnostic; a. meadow hawkweed and kingdevil (exotic) have few stem leaves that are greatly reduced in size and found mostly on the lower half of the stem, b. woollyweed (native) has numerous (5-10) leaves along the length of its stem although they get smaller as they progress upward, c. narrowleaf hawkweed (native) has many (8-15+) stem leaves with the biggest leaves in the middle and the lower and basal leaves dropping off, d. white hawkweed (native) stem leaves are reduced in size and number but not to the degree that is typical of the exotics.

inches but only a 1/2 to 3/4 of an inch wide. Most leaves are tapered at both ends and have continuous edges but some leaves may have occasional minute teeth.



Figure 4. Stolons are formed only by the exotic hawkweeds; a. meadow hawkweed can form short stout stolons usually parallel to the ground, b. kingdevil stolons are usually initiated in a long slender decumbent stem form with many small leaves

The presence of stolons, similar to the runners formed by strawberries, is a critical diagnostic feature of the exotic hawkweed species as stolons are never present on native hawkweeds (Figure 4). However, fewer than five to ten percent of individual exotic hawkweed plants may develop these stolons under the generally dry conditions prevalent in Montana. The growth of new stolons does not occur until the plants are in the flowering stage. On kingdevil hawkweed, the stolons are typically in the form of decumbent stems rather than the form of strictly horizontal runners as are seen on strawberry. Although the exotic hawkweed flowering stems are nearly leafless, the decumbent stem form of stolons has numerous small leaves. This decumbent stem form of leafy stolons may reach lengths of 8 to 12 inches under favorable growth conditions. The stolons can form a small single flower head at their tip, or if they contact the ground the stolons can develop roots and form new daughter plants. The stolons of meadow hawkweed are usually short (up to 4 inches long), thick, have few or no

leaves, and are mostly horizontal in contrast to the long, leafy, decumbent stolons formed by kingdevil.

Meadow hawkweed (*H. caespitosum*) and kingdevil (*H. praealtum*) differ in the degrees of pubescence they develop, but there is considerable overlap in these hair characteristics, so numerous individual plants should be examined in order to determine which species forms the infestation. There are three types of hairs that can be formed on hawkweeds. There are long or short simple hairs which may also have a conical base or if short an overall pronounced taper, short hairs that have a round gland tip, and very small hairs that have numerous tree-like branches giving an approximate star-shaped appearance. Most people need a 20X hand lens to see the details of the individual star-shaped hairs. However, the star-like hairs on the upper flowering stem can be so dense as to form a shiny white mat-like appearance. The small round glands are most often black or dark brown in color and the conical bases of the simple hairs

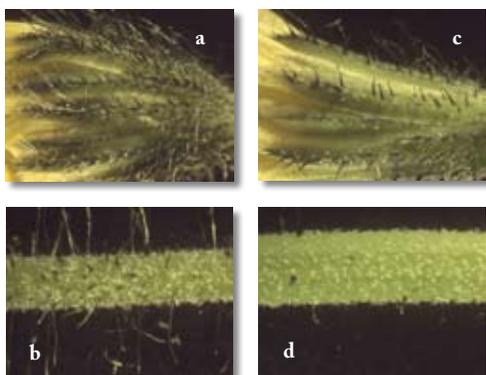


Figure 5. Black, round, gland-tipped and black, stiff, simple conical hairs are more numerous on meadow hawkweed than kingdevil; a. meadow hawkweed flowerhead base bracts (phyllaries), b. upper flower stem stalk of meadow hawkweed also has more long, simple, black glandless hairs, c. kingdevil flowerhead base bracts (phyllaries), d. upper flower stem stalk of kingdevil

can be quite dark in color. This hair coloration is often so well developed on orange hawkweed (*H. aurantiacum*) and some meadow hawkweed plants that they have a distinctive black- speckled hairy appearance.

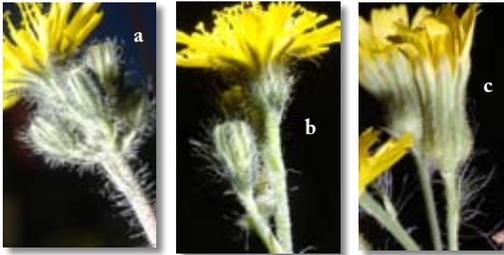


Figure 6. Hair in the flowerhead bases (involucres) and upper flower stalk appear darker in meadow hawkweed than kingdevil and are brownish in the native woollyweed; a. meadow hawkweed (exotic), numerous dark hairs on the upper portions of meadow hawkweed stalks and the flowerhead bases (involucres) often create a dark, speckled appearance, b. kingdevil (exotic) upper flower stalk appears shiny because of dense mat star-like hairs, c. woollyweed (native) has brownish or clear, rather than blackish, glandular hairs and long simple hairs usually are most prominent.

Most meadow hawkweed plants are more hairy overall than kingdevil plants. To utilize these diagnostic features requires close examination of several structures; the small overlapping bracts (phyllaries) that form the base of the flowerhead (involucre), the upper flower stem where it begins branching to form the stalks (pedicels) for individual flowerheads, and the leaves. The small bracts (phyllaries) that form the bell-shaped base of the flowerhead of meadow hawkweed has a greater density of black gland-tipped and stiff black simple conical hairs than are formed on kingdevil (Figures 5a & b, 6a & b). The upper stem and individual flower stalks (pedicels) of most meadow hawkweed plants also have more numerous black gland-tipped and dark conical-based simple hairs than do kingdevil plants (Figures 5c & d, 6a & b).

On the leaves of hawkweeds, one should look at the lower and upper leaf blade surfaces, the leaf margin area, and the lower mid-vein. The upper and lower leaf blades of meadow hawkweed have denser continuous coverage with simple hairs (Figure 7a); the upper leaf blade of kingdevil is often nearly hairless except near or on the leaf margins (Figure 7b). The lower leaf blade of meadow hawkweed is densely to sparsely hairy across its entire width (Figure 8a), while on the bottom side of kingdevil leaves, the simple hairs are primarily restricted to the mid-vein and the marginal area of the leaf blade (Figure 8b).

A rhizome is a structure similar to a stolon except that the rhizome grows underground. The leaves on a rhizome are greatly reduced in size, more scale-like, and lack chlorophyll, rather than being small green leaves as formed on stolons. The rhizome of exotic hawkweeds can elongate horizontally and form new daughter plants, although this elongation to a new daughter plant is usually not greater than about four inches in Montana (Figure 9a & b).



Figure 7. Top of leaf blade folded back to elucidate simple hair pattern; a. meadow hawkweed (exotic) has many simple hairs across the entire upper leaf surface, b. kingdevil leaf (exotic) upper surface has no or only a few simple hairs, which tend to be near or on the leaf margin, c. woollyweed (native) is densely covered with long simple hairs.

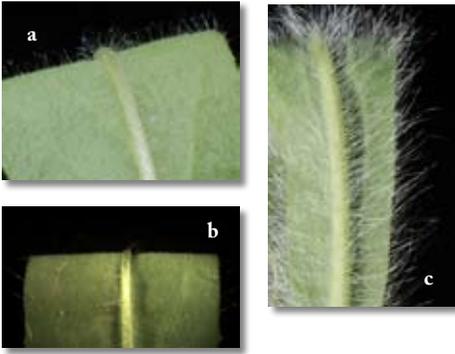


Figure 8. Bottom of leaf blade folded back to elucidate simple hair pattern; a. meadow hawkweed (exotic) has many simple hairs across the entire lower surface of the leaf, b. except for the haired mid-vein, the kingdevil leaf (exotic) lower surface has no or only a few simple hairs which tend to be near or on the leaf margin, c. woollyweed (native) is densely covered with long simple hairs.

Elongation of the rhizome and formation of new daughter plants is another diagnostic feature that separates exotic hawkweeds from natives. As with the above ground stolons, fewer than ten percent of the individual plants may have elongated rhizomes leading to daughter plants. The rhizomes of native hawkweeds are quite stout and upward/downward angled rather than elongated horizontally; and the above ground regrowth is developed from only one end of the native species rhizomes.

Orange hawkweed (*H. aurantiacum*)

Orange hawkweed (*H. aurantiacum*) growth form is quite similar to meadow hawkweed except for the striking orange flowers (Figure 1). The orange hawkweed plants are usually somewhat shorter, 4 to 24 inches tall, than the yellow-flowered exotics. Short stout stolons and rhizomes can be very numerous such that a matt of overlapping daughter plants is often formed. Prominent black gland-tipped hairs, as well as numerous long hairs on the flowers, stems, and

leaves, give orange hawkweed an overall darker and more bristly appearance than most of the exotic yellow-flowered plants. Stem leaves are greatly reduced and many plants will have no or only one small stem leaf. The multi-head inflorescence is usually smaller and more compact. Orange hawkweed is more common in forest openings than the yellow exotics.

Woollyweed (*H. scouleri*)

The yellow flowerheads of native woollyweed (*H. scouleri*) are practically identical to the flowerheads of exotics (Figure 1c), although woollyweed tends to have larger individual ray flowers than either of the yellow exotics. The inflorescence of woollyweed is usually more elongated and open in contrast to meadow hawkweed and kingdevil, which have a more compact inflorescence with a flat to rounded top (Figure 2). The salient difference is the more numerous stem leaves formed by woollyweed. There are usually five to ten stem leaves on the flower stalk (Figure 3b). The

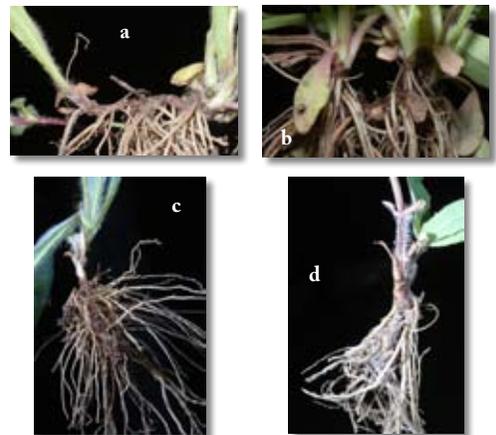


Figure 9. Underground rhizomes can elongate to daughter plants for the exotic hawkweeds (including orange hawkweed); a. meadow hawkweed (exotic) b. kingdevil (exotic), c. woollyweed has short stout rhizomes (native), d. narrowleaf hawkweed has short stout rhizomes (native).

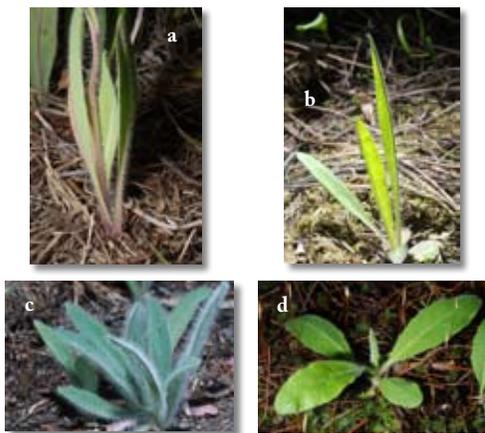


Figure 10. Rosettes; a. meadow hawkweed (exotic) long near-linear leaves with hairs evident, b. kingdevil (exotic) long near-linear leaves with few and less prominent hairs, c. woollyweed dense (native), long hairy leaves, d. white hawkweed (native) with broader near-oval leaves and short simple hairs.

lower stem leaves are fully formed and similar to the basal leaves, while the upper stem leaves are somewhat reduced in size. The numerous basal leaves are persistent but may wither later in the season. The two varieties of woollyweed common in Montana (western hawkweed (var. *albertinum*) and hounds tongue hawkweed (var. *cynoglossoides*, also in more recent volumes designated as *H. scouleri* var. *griseum*)) have an overall white or light brown hairy appearance because of numerous long simple hairs (Figures 2c, 7c, 8c, 10c). This prominent dense pubescence gives rise to the common name woollyweed. The third variety of woollyweed (Scouler's hawkweed var. *scouleri*) is infrequent in Montana relative to the other two varieties of *H. scouleri*. Scouler's hawkweed has very few to no simple hairs and if simple hairs are present they are very short (1/10 inch). Woollyweed never develops stolons or elongated rhizomes leading to daughter plants. The rhizomes are short and stout (Figure 9c).

Narrowleaf hawkweed (*H. umbellatum*)

The native narrowleaf hawkweed (*H. umbellatum*) subspecies (ssp. *umbellatum* and ssp. *canadense*) are distinctive in that the basal and lower stem leaves are small and drop off the plant, while the numerous middle stem leaves are the largest and are persistent. These middle stem leaves are 2½ to 4 inches long and ½ to ¾ inch wide, tapered at both ends and stalkless. The stems typically have at least 8 to 15 leaves (Figure 3c) and large plants can have up to 45 stem leaves. Narrowleaf hawkweed, like the other natives, has a short rhizome that does not elongate to form daughter plants and it does not have stolons (Figure 9d). The stems are usually smooth, but occasionally the stems have a few simple or very small star-like hairs. The leaves also can be either smooth, or have small star-like hairs on the blade and short rough hairs near the leaf margins. The leaf margins often are slightly toothed.

Slender hawkweed (*H. gracile*)

Native slender hawkweed (*H. gracile*) is found in mid-montane to alpine settings, although it is most common just above and below timberline in open stands of alpine larch and whitebark pine. It only grows 2 to 12 inches tall. It has persistent basal leaves which can be smooth or short hairy. Stem leaves are usually lacking. The stem has only one to a few flowerheads.

White hawkweed (*H. albiflorum*)

The native white hawkweed (*H. albiflorum*) is the only hawkweed with white flowers. The inflorescence is rather open in comparison to the more compact inflorescence of the exotic hawkweeds and

often elongated (Figure 2d). Stem leaves are reduced in size and number but not to the degree that is more typical of the exotics (Figure 3d). The leaves and stems are mostly smooth, but particularly on the lower parts of the stem there are some sparse simple hairs that may be ¼ inch long. The lower stem and basal leaves are relatively wide in comparison to the exotic hawkweeds (Figure 10d). Basal leaves can be almost oval in shape rather than long and narrow. White hawkweed has the short stout rhizome typical of our native hawkweeds. It is widespread in dry open canopy forest although usually at rather low densities.

Rosettes

As with many other plants it takes some study to be able to identify the rosettes. Identification based on rosettes is easiest to learn by first studying the immature plants during the late spring through summer when the older plants have flowered and stolons are developed and you can confirm the species. Digging enough early spring season plants to check for the presence or absence of rhizomes will allow the exotics to be definitively separated from the natives; and you can also check then for any rooted surface stolons that developed in previous years. The degree and length of leaf pubescence and leaf shape are also diagnostic during the early spring spraying season (Figure 10). A high density of long simple hairs indicates native woollyweed. Broad more oval basal leaves, often with slight but marked wavy toothing, and short simple hairs indicates the native white hawkweed.

Where Found

Most hawkweed species have fairly wide ecological amplitude but they typically occur in higher numbers in certain habitats in Montana. The native hawkweeds are found in the western and central parts of the state. Woollyweed is found scattered at low densities throughout mountain grasslands, increasingly common in drier to mesic open canopy forests, and can be quite abundant along roads and trails passing through these low and mid-elevation forest habitats. Although it sometimes grows in open areas, narrowleaf hawkweed is most abundant on moister sites with partial shade in riparian and mid-elevation forested habitats. Slender hawkweed is mostly restricted to the higher elevation montane and alpine sites just above or below timberline. White hawkweed is widespread from dry open foothill areas up into openings in subalpine forest, but only at rather low densities.

The exotic hawkweeds have principally invaded northwest Montana. Meadow hawkweed and kingdevil can form dense infestations in mesic grasslands and moist open forests at low and mid elevations. They are not well adapted to our drier low elevation habitats or wet, poorly-drained habitats. Orange hawkweed distribution has considerable overlap with that of meadow hawkweed and kingdevil, but orange hawkweed extends to higher elevations in openings or under partial shade of mesic forest types. Besides being invasive of relatively undisturbed natural sites, these exotic hawkweeds are quite successful in establishing high densities in disturbed

areas like roadsides, irrigated pastures, and abandoned farmland. Orange hawkweed is particularly invasive of lawns, and meadow hawkweed and kingdevil can establish and maintain infestations in residential and park turf.

Practical Keys for Mature Plants

If you learn to identify the hawkweeds in the more definitive flowering stage and refer to the species descriptions and photos, you will increase your ability to discern species at the rosette and post-flowering stages based on the more subtle and often overlapping vegetative characteristics. It is necessary to examine a number of individual plants in a population when considering the vegetative traits. The presence of stolons and/or elongated rhizomes is confirmatory of an exotic hawkweed species but it may be necessary to dig ten to twenty individual plants as the frequency of development of stolons and rhizomes can be quite low in Montana populations.

- 1. Stems with 3 or fewer leaves, mostly on the lower 1/3 to 1/2 of the stem and the higher leaves are very small, stolons may be present on some plants2
- 1. Stems with more than 3 leaves, stolons not present..... 5
- 2. Flowers orange.....
.....*H. aurantiacum* orange hawkweed
- 2. Flowers yellow 3

- 3. Found at high elevations (subalpine or alpine) and most plants less than 12 inches tall....*H. gracile* slender hawkweed
- 3. Found at low and mid elevations with most plants more than 12 inches tall 4
- 4. Upper stem and flowerhead base bracts with dense gland-tipped hairs, upper and lower sides of leaf blades with simple hairs.....
..... *H. caespitosum* meadow hawkweed
- 4. Upper stem and flowerhead base bracts with only scattered gland tipped hairs, upper and lower sides of leaf blades mostly without simple hairs.....
..... *H. praealtum* kingdevil
- 5. Flowers white
..... *H. albiflorum* white hawkweed
- 5. Flowers yellow 6
- 6. Lower leaves withered or dropped off at flowering.....
..... *H. umbellatum* narrowleaf hawkweed
- 6. Lower leaves intact at flowering.....
.....*H. scouleri* woollyweed

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