Professional Applicators and Ecologists Guide to Manage

STINKNET (*Oncosiphon pilulifer*)

National Park Service Regional Invasive Plant Management Team treating Stinknet at Cave Creek Regional Park. Photo Credit Maegan Stephenson, National Park Service

INTRODUCTION

Stinknet, also known as globe chamomile, is an invasive annual weed in the Sunflower (Asteraceae) family, spreading in Arizona. It is established in areas within Maricopa County, Arizona (the Phoenix Metro area) and extends into Pinal County, Arizona, especially along the I-10 corridor. The weed expansion extends down the 1-10 corridor into Tucson and is now also established there and in surrounding counties. It can occupy most habitat types. It is invading natural areas, neighborhoods, and everywhere in between. This species and other invasive weeds fuel wildfires, allowing wildfires to occur more frequently and with greater magnitude.

Stinknet Origin (Native Range)

Stinknet is native to South Africa and the enclave country of Lesotho.

Stinknet Invasive Areas (may not be comprehensive; newly invaded regions continue to be observed).

- Australia; Western Australia, Victoria
- Mexico; Sonora
- United States: Arizona, California, Nevada

Noxious Weed Status

Stinknet is listed as an Arizona State Noxious Weed, Class B.

Identification

- Size: 2 inches up to 2+ feet
- Growth Form: Forb
- Leaves: Finely dissected (carrot-like)
- Odor: Crushed foliage produces a pungent turpentine-like stink. Flowering plants may emit this odor without disturbance.
- Flower heads: globe/spherical shaped, bright yellow, with many tiny flowers.

- Seed heads are globe/spherical shaped and brownish-tan colored. They consist of tiny individual flowers that have dried out, with a little mature seed at the base of each dried flower.

Life Cycle

Winter annual (cool season)

Stinknet growth stages. Top left: Small rosette. Top right: Small bolting plant. Bottom Left: Full bloom. Bottom Right: Landscape covered in dead stinknet. Photo Credits J. Armstrong-Ullberg, Maricopa County Parks and Recreation.

- Germinating seeds occur from November through April following sufficient rain or irrigation. Multiple flushes of seed germination from the soil seed bank may occur during a wet winter. Early growth is in the form of a rosette of finely divided leaves, usually bright green.
- Flowering occurs from February through June, depending on the site's characteristics and moisture availability. Some plants may persist and bloom longer. Flowering is often synchronous among plants of different sizes and may last several weeks.
- Seeds set after flowering; the yellow flower heads quickly turn tan. Hot weather can accelerate maturation and seed set. The seed heads will shatter and release if disturbed. However, the seed heads maintain integrity through slight disturbances. They may remain intact for months through the summer. Brushing by passing hikers or animals, strong winds, or blowing sand can break up the seed heads and allow them to spread. The seeds are tiny and light and can spread quickly. People, animals, vehicles, wind, and water are all vectors for seed spread. Stinknet plants have no lasting perennial structures such as bulbs, corms, or rhizomes. Only the seeds persist to form the subsequent germination.
- Caveat: While stinknet is characterized as a winter annual, some plants have been observed growing into the warmer months if they receive adequate moisture.

Habitat

This noxious weed can grow in various habitats, from urban sites, people's yards, and vacant lots to wildlands and natural areas. Irrigated urban sites offer favorable conditions, and stinknet will readily occupy disturbed soils.

Allergies

Stinknet has been implicated in the effects of contact dermatitis and respiratory allergy. Do not confuse stinknet with herbal chamomile plants.

Wildfire

Dead, dried stinknet can fuel wildfires. Stinknet may grow alongside other invasive weeds like red brome, buffelgrass, and fountain grass, which may carry fire. Native Sonoran Desert vegetation is mainly intolerant of fire. Plants such as saguaro and barrel cacti and native trees such as palo verde are easily killed by brush fires. In contrast, invasive weeds like stinknet, red brome, and buffelgrass will germinate and grow aggressively in burned sites.

PREVENTATIVE MEASURES

There are simple things that can be done to stop the spread of this species.

- Treat stinknet as soon as it emerges. Don't let it mature and set seed.
- When hiking or walking in areas of stinknet that are in seed, shake, stomp, and brush off your shoes and clothes near the trailhead or when exiting the stinknet areas.
- Regularly hose down your bike or vehicle tires after leaving an area with stinknet infestation to prevent the invasive species from spreading to other places.
- Clean stinknet seeds from tarps, tents, or camping gear. The seed may cling to surfaces by static charge.
- Do not allow pets to run through patches of dried stinknet. If they do, clean them thoroughly.

TREATMENT METHODS

Stinknet is a relatively new invasive species in Arizona, and the professionals are still learning the best management practices. Therefore, we are providing current knowledge of the methods, which may change over time.

- **Mechanical**

  Mechanical controls are adequate for small and new populations of early to mid-blooming plants. When engaging in mechanical control measures, be mindful of allergic reactions. Avoid physical contact with stinknet plants by wearing gloves, long sleeves, and long pants. Watch for signs of respiratory allergic reactions and stop work if they are encountered. Pull stinknet plants by hand. They have a limited root system with no bulbs or rhizomes underground. Plants are most accessible to pull when the soil is moist. Destroy young plants by uprooting them using hand-held hoes; you can also use a weed whacker (string trimmer) or mower. Mature flowering plants tend to be more challenging to impact. Mechanically treated plants can be left on the ground early in flowering. Once most plants are in full bloom, they should be bagged and disposed of. Weed-whacked stinknet stem bases may re-grow and flower if plants receive rain after trimming. Take special care to clean tools, gear, boots, and clothing to prevent spreading of seeds.

➢ Post-emergent Herbicide Application [1]

The application timing is critical for post-emergent treatment control of stinknet. While several herbicides provide excellent post-emergent control, few offer the same level of control when the plants are flowering or in the late bud stage. Applications of herbicides are most effective when applied to plants in the rosette or bolting stages and before flowering. While some land managers have successfully controlled stinknet at the flowering stage, control at this stage can be inconsistent to minimal.

- When adding surfactants to herbicides, always follow the herbicide label.
- The non-selective herbicide **glyphosate,** when used alone, has provided inconsistent results, with irregular performance in some years and effective performance in other years. Consider adding additional herbicides with **glyphosate, 2,4-D,** when combined with **glyphosate**, has been an effective pre-flowering treatment. **Diquat** combined with **glyphosate** has been effective up to the mid-flowering stage.
- The selective herbicides **aminopyralid** and **aminopyralid/triclopyr** also provide excellent in-season control of stinknet, and many kinds of grass will tolerate their application.

This document is intended for professional ecologists and licensed applicators. Whether using pre- or post-emergent treatment methods, always follow pesticide licensing requirements (if applicable) and the instructions on the herbicide labels; the label is the law. Wear the recommended Personal Protective Equipment. Some herbicides are not approved for use in aquatic habitats.

[1] McDonald CJ, Larios L, Rodriguez C. 2023. UC IPM Natural Area Pests: Stinknet. UC ANR Publication 7601. Oakland, CA. PDF: Natural Area Pests: Stinknet (ucanr.edu)

Pre-emergent Herbicide Application[1]

Several pre-emergent herbicides provide excellent control of stinknet and can be applied in the fall before the first winter rains. Rain or irrigation is required after application for the product to move through the soil effectively and prevent seed establishment. Pre-emergent herbicides can also be effective and applied as a tank mix partner with post-emergent herbicides (growing season treatment). A tank mix of post-emergent and pre-emergent herbicides can be applied after seedlings have emerged from the soil and before flowering. This will continue to control stinknet that has already germinated and any seedlings that appear throughout the growing season. (Use caution when applying preemergent herbicides in the spring as they require rain or water within a window of time).

- The selective **aminopyralid herbicide** can provide season-long control of stinknet and excellent post-emergent control.
- **Indaziflam, {isoxaben** or **isoxaben + dithiopyr** herbicides}[2], provide excellent pre-emergent control only.
- **Clopyralid** has been shown to provide excellent pre-emergent control of stinknet. These herbicides may provide pre-emergent control of stinknet the next growing season after application.
- In areas where protecting native perennials is warranted, the pre-emergent herbicides **indaziflam or {isoxaben + dithiopyr}[2]** have minimal post-emergence activity and generally do not control emerging perennials. A post-emergent herbicide may be mixed with Indaziflam to control existing weeds. **Indaziflam** does not prevent the growth of weeds from perennial reproductive structures, such as tubers, rhizomes, or woody vegetation. While these herbicides may be effective on stinknet and annual grasses such as Bromus rubra and Schismus spp., some of them may also have

[2] These treatments have been effective in California studies, and effectiveness in Arizona is not known in Arizona, more research needed.

harmful effects on native desirable plants as well—additional effective herbicides: metsulfuron-methyl, aminocyclopyrachlor, and pendimethalin.

- As stated on the herbicide labels, pre-emergent herbicides such as indaziflam and aminopyralid require rain /water within a set number of days after treatment, making it risky to use late in the growing season or during low precipitation seasons.

Removing dead stinknet

Treating dead, dried, tan-colored stinknet with herbicide is ineffective. These plants are annuals and have completed their life cycle. Removing dried stinknet will cause many seeds to fall off the plants. For these reasons, efforts should be concentrated on killing stinknet before they produce seeds.

Fire Fuel Reduction: Dead stinknet plants may be removed to remove fuel from the site. Although removing the plants will release seeds, taking no action on dead stinknet will contribute seeds to the environment over time. When removing dead stinknet, avoid carrying away stinknet seeds on clothing, tools, and vehicles. When possible, place plastic bags under the plants so the seed falls into the bag, or you can use a small hand-held vacuum to suck up flower heads that fall off during the removal process. You may want to double bag stinknet plants and **dispose** of dead stinknet at the closest dump site; make sure not to transport and dispose of stinknet bags in un-invaded areas**.**

Develop a plan to manage stinknet!

Stinknet has reached widespread invasion in Maricopa County, making complete eradication of the weed unlikely. A stinknet management plan addresses the yearly need to scout for and eliminate emerging stinknet plants in an optimal time frame.

A stinknet management plan is combined with an Integrated Pest or Weed Management Plan that addresses all weed species on the site. The plan can also be integrated with other management objectives.

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instructions on the herbicide labels; the label is the law. Wear the recommended Personal Protective Equipment. Some herbicides are not approved for use in aquatic habitats.

Elements of a stinknet management plan

- Rapid Action: The objective is to kill stinknet plants before they produce seed and stop or minimize stinknet regeneration on site. Act on stinknet early in its life cycle for best results with minimal cost/effort.

- Prevent the opportunity for wildfire on the site. This may involve removing dead, dried stinknet. Be extremely careful with ignition sources, including gas/electric-powered equipment.

- If stinknet has been on the site for more than one season, stinknet seeds are already in the soil, forming a seed bank. Stinknet seeds may live in the soil seed bank for 4-5 years. Management actions should include eliminating stinknet plants emerging from the seed bank before they can go to seed.
- Regular site monitoring will be needed once the seed bank is exhausted to ensure that stinknet has been extirpated on your site.

- Be mindful of the ecosystem and other plants on the site. Develop a revegetation plan when native species aren't present; native desert wildflowers and grasses can be reseeded to deter invasive species.

- Preventative Measures-Any time working in stinknet populations, decontaminate before leaving the area, to the fullest extent possible. If using vehicles, make sure to wash them offsite before traveling to non-invaded areas. Use extreme care not to spread stinknet or other invasive species seeds.

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The information provided in this document was derived from the knowledge and experiences of the Regional Stinknet Planning Team members; as new research and science continue to provide updated best management practices; the document will be updated:

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