

TECHNICAL NOTE #2

Herbicide Mixes for State Park Use

Herbicides are just one tool of many to manage vegetation. They have tremendous utility both in natural resource management and maintenance situations. As with any potent tool, they can accomplish a lot of work with proper use, or cause unintended damage if used incorrectly. Applications must be conducted or overseen by a Certified Applicator, or conducted by a Registered Technician.

Suggested products are described in Table 1, application types are defined in Table 2, and Table 3 provides suggested mixes for each application type.

Table 1. Herbicides are listed by product name (PA Statewide Contract, if applicable), active ingredient, aquatic registration status, and a brief description of its use.

Product Example	Active Ingredient	Aquatic Registration	Description
Aquaneat	glyphosate	YES	Non-selective, systemic, foliage or stem application.
Garlon 3A	triclopyr-amine, 3 lb/gal	YES	Selective, systemic, foliage or stem application.
Vastlan	triclopyr-amine, 4 lb/gal	YES	Selective, systemic, foliage or stem application.
Pathfinder II	triclopyr-ester	NO	Use undiluted, woody stem treatments only.
2,4-D Amine	2,4-D (dimethylamine)	YES	Selective, systemic, best use is in foliar mixes.
Pendulum AquaCap	pendimethalin	NO	Residual, only affects germinating seedlings.
ProClipse	prodiame	NO	Residual, only affects germinating seedlings.
Esplanade 200 SC	indaziflam	NO	Residual, should be applied before emergence.
Assure II	quizalofop	NO	Selective, systemic, injures only grasses.
Milestone	aminopyralid	NO	Selective, systemic, useful for Canada thistle control.

Table 2. Common herbicide applications for resource or maintenance situations. These terms are used in Table 3.

Application Type	Definitions
Foliar: Non-selective	Application to foliage using a mixture that will injure any target. The application itself can be selective by treating only targets, or <i>spot treatment</i> . This describes applications including <i>glyphosate</i> .
Foliar: Selective	A foliar application that only injures certain species, and leaves others intact. Mixtures that injure broadleaf weeds (dicots) while preserving grasses are the most common example.
Stump Treatment	Application of a concentrated herbicide mixture to a woody stump after cutting. Water-based mixes should be applied immediately after cutting, while oil-based mixes can be applied any time after cutting, as long as the entire surface including bark is treated.
Woody Stem	<u>Hack/Squirt</u> : concentrated water-based mixes can be applied to fresh, spaced cuts in the bark. <u>Basal Bark</u> : oil-based mixtures can be applied to the circumference of the lower 12-18 inches of stems up to 6-inches in diameter.
Soil Applied: Non-selective	When bare ground is the desired result, such as parking lots or fencelines, add <i>glyphosate</i> to residual herbicides to remove the existing vegetation and prevent reestablishment of new seedlings.
Soil Applied: Selective	Some residual herbicides only impact plants emerging from seed, and can be used to prevent weedy annuals from establishing while preserving existing vegetation.

Table 3. Each herbicide has specific uses - no product is useful for all applications. This table presents preferred mixes. Many of the products listed are labeled for uses beyond what is described below. When a mix is recommended, an application rate is provided, on a per-acre basis. 'NR', for not recommended, indicates that the products have labeling for the use, but a better alternative is available for use in State Parks. 'NO' indicates the product is not labeled or not effective.

Product Example	Foliar: Non-selective	Foliar: Selective	Stump Treatment	Woody Stem	Soil Applied: Bare Ground	Soil Applied: Selective
Aquaneat + Vastlan OR Garlon 3A	3 qt/ac + 1.5 to 2 qt/ac ¹	NO	NO	NO	NO	NO
Aquaneat	2-3 qt/ac ¹	NO	1:1 in water	hack/squirt 1:1 in water	2 qt/ac ¹ + <i>residual herbicide</i>	NO
Vastlan, Garlon 3A	NR	broadleaf ² 1 to 2 qt/ac ¹	1:1 in water	hack/squirt 1:1 in water	NO	NO
Pathfinder II	NO	NO	undiluted	basal bark undiluted	NO	NO
Pendulum AquaCap	NO	NO	NO	NO	4 qt/ac + Rodeo, 2 qt/ac ¹	4 qt/ac
ProClipse	NO	NO	NO	NO	2 lb/ac + Rodeo, 2 qt/ac ¹	2 lb/ac
Esplanade 200 SC	NO	NO	NO	NO	5 oz/ac + Rodeo, 2 qt/ac ¹	5 oz/ac
Vastlan + 2,4-D Amine	NR	broadleaf ² 32 oz/ac + 64 oz/ac ¹	NO	NO	NO	NO
Assure II	NO	stiltgrass ³ 4 oz/ac ¹	NO	NO	NO	NO
Milestone	NR	Canada thistle ⁴ 7 oz/ac ¹	NR	NR	NO	NO

¹ Add an aquatic-labeled surfactant. The current (2019) PA state herbicide contract includes Chemsurf 90', which should be added at 0.25 to 0.50 percent by volume.

² Broadleaf plants, also known as *forbs* or *dicots*, can be selectively controlled while true grasses and many grass-like plants remain uninjured.

³ Japanese stiltgrass can be selectively removed from *forbs* and most *perennial* grasses with this low-rate application.

⁴ Canada thistle and crownvetch are examples of broadleaf weeds that are very difficult to control and require a specific treatment, rather than the general-case mix of triclopyr + 2,4-D.

This document is intended to provide a quick overview. It reflects an effort to limit the number of prescriptions and reduce the number of products in inventory, and emphasizes use of reduced risk products to minimize the possibility of non-target impacts.

It should cover most application situations in PA State Parks. This is not a standard, or specification. For additional details on these recommendations, contact the Bureau of State Parks Resources Management and Field Services Section (RMFS). RMFS provides recommendations specific to your site and situation, and applicator training and support through Region and Park-level events.

This document should not be used as a substitute for product label information. The pesticide user bears the responsibility consulting the pesticide label and adhering to those directions.

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