

## Stinkhorn Fungi

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*This NebGuide discusses the biology, identification, and management of stinkhorn fungi.*

### Diagnosis and Identification

Stinkhorn fungi can be quite striking in the landscape but are often viewed as a nuisance because of the foul odor they emit. These fungi are in the scientific classification division Basidiomycetes so they produce a mushroom stalk and cap. Many species of fungi belonging to the family Phallaceae are considered stinkhorns, and they can be found across North America. These species exist in many sizes and colors and can have white, tan, brown, orange, yellow, and red stalks. The stinkhorn species found in Nebraska belong to two genera, both in the family Phallaceae. *Phallus* spp. typically have orange to red stalks and a reddish- orange cap with dark brown gleba, which is spore-forming tissue (Figure 1). *Mutinus* spp. often have white stalks with an olive green or brown sticky cap (not pictured).



Figure 1. *Mutinus* spp. stinkhorns in the landscape.

### Occurrence and Distribution

These fungi are saprophytic, which means they derive their nutrients from dead organic matter and are not considered plant pathogens. They are typically found in wood chip mulch in landscape beds and around shrubs and trees; in areas of the lawn high in organic matter; in locations containing old stumps or decaying wood; and on dead, rotting roots. Stinkhorn fungi in Nebraska can be found in late spring or early fall. In locations with warmer climates, stinkhorns can be found in the winter months as well.

### CLASSIFICATION

Kingdom: Fungi  
Division: Basidiomycota  
Class: Agaricomycetes  
Order: Phallales  
Family: Phallaceae  
Genus: *Phallus* sp.  
Genus: *Mutinus* sp.  
Common names: dog stinkhorn, devil's stinkhorn, common stinkhorn

### Biology

Stinkhorn fungi spend most of their lives in a vegetative state as mycelia (small, thread-like filaments) just beneath the soil surface or in the mulch directly on top of soil. The white to reddish- orange mushroom stalk supports the cap, which is the reproductive structure of the fungus. When the fungus is ready to produce a stalk and cap, a small egg-like structure forms below the mulch or soil surface from a specialized mycelial strand called a rhizomorph (Figure 2).

Table 1. Recommended groundcover plants for Nebraska that can be used in place of wood mulch.

Groundcovers																
Common Name	Cultivars and Varieties	Family	Environmental Preferences					Design Characteristics								
			Sun	Part Sun	Shade	Moist/Wet	Average	Dry	Well-Drained	Botanical Name	Height/Spread	Bloom Time	Color	Foliage	Texture	Uses
common yarrow	'Paprika,' 'Fireland,' 'Snow-sport,' 'Cassis'	Asteraceae	P	T		T	P	P		24" -48" +	June-Aug	White, yellow, orange, red, pink	Gray-green	Fine	Cut, natural	Some cultivars do not spread
bugleweed, carpet bugle	'Catlin's Giant,' 'Chocolate Chip,' 'Jungle Beauty'	Lamiaceae	T	P	T	T	P			6" /24" +	April-May	Violet-blue	Green	Medium	Bloom, color contrast	Tolerates poor soil
ornamental onion	var. glaucum, 'Twister'	Alliaceae	P	P	T	P	T	P		12" /12"	July-Sept	Lavender	Blue-green	Fine	Edger	
snowdrop anemone		Ranunculaceae	T	P	T	T	P			12" /18" +	May	White	Green	Medium	Dark foliage, bloom	Good woodland edge
Rocky Mountain pussytoes		Asteraceae	P	P		T	P	P		4" -18"	April-May	White, pink	Silver	Fine	Groundcover, rock	Ever-gray
wild ginger, Canadian ginger		Araceae	T	P	T	T	P			6" /18" +	May	Brown	Green	Medium	Uniform texture, under shrubs	Good woodland groundcover
purple poppy mallow	var. tenuissima	Malvaceae	P	T	T	T	P	P		6" /24"	May-Aug	Magenta	Green	Med-fine	Naturalize, open groundcover	Shear after flowering to restore foliage appearance
clustered bell-flower	'Joan Elliott,' var. acaulis	Campanulaceae	T	P		T	T			15" /24" +	June	Blue	Green	Medium	Under trees, edger	Takes full sun with moisture
palm sedge		Cyperaceae	T	P	T	P	T			18" /36" +	April-May	Tan	Green	Med-fine	Raingardens, swales	Not evergreen; rapid growth
snow-in-summer		Caryophyllaceae	P	T		T	T	P		3" /18" +	May	White	Silver	Fine	Color contrast, rock garden	Keep standing water or snow off plant in winter
plumbago		Plumbaginaceae	P	T		P	T			12" /24"	Aug-Oct	Blue	Green	Fine	Edger, walls, mass	Bloom & fall color
lily-of-the-valley	'Dora'	Lilaceae (Ruscaceae)	T	P	T	T	P	T		9" /24" +	May	White	Green	Bold	Under trees, deep shade, cut	Very aggressive; hard to eradicate; fragrant
hybrid red chrysanthemum	'Clara Curtis,' 'Mary Stoker'	Asteraceae	P			P	P			18" /30" ++	Aug-Sept	Pink, yellow, salmon	Gray-green	Med	Border, cut flowers	Very hardy
hardy ageratum		Asteraceae	P	T	T	T	P			24" /36" ++	Aug-Sept	Blue, white	Green	Med	Border, cut flowers	Colonizes
sweet woodruff		Rubiaceae	T	P	T	P	T	P		6" /18" +	May	White	Green	Fine	Edging, under shrubs	Goes dormant in sun; aromatic foliage

bigroot cranesbill	Geraniaceae	'Bevan's Variety,' 'Ingwerson's Variety'	T	P	P	T	P	T	12"/18"+	May-June	Dark pink	Light green	Medium	Under shrubs, edging	Evergreen; some winter red; aromatic
yellow archangel	Lamiaceae	'Variegatum'	T	P	P	T	P	T	12"/24"+	May-June	Yellow	Green/white	Medium	Color contrast, dry shade	Very invasive; roots rapidly & hard to dig old crowns
creeping lilyturf	Lilaceae (Ruscaceae)		T	P	T	T	P	T	8"/24"+	July-Aug	Violet, white	Green	Fine	Edger, texture contrast, weed barrier	Semi-evergreen; competes with tree roots
goose-neck loosestrife	Primulaceae		T	P	P	T	T	T	30"/60"+	June-July	White	Green	Medium	Colonizer, interesting form in flower	Aggressive
creeping Jenny, moneywort	Primulaceae	'Aurea'	P	T	P	T	P	T	2"/24"+	May	Yellow	Green	Fine	Bioswales, under shrubs, shade	Roots at nodes; takes limited foot traffic
spear-mint, mint	Lamiaceae	'Kentucky Colonel,' 'Chocolate,' 'Orange,' many others	P	T	P	T	P	T	18"/36"+	Aug-Sept	Lilac, pink	Green	Medium	Scent, pollina- tors, culinary	Runs and runs and runs
beebalm	Lamiaceae	'Jacob Kline,' 'Purple Rooster,' 'Grand Parade,' others	P	T	P	T	P	T	36"/60"	June-July	Lavender, red, pink, white	Green	Medium	Cut, humming- birds, pond edges	Choose mildew-resistant cultivars
Japanese pachys- andra	Buxaceae	'Green Sheen,' 'Silver Edge'	T	P	P	T	P	T	6"/18"+	April-May	White	Green	Fine	Under shrubs or trees, slopes	Burns in sun; leaf blight, root rot, scale
moss phlox	Polemoniaceae	many	P	T	P	T	P	T	3"/24"+	April-May	Pink, blue, white	Green	Fine	Slopes, poor alkaline soils, walls	Centers can become open; shear
orange stonecrop	Crassulaceae	'Weihenstephaner,' 'Variegatum'	P	T	T	P	T	T	6"/18"+	June-July	Yellow	Green	Medium	Mass, slopes, roofs	Huge numbers of sedums available for groundcover
two-row stonecrop	Crassulaceae	'Dragon's Blood,' 'Elizabeth,' 'Voodoo'	P	T	T	P	T	T	6"/18"+	June-July	Pink, red	Reddish bronze	Fine	Mass, slopes, roofs	Many cultivars; blend with others
woodland stonecrop	Crassulaceae		T	P	T	T	P	T	10"/18"	June	White	Green	Fine	Shade, woodland	Unusual for drier shade
lamb-ear	Lamiaceae	'Helene von Stein,' 'Silver Carpet,' 'Big Ears'	P	T	P	T	P	T	12"/24"	June	Purple	Silver	Bold	Edger, contrast	Must have good drainage
foam flower	Saxifragaceae	'Dark Eye,' 'Slick Rock,' 'Spring Symphony'	T	P	T	T	P	T	9"/24"+	April	White	Green	Fine	Border, rock walls, woodlands	Rhizomatous; good new cultivars
woolly speedwell	Scrophulariaceae		P	T	T	P	T	T	12"/24"	June	Deep blue	Silver	Medium	Edger, walls, groundcover	Rosette-type growth
periwinkle, vinca	Apocynaceae	'LaGrave,' 'Bowles,' 'Ralph Shugart,' 'Blue & Gold'	T	P	T	T	P	T	12"/24"+	May	Periwinkle	Green	Fine	Under trees, shrubs, massed	Evergreen; blight can be a problem

P= Prefers, T = Tolerates



Figure 2. The rhizomorph and egg of a stinkhorn fungus. The egg is found beneath mulch piles and gives rise to the reddish- orange stalk.



Figure 5. Stinkhorn eggs exposed after digging through the mulch bed.



Figure 3. Stinkhorn egg cut in half to view the distinctive internal pattern (photo: Loren Giesler, University of Nebraska—Lincoln).

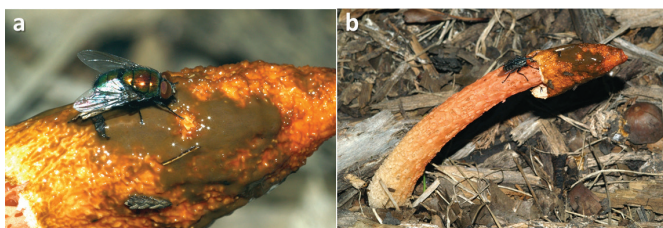


Figure 4. A blow fly (a) and flesh fly (b) attracted to the smelly gleba produced on the stinkhorn cap.

Rhizomorphs are often uncovered when digging through the mulch. The egg develops in an archlike fashion. As a result, when the egg is cut in half a distinctive pattern is visible on the inside (Figure 3). This pattern is diagnostic and can help distinguish stinkhorn eggs from other things in the landscape that might resemble them, like truffles, puffballs, sedge nutlets, and even acorns.

One rhizomorph can produce up to six eggs. Once the egg is fully developed, it breaks open and the mushroom stalk emerges, growing to maturity (3 to 5 inches tall) in about four to six hours. Growth rates vary depending on the species and environmental conditions. As the mushroom stalk matures, it forms a red, orange, or brown bell-shaped cap near the tapered tip. The cap contains the sticky, slimy, spore-bearing gleba. Stinkhorn fungi get their name from the foul odor produced by the gleba. Although many consider this smell to be quite putrid, the odor is, in fact, a unique adaptation for the fungus. Many fungi in the Phallaceae family attract insects to facilitate the spread of their reproductive spores. The foul smell of stinkhorn fungi attracts several species of flies (Figure 4) and beetles. The insects consume the gleba, and the spores that stick to their legs and abdomen are then distributed in other locations.

### Favorable Environmental and Growing Conditions

Stinkhorn fungi prefer cooler temperatures and are most likely to appear in moist areas with high organic matter, such as mulched landscaping beds. They appear to prefer hardwood bark mulch over pine mulch or pine needles. Stinkhorns are frequently found in partly shaded beds, but they may develop in thin turf, too.

### Management

No chemical product is available to prevent stinkhorn fungi or remove them once they appear. Luckily, the fruiting bodies of stinkhorn fungi are short-lived and last only a few days to a week in the landscape. Stinkhorn fungi rarely occur in dry mulch beds or locations in the landscape that receive full sun. Increasing the air circulation and thinning tree canopies or dense shrubs to allow more sunlight to

## Resources

reach the ground can help dry a location and may help limit the occurrence of stinkhorns (*Figure 5*). Eliminating the fungi's food source by reducing the amount of organic matter (grinding tree stumps, removing excess mulch) from the landscape will also help reduce the number of stinkhorns.

Stinkhorn fungi can be removed by hand in the egg stage to prevent the fruiting bodies from emerging or the mushrooms can be picked and discarded away from the home to avoid the odor problem associated with them. Groundcover plants can be used in place of mulch to help reduce the possibility of stinkhorn emergence. See *Table 1* for recommended groundcover plants that grow well in Nebraska and can be used in place of wood mulch.

For more information, including identification of nuisance fungi, consult:

- Huffman, D. M., Tiffany, L. H., Knaphus, G., and Healy, R. A. 2008. *Mushrooms and other fungi of the midcontinental United States*. Second Edition. University of Iowa Press, Iowa City, IA 52242
- McKnight, K. H., and McKnight, V. B. 1987. *The complete mushroom hunter: An illustrated guide to finding, harvesting and enjoying wild mushrooms*. Houghton Mifflin Company, New York, NY 10003

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