

## TECHNICAL EDUCATION BULLETIN

### Get ready for a bigger win in burndown weed control

Introducing Gamma™, a non-selective contact herbicide for broad-spectrum weed control in grapes.

With a novel active ingredient, Gamma delivers high levels of performance for cleaner vineyards while protecting grapes against the threat of resistant weed populations.

#### Technical Overview

Gamma is an innovative PPO-inhibitor herbicide that defeats some of the most difficult-to-manage weeds like filaree, hairy nightshade, mallow and prickly lettuce.

Its proprietary, next-generation active ingredient called Tergeo™ demonstrates effective control of more than 50 broadleaf and grass weeds, including ALS, triazine and glyphosate-resistant species.

Gamma is formulated as a water-dispersible granule for greater convenience in handling, mixing and storage. It also has an ultra-low use rate which helps minimize environmental impact without compromising crop safety.

A preeminent new tool for U.S. grape growers, Gamma helps to eliminate weed competition resulting in cleaner vineyards that maximize yield potential, crop quality and return on investment.

#### Power. Performance. Confidence.

Gamma delivers the right kind of burndown solution for today's most challenging weed control issues.

**Powerful Performance:** A new and highly effective weed control solution that is fast and flexible.

**Low Use Rate:** Greater convenience while reducing container size and application rates.

**Resistance Management:** A novel active ingredient to combat hard-to-control weed species.

**Peace of Mind:** Elimination of weed competition with minimal risk of crop injury due to phytotoxicity.



## Product Specifications

<b>Brand Name</b>	Gamma™
<b>Active Ingredient</b>	Tergeo™
<b>Category</b>	Herbicide
<b>Crop</b>	Wine grapes, table grapes, raisin grapes
<b>Weed Spectrum</b>	50+ broadleaf & grass species
<b>Site of Action</b>	Group 14 herbicide / PPO-inhibitor
<b>Chemistry Family</b>	Pyrimidinedione
<b>Formulation</b>	Water-dispersible granule
<b>AI/pound</b>	0.70 pound of AI per pound
<b>Applications</b>	Directed Postemergence
<b>Rates</b>	
<b>Used Alone</b>	Gamma @ 0.50 - 1.50 oz/A
<b>Tank mix</b>	Gamma @ 0.50 oz/A + approved tank mix partner
<b>Signal Word</b>	Caution

## Primary Weeds Controlled (or suppressed)

Annual bluegrass	Mallow
Barnyardgrass	Marestail
Carpetweed	Mayweed chamomile
Chickweed	Morningglory species
Crabgrass	Mustard
Dandelion	Nightshade species
Downy brome	Pigweed species
Evening primrose	Prickly lettuce
Field bindweed	Prickly sida
Filaree	Prostrate knotweed
Giant foxtail	Purslane
Green foxtail	Ragweed species
Hairy fleabane	Shepherd's purse
Henbit	Sowthistle
Johnsongrass (seedling)	Velvetleaf
Kochia	Wild buckwheat
Lambsquarters	Wild oats
Little barley	Willowweed

**Low Use Rate:** Always apply product with an effective tank mixture partner, if electing to use the low rate.

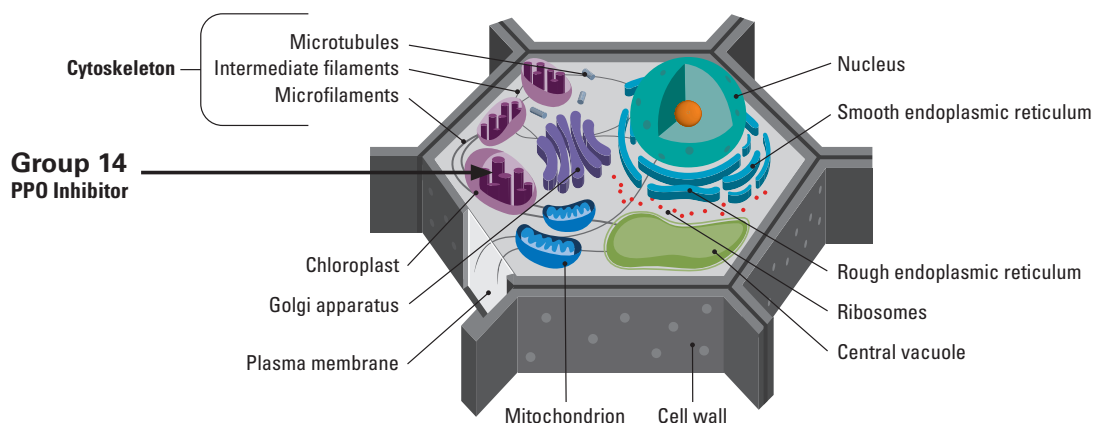
**Adjuvant Use:** Gamma applications require the addition of an adjuvant applied at label recommended rates. Although the label allows for Methylated seed oil (MSO), non-ionic surfactants (NIS) and crop oil concentrate (COC) adjuvants to be used, MSO-based adjuvants are recommended to achieve the most consistent performance. COC and NIS are not the preferred adjuvants for use with Gamma. However, research has shown that some premium COC and NIS products can achieve similar levels of performance to that of MSO products. For guidance on these premium COC and NIS products, contact your HELM Agro US representative. For specific instructions for adjuvant use, mixtures and spray volume, always reference the Gamma label.

## How Gamma Works

Gamma is powered by a new active ingredient called Tergeo, a protoporphyrinogen IX oxidase (PPO)-inhibiting pyrimidinedione herbicide with a WSSA Group 14 classification.

PPO is an enzyme found in chloroplast and necessary for chlorophyll formation in plants. As a pyrimidinedione herbicide, Tergeo shuts down chlorophyll production and photosynthesis resulting in a rapid built up of reactive oxygen species and lipid per oxidation of the cellular membrane followed by quick herbicidal effects.

Tergeo is described as being fast-acting with herbicidal effects occurring 24 hours after treatment.



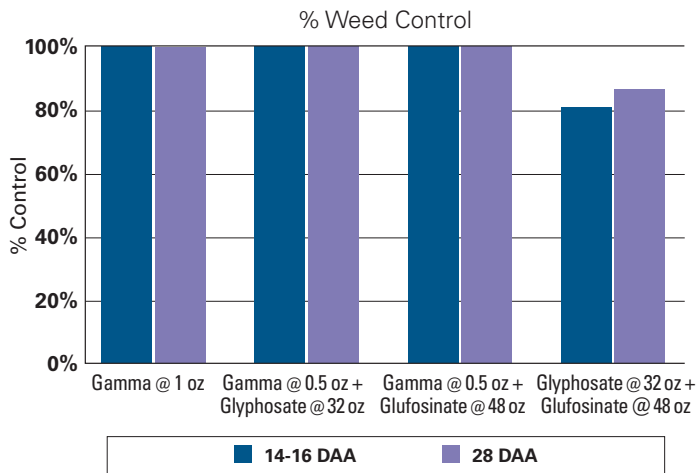
**Diagram: Anatomy of a plant cell**

## Field Trial Data

In product development trials and regulatory studies, the active ingredient in Gamma has demonstrated high performance ratings in burndown efficacy of emerged broadleaf and grass weeds.

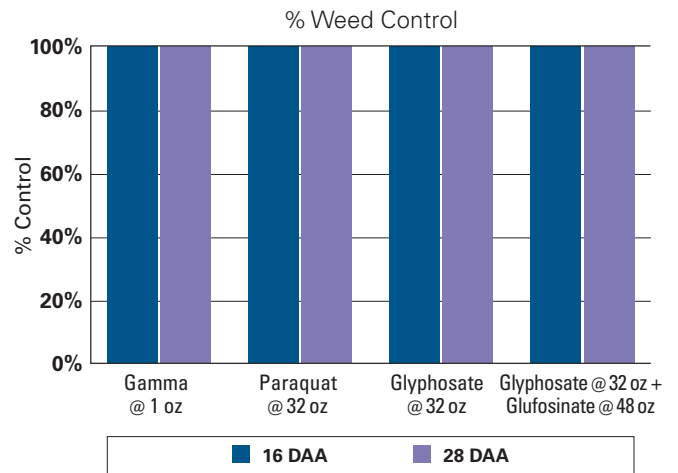
In a postemergence (directed) application, Gamma can be used alone or in combination with a variety of herbicides. Research has shown that Gamma can boost the effectiveness of other herbicides in the tank, providing the additional power needed to knock out weeds that competitive products may miss.

### Hairy Nightshade Performance Summary



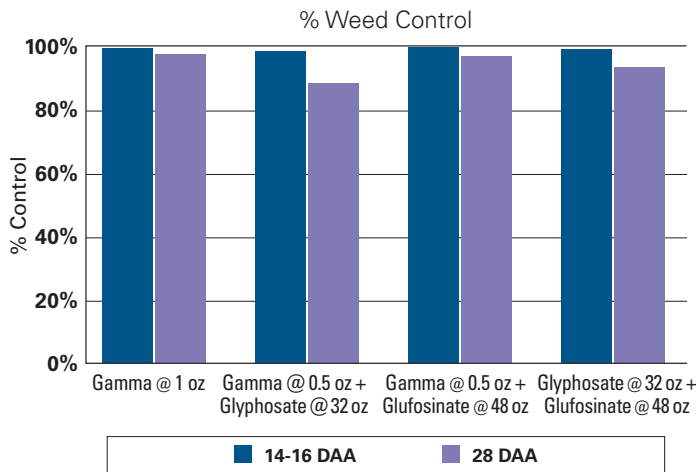
2019. Avg % weed control across 2 trials (Arroyo Grande CA; Culver OR). AMS and a premium MSO added to all treatments. Applied to 3"-4" weeds.

### Prickly Lettuce Performance Summary



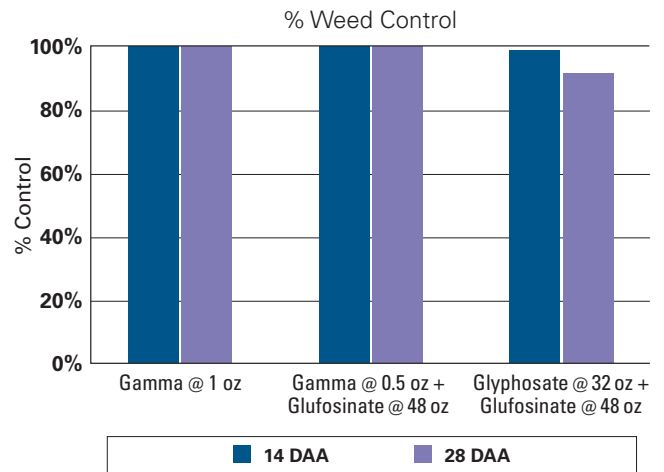
2019. Culver OR. AMS and a premium MSO added to all treatments. Applied to 3"-4" weeds.

### Mallow Performance Summary



2019. Avg % weed control across 3 trials (Arroyo Grande CA; Santa Maria CA; Culver OR). AMS and a premium MSO added to all treatments. Applied to 3"-4" weeds.

### Wild Radish Performance Summary



2019. Avg % weed control across 3 trials (Arroyo Grande CA; Santa Maria CA; Culver OR). AMS and a premium MSO added to all treatments. Applied to 3"-4" weeds.



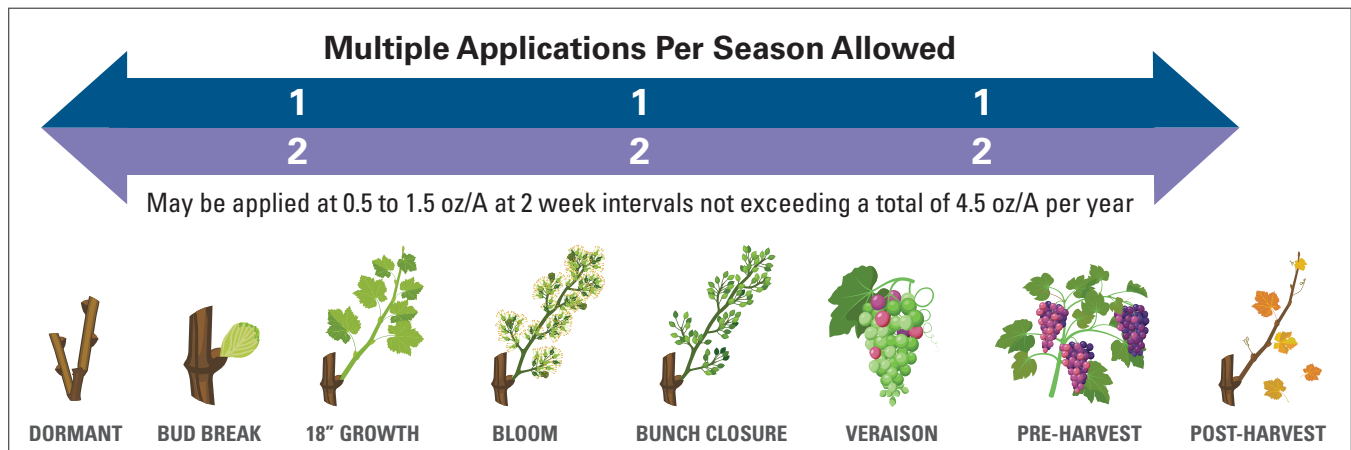
## Gamma in Action

With growers seeking new strategies to strengthen their existing weed control programs, Gamma's powerful foundation sets the stage for greater success throughout the entire growing season.

Vineyards treated with Gamma benefit from burndown that is fast and complete while managing and minimizing the risk of herbicide-resistant weed populations.

Gamma provides stand-alone or tank mix options to address many of today's most pressing weed control challenges.

<b>1</b>	<b>Using Gamma alone</b> <ul style="list-style-type: none"><li>• Effective control of difficult herbicide-resistant weed species</li><li>• Faster performance than glyphosate when used alone</li><li>• Reduces reliance on glyphosate to maintain its effectiveness for long-term use</li></ul>	<b>2</b>	<b>Using Gamma + tank mix partner</b> <ul style="list-style-type: none"><li>• Effective control across a broad spectrum of weeds</li><li>• Stronger crop establishment to maximize yield potential</li><li>• Reduces reliance on older chemistry while providing mode of action diversity</li></ul>
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## Lessening the Impact of Resistance

At a time when few new molecules are being discovered, Gamma is truly breakthrough technology.

With an active ingredient never before used in the U.S., Gamma is an essential complement to the weed management toolbox. It is designed to become the backbone of effective and sustainable weed management programs where rotating multiple modes of action is critical to fight resistance.



For more information, visit [discoverhelm.com](http://discoverhelm.com).

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