

# Management of Garlic Mustard in the Deep Creek Watershed

---

Joseph Esparza, San Bernardino NF



# About the Weed

- *Alliaria petiolata* (Bieb.) Cavara & Grande
- Medicinal and food purposes, debut in 1868 on Long Island, NY
  - Good source of vitamins A & C
  - First year plants high in cyanide
- Unknown arrival date, suspected on the forest post Old Fire, 2003
  - Impacting lands of the Maara'yam (Serrano) people
  - Found in Hooks, Little Bear, and Deep Creek, a Wild and Scenic River
- Biannual
  - Rosette
  - Bolting



Rosette



Bolting

# Phenology

- Effectively Invasive
  - Biannual
  - Allelopathy
  - Extended leaf phenology
  - Cold stratification
  - Self-pollination
  - 350-7900 seeds per plant
  - 4-6yr seed viability
- Partial shade dependent
- Disrupts arbuscular mycorrhizae
  - Damaging plant tissues causes sinigrin to interact with myrosinase and form sulfur compounds (glucosinolates) such as allyl isothiocyanate



3mm seed measurement

# Size Varies



Mature plant at 1in tall



5ft tall with myself to scale

# Extended Leaf Phenology 11/4/22



Flowering with intact siliques



Snow on a field of rosettes

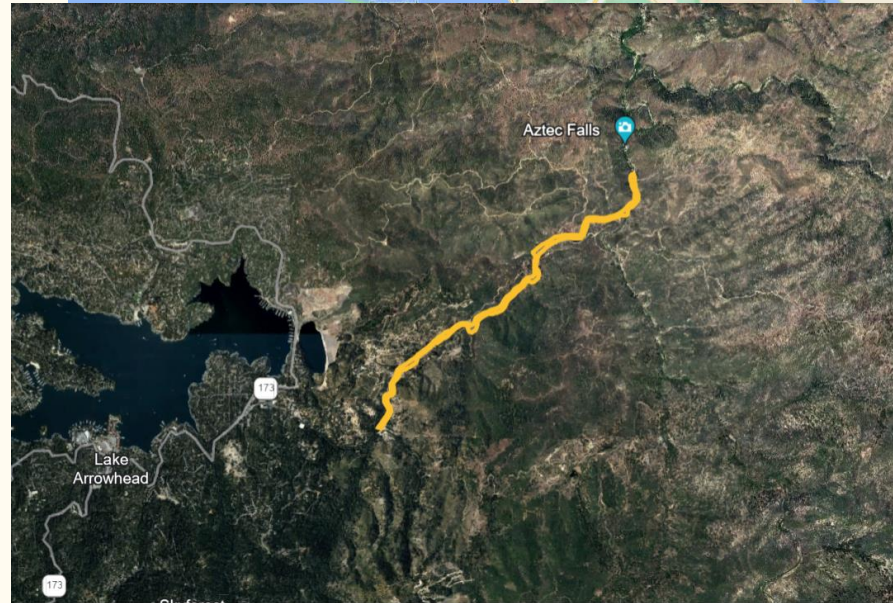
# Extended Leaf Phenology 2/7/23



Overwintering rosettes keep some green leaves while others die back

# EDRR

- Discovered by Duncan Bell, CalBG 6/17/2020
- 10-20 plants to 2.5mi scattered
- Infestation begins on private land
- Hand treatments began 4/2021
- Downstream extent found 8/2021



# Management

- Each year April through July
  - Until dehiscence
- ~9-12 treatment days per year
  - Handpulling
- Total of 40 acres treated
- All biomass disposed of in dumpsters within watershed
- Boots and tools cleaned along Prevention Guidelines



Lisa Underwood eradicating seedlings



# Springtime Struggles

- May 1-30  
Southwest  
Willow  
Flycatcher  
nesting period
- Nettles, Willows,  
and Roses Oh My!
- Rattlesnakes



Hook Creek enclosed by foliage

Spot the  
Rattlesnake!



# Challenges

- Lack of a broad pesticide use NEPA Document on BDF
- No Weeds Crew on Forest
- Tough to secure crew days with the UCCs and IERCD
- Terrain and nature of the work
- Seedbank size



Dormant roses hide a bolting garlic mustard

# Partners

- University of California, Riverside Extension, UCR Ext
- San Bernardino County Department of Agricultural Weights and Measurements
- Southern California Mountains Foundation
- Urban Conservation Corps, UCC
- MobilizeGreen
- Inland Empire Resource Conservation District, IERCD



A clump of 2nd year plants in flower

# UCCs



# MobilizeGreen



# IERCD



# Potential Spread

- Well-traveled access from the Pacific Crest Trail (PCT) into local businesses crosses through infestation
- Aztec Falls/Splinters Cabin Recreation Area
  - Closed in 2020 due to sheer number of visitors



Hikers risk spreading seed as a trail bisects infestation



If Left Unchecked:

Roadside in Quincy, MA





Garlic mustard becomes the forest understory if left to its own devices

# What to do if you find this in a neighborhood near you...

- Remain calm
- Clean shoes when leaving area
- Report infestation to the authorities
  - County Ag Dept, Park Manager, Forest Service Botanist, etc.
- Post on iNaturalist and Calflora
- Look up pesto recipes



\*Trader Joe's Aioli Garlic Mustard Sauce does not contain Garlic Mustard

# Acknowledgements

- Chris McDonald, UCR Ext
- Emilio Lopez, SBC Dpt. Ag



# References

- “About Garlic Mustard.” *Integrated Pest Management*, [www.canr.msu.edu/ipm/Invasive\\_species/garlic\\_mustard/about\\_garlic\\_mustard](http://www.canr.msu.edu/ipm/Invasive_species/garlic_mustard/about_garlic_mustard). Accessed 19 Aug. 2023.
- Mercer, Donald G., and Delia B. Rodriguez-Amaya. “Reactions and Interactions of Some Food Additives.” *Chemical Changes During Processing and Storage of Foods*, Academic Press, 29 Jan. 2021, [www.sciencedirect.com/science/article/abs/pii/B978012817380000129](http://www.sciencedirect.com/science/article/abs/pii/B978012817380000129).
- Saul, Hayley, et al. “Phytoliths in pottery reveal the use of spice in European prehistoric cuisine.” *PLoS ONE*, vol. 8, no. 8, 2013, <https://doi.org/10.1371/journal.pone.0070583>.