

Integrated Pest Management (IPM) Guide for **Garlic Mustard** in the Pacific Northwest



How to use this guide

Why two tables? **Garlic mustard is a biennial (2-year limited lifecycle).** Working with its biology is vital to effective management.

1. **Consult the appropriate table below for your situation** → **PRO TIP:** prioritize/start with 2nd year plants (bottom table)
2. **Identify your relative start time (month)** → **PRO TIP:** ideal control timing is late March through May (bolted, before seeds)
3. **Identify the appropriate method (manual, chemical, cultural) for your site at that time**
4. *If time/resources allow*, can incorporate control for 1st year plants as well using **top table**

Plan ahead for revisiting the site at least 2x per season for multiple years (until seed bank is exhausted, at least 5 years)

PREVENTION IS KEY - brush boots and clean any tools/equipment on-site before moving onto other sites or getting into vehicles. Decontamination should be part of your work plan.

1 ST YEAR PLANTS	WINTER			SPRING			SUMMER			FALL		
	December	January	February	March	April	May	June	July	August	September	October	November
Life-Cycle (yr. 1) »			Seedling	True leaves	Rosette (growing)			Rosette (dormant) »				
Manual	~70% of seedlings die off naturally. Digging 1st year plants can be effective if you get the whole root out. Regrows from broken											
Chemical (foliar spray)				2% triclopyr amine (or choline) (S)							1% glyphosate (NS)	
Mix = 1 chemical option + 1% surfactant								0.5 - 1% imazapyr (NS, LR)			1% triclopyr amine (or choline) (S)	
								0.5 - 1 oz/acre metsulfuron methyl (S, LR)			Fall rosette treatments will require spring follow-up for new/skipped plants.	
Cultural <i>NOT EFFECTIVE ALONE</i> Do <u>in addition</u> to other methods	Thick mulch, 3"-6" of coarse material has been shown to suppress germination. Hemlock mulch shown more effective. Mulching can be done at anytime AFTER plants have been removed or treated (follow label for timing).											

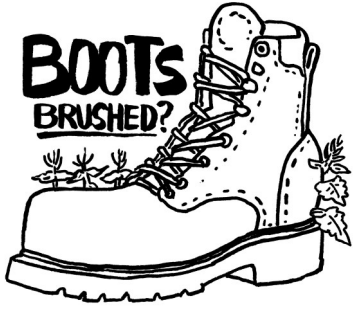
2 ND YEAR PLANTS	WINTER			SPRING			SUMMER			FALL		
	December	January	February	March	April	May	June	July	August	September	October	November
» Life-Cycle (yr. 2)	» Rosette (dormant)			Bolt//Buds	Flowers	Flowers / seed pods form	Seeds form / pods ripen			End of life cycle (senescence/death)		
Manual	Can dig, but best to follow-up this season (missed late bolters will flower).			Best time to dig, get all of the roots! Bag & trash all 2 nd year plants.			Controlled early in season? Revisit now. Green pods? OK. Dig up, put in trash. <u>Dried/browning pods? DO NOT DISTURB</u>					
Chemical (foliar spray)				2% glyphosate (NS)								
Mix = 1 chemical option + 1% surfactant				1% glyphosate (NS) + 2% triclopyr amine (or choline**) (S)								
				2% triclopyr amine** (S)								
Cultural <i>NOT EFFECTIVE ALONE</i> Do <u>in addition</u> to other methods	Can mulch as described in 1st year cultural control. Once infestation is diminished, improve competitive plant cover/reduce seed germination by reseeding sites with suitable native grasses or replant with trees and shrubs.											

Herbicide Specifications

NS Non-selective = will kill all green plants **S Selective** = targets broadleaf plants, generally leave grasses in-tact
LR Long residual = can act as a pre-emergent/reduce germination rates. Extreme caution around desirable vegetation.
 **triclopyr amine choline less effective at halting seedpod maturation during "late season" applications

see pg. 2 herbicide notes section for more important considerations

Integrated Pest Management (IPM) Guide for **Garlic Mustard** in the Pacific Northwest



The listed methods are effective, but **the best strategy is prevention**. Garlic mustard is a priority species—required for control in many parts of the PNW because it is still not considered widespread and we have the chance to prevent it from becoming a larger issue.

- ✓ **Prioritize its control as soon as you notice it.** More time left to grow = more seeds = more work & resources.
- ✓ **Plan for follow up visits** at least 2 times per year until no new seedlings for at least 5+ years.
- ✓ **Prevent seed production:** appropriately time your work & use the right methods for your situation.
- ✓ **Prevent seed spread:** do not enter sites once seed pods are mature, clean your gear/self of seeds before you leave the infestation site.
- ✓ **Properly dispose of these plants.** Pulled plants can still make flowers/seeds. Bag as you go & dispose of plant parts in the garbage (not compost).

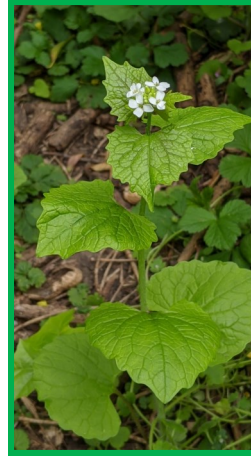
← **Control as able** → **Ideal stages for control** → **-As necessary-** **—Avoid controls//contact—** →



Seedlings & Rosettes



Bolted / Budding



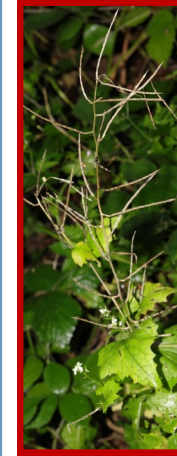
Flower



Seed pods green/forming



Seed pods maturing



Death

Herbicide notes

Always read the entire label before using any herbicide. Wear proper safety gear, and mix and pour herbicides carefully in a safe environment. Ensure the products you select are appropriate for the site you are applying in.

Treatment window: DURING ACTIVE GROWTH

- *After last spring frost (true leaves must be present on 1st year plants to be effective)*
- *Before first fall frost*
- *Not during drought or heat wave stress*

- ⇒ Choose your chemical option based on timing, March through May is optimal. If multiple chemical options for that time, choose based on site needs. **Add 1% surfactant to all mixes.**
- ⇒ A site-appropriate non-ionic surfactant and indicator dye will help with efficacy and control.
- ⇒ Aquatic formulations of herbicides AND surfactants must be used near water.
- ⇒ Spray to wet entire plant, including flowers and seedpods. Unsprayed seedpods may continue to set mature seed.

Integrated Pest Management (IPM) — Example Strategy

IPM is the strategy of combining and applying the best methods and timing for your site. There are endless combinations of strategies. This is just one example.

- **Early spring herbicide treatment** (true leaves formed, some flowers):
Mix → 2% triclopyr amine + 1% surfactant, prioritizing bolted plants, hitting 1st year plants as time allows.
- **Early summer manual removal** (bolted, flowering, and green seed pods): hand pull 2nd year plants. Can carefully dig out 1st year plants with remaining time.
- **Early fall herbicide treatment** (on 1st year rosettes): avoiding any missed plants with mature seed pods, Mix → 1% glyphosate + 1% surfactant

Plan to repeat this strategy annually, continue to visit the site for re-checks even after no new plants are seen for at least 5 years to ensure seed bank is exhausted.