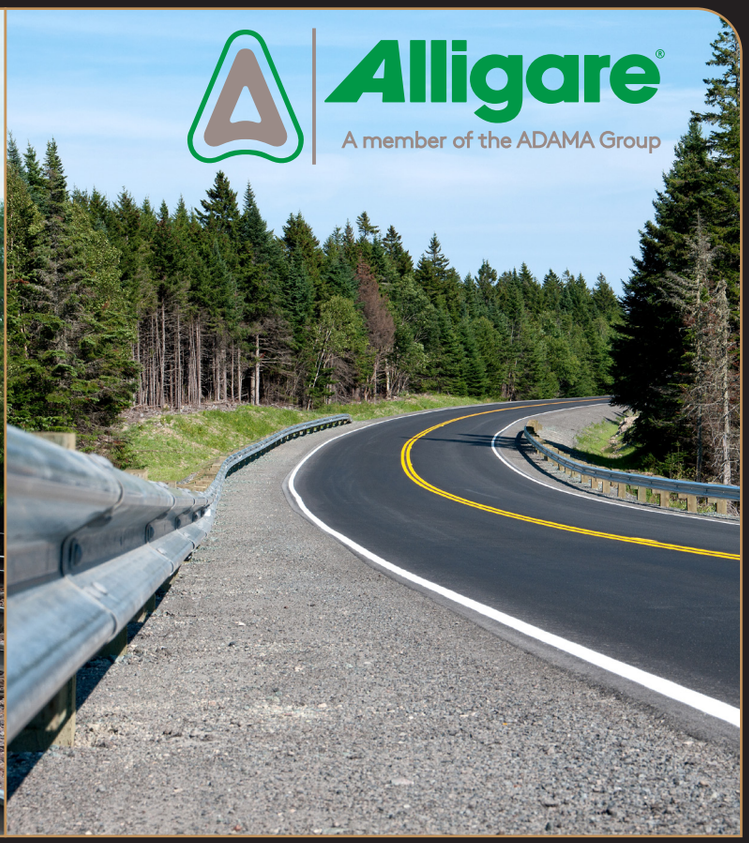
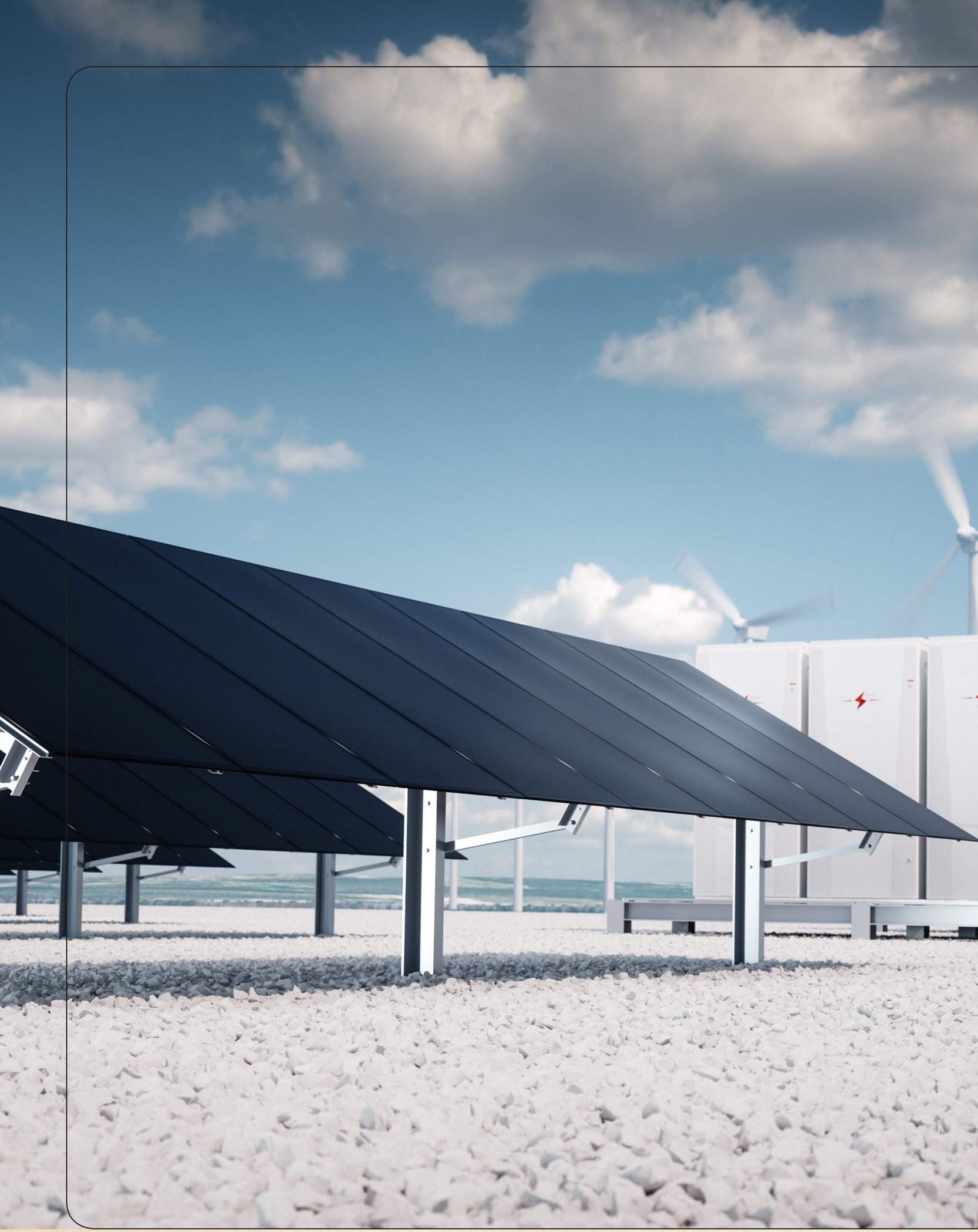


Alligare®
A member of the ADAMA Group

Transportation & Energy

Bare-ground Guide



We Are Alligare

Alligare is America's largest post-patent industrial vegetation management (IVM) company, proudly offering more bare ground herbicide solutions than any other provider. ADAMA, our parent company, is a leader in the global chemistry industry. With their support we are continually adding to our portfolio, which currently stands at 48 products.

But we're much more than an array of trusted herbicides. We're a formidable team of leading experts who take the time to listen and learn of your bare ground IVM needs, and formulate and deliver innovative solutions to control your problem vegetation. Unlike other manufacturers who only offer a few products with limited modes of action to choose from, Alligare offers the widest range of modes of action in the market. We pride ourselves in not just selling product, but also solutions to your problems. Our solutions provide you with peace of mind, efficiently addressing today's needs, while helping ensure that herbicide resistance does not become a concern tomorrow.

Controlling vegetation in bare ground areas is an immensely important task. Alligare solutions, along with your efforts, help ensure that visibility is safely maintained; that parking areas, buildings and equipment are not damaged by root growth and water intrusion; that weeds, brush and trees don't create fire hazards; and that plant growth doesn't impede drainage or interfere with intended facility uses.

This bare ground reference guide was written and designed with your needs in mind — a tool for you to easily match the product to the vegetation you need to control. The guide also includes application tips, safe handling advice, an adjuvant selection guide, and volume conversion tables.

Alligare is here to provide the bare ground herbicides and expertise you need. Our field reps are seasoned experts who will work with you to provide a customized prescription of multiple active ingredients (AIs) for your specific needs. We will even custom blend the solution for you, simplifying your job in the field with fewer containers and easier measuring and clean-up.

Alligare is the Latin word for "ally" and this is the core of who we are. Our commitment to you is that through our people and products you will have no better ally than Alligare.

Please let us know how we can help you today.

Austin Tinsley
President and CEO

TABLE OF CONTENTS

Bare-ground Portfolio

Liquid	Dry	Alligare Product	Active Ingredient	Herbicide Group (MOA)	BLM Approved	Tree Tolerant[1]
●		BALLAST®	Imazapyr + Flumioxazin	2, 14	N	N
	●	BROMACIL 40/40	Bromacil+Diuron	5, 7	Y	N
	●	BROMACIL 80 WG	Bromacil	5	Y	N
	●	CHLORSULFURON 75	Chlorsulfuron	2	Y	Y
●		DICAMBA 4	Dicamba	4	Y	N
●		DIQUAT HERBICIDE	Diquat	22	Y	Y
●		DIURON 4L	Diuron	7	Y	N
	●	DIURON 80 DF	Diuron	7	Y	N
●		ECOMAZAPYR 2 SL	Imazapyr	2	Y	N
●		FLAGSTAFF®	Fluroxypyr	4	Y	Y
●		FLUMIGARD® SC	Flumioxazin	14	N	Y
	●	FLUMIGARD®	Flumioxazin	14	N	Y
●		HYVAR® X-L IVM	Bromacil	5	Y	N
	●	HYVAR® X IVM	Bromacil	5	Y	N
●		IMAZAPYR 4 SL	Imazapyr	2	Y	N
●		IMOX®	Imazamox	2	Y	Y
	●	KROVAR® IVM	Bromacil + Diuron	5, 7	Y	N
	●	LARAMIE 25DF	Rimsulfuron	2	Y	Y
●		MAINLINE™	Imazapic + Flumioxazin	2, 14	N	Y
	●	MOJAVE 70 EG	Diuron + Imazapyr	7, 2	Y	N
	●	MSM 60	Metsulfuron methyl	2	Y	N
●		PANORAMIC 2SL	Imazapic	2	Y	Y[2]
●		PRODIAMINE 65 WG	Prodiamine	3	N	Y
	●	PROVISION™	See Prodiamine 65 WG	3	N	Y
	●	SFM 75	Sulfometuron	2	Y	Y
	●	SFM EXTRA™	Sulfometuron + Metsulfuron	2	Y	N
●		SONORA™ HERBICIDE	Clopyralid	4	Y	N
	●	TEBUTHIURON 80 WG	Tebuthiuron	7	Y	N
●		TRIUMPH® 22K	Picloram	4	Y	N
●		WHETSTONE™	Aminopyralid	4	Y	N

[1] Where reflected as 'Y' for YES, trees are tolerant if product is kept off foliage and green bark.
[2] Where noted as 'Y', refer to label for specific tree species that are tolerant to Panoramic root and foliar absorption.

Usage Description
This solution is a non-selective, dual-action, bare-ground herbicide that is ideal for industrial facilities, railroads, oil and gas installations, and other sites where bare-ground results are required.
See Bromacil 80 WG and Diuron 80 DF
Old standby for bare ground. Broad spectrum that controls at least 42 annual, biennial, and perennial broadleaf and grass weeds; best control achieved when rainfall moves the herbicide from the soil surface into zones where weed seeds germinate. Very strong on woody weeds and hard to control perennials.
Controls 85 annual, biennial, and perennial broadleaf weeds. It is an outstanding choice to control annual and perennial mustards, several pigweed species, horseweed/marestail, puncturevine, and wild carrot. Its primary use in bare ground would be to target particular difficult to control weed species known to be present at a given site.
Very broad spectrum, controls 158 annual, biennial, and perennial broadleaf weed species. It has foliar activity on numerous broadleaf weeds and also displays some pre-emergence activity.
Foliar activity only. Very broad spectrum, contact herbicide for annual weed control. Typically used as a burndown herbicide at application.
Broad spectrum and controls 61 annual, biennial, and perennial weeds. Good activity on broadleaf and grass weeds and best control achieved when rainfall moves the herbicide from the soil surface into zones where weed seeds germinate.
See Diuron 4L
See Imazapyr 4 SL
Foliar activity. Broad spectrum control of 76 annual, biennial, and perennial weeds. Excellent activity on kochia, ragweeds, especially ALS resistant individuals; and nightshades and puncturevine.
Fast-acting herbicide that achieves pre- and post-emergent results in terrestrial settings. Very effective on annual weeds and its mode of action makes it an excellent choice for the control of species that have developed resistance to synthetic auxins, and ALS PSII and EPSPS inhibitors.
See Flumigard SC
See Bromacil 80 WG
See Bromacil 80 WG
Controls 187 annual, biennial, and perennial weeds with outstanding activity on annual and perennial mustards and excellent activity on many woody species.
Broad spectrum and will control 76 annual, biennial, and perennial broadleaf and grass weeds. Imazamox is rapidly absorbed by foliar application while root absorption is slower. Good choice to control annual and perennial mustards, buttercups, filarees, nightshades, pigweeds, ragweeds, and smartweeds.
See Bromacil 80 WG and Diuron 80 DF
Broad spectrum of weeds controlled (65 weed species) - mostly annuals - many of which are annual grasses such as barnyardgrass, crabgrasses, foxtails, downy brome, japanese brome, panicums, wild oats and many broadleaf such as mustards, marestail/horseweed, kochia (except ALS resistant), pigweeds, and spotted or annual spurge.
PPO and ALS inhibitors for quick demise, long-term control, and good burndown activity on small weeds. Flexible rate options allow for selectivity or total vegetation management.
See Diuron 80 DF and Imazapyr 4 SL
Very broad spectrum (143 weed species), controls many annual, biennial, and perennial weed species and is especially active on mustard species. Has good activity on several woody weeds and controls some tough noxious weeds like old world climbing fern and kudzu. Its primary use in bare ground would be to target difficult to control susceptible weed species known to occur in some locations.
Outstanding activity on annual and perennial mustards and excellent activity on many annual grass species including downy brome, sandbur, foxtails, crabgrasses, goosegrass and some sedges (120 annual, biennial, and perennial weeds). It also controls many broadleaf weeds including the annual spurges. Pre- and post-emergence activity is species oriented.
Versatile and persistent, this solution provides residual control of many annual broadleaf weeds and grasses.
See Prodiamine 65 WG
Broad spectrum and controls 89 broadleaf and grass annual, biennial, and perennial weeds. Controls annual and perennial mustards well and also controls many grass weeds including annual bromes, crabgrass, foxtails, johnsongrass, panicums, and Italian ryegrass.
See SFM 75 and MSM 60
Broad spectrum control of 51 annual, biennial, and perennial broadleaf weeds. Excellent activity on thistles and knapweeds.
Absorbed by roots of susceptible plant species. Used to control unwanted woody vegetation from brush to trees (75 species). Has excellent activity on downy brome and other herbaceous weeds (104 weed species). Control is best where precipitation can move it into the root zones of susceptible plants or into the zone where weed seeds germinate.
Has outstanding activity - both foliar and soil - on thistles, knapweeds, and starthistles and many others (130 weed species). It also has excellent activity on the toadflaxes, field bindweed, horsenettles, horseweed, ragweeds, and prickly pear.
Foliar and soil activity. Broad spectrum that controls 99 annual, biennial, and perennial broadleaf and some grass species. Outstanding activity on thistles and knapweeds.

Application and Calibration Tips

It's been said that wise people learn from the mistakes of others. Likewise, it's good to mirror the habits of successful people. When it comes to herbicide, the most successful applicators focus on three areas:

1) Maintain Accurate Spray Records

These records can assist in capturing details of what weeds were present, and how you addressed the situation, providing a handy reference for later applications in the same area.

Additionally, every state has specific record-keeping requirements for professional applicators, most of which include:

1	Location of the application. GPS coordinates may be helpful if treating over large areas, or multiple sites at the same location.
2	Date of application
3	Time of application
4	Weather, including: A) Wind speed B) Temperature at time of application. Since temperatures may change during an extended treatment, record the starting and ending temperature.
5	Products applied, including EPA registration numbers
6	Spray volume (gals/area)

Know what information is legally required for every state where you operate. Contact your state's registration office for pesticide applicator certification and licensing.

2) Ensure Equipment Operation and Cleanliness

Be sure that your sprayer is clean, mechanically sound and properly calibrated prior to any application. If a sprayer is not adequately cleaned, residue will clog the pumps, hoses, filters and nozzles — leading to uneven application of herbicide and cross contamination of active ingredients.

Routinely clean your equipment and periodically pump clean water through your tank to ensure all strainers, filters, and nozzles will allow the water to uniformly and evenly move throughout the plumbing system. Ensure that the water exiting each nozzle is clear and does not contain residue.

3) Calibrate Spray Equipment to Ensure Consistency and Volume

For Boom-Type Sprayers (this equipment consists of multiple nozzles on a staionary boom)

Calibration consists of the following steps:

1	Ensure all nozzles are identical along the boom.
2	Set the pressure at the proper PSI designated for the type and size of the nozzles being used.
3	With clean water in the tank, place a container under each nozzle. Turn on the sprayer for a set time and catch the output of each nozzle. Compare each output to ensure a uniform pattern. A) If all nozzles do not provide an equal amount of spray solution, check to see if any nozzles are clogged, or if the lines leading to individual nozzles are clear.
4	Measure off this distance (continuing our example, you need to measure 100 feet). With the sprayer off, measure the time it takes for you to travel that distance at the speed you will be spraying.
5	Once you establish a uniform pattern, turn on the sprayer and measure the spray pattern width. Divide 1000 by the spray pattern width (for example, if the spray pattern measures 10 feet, 1000/10 = 100). This is the distance you will need to travel to treat 1000 ft^2.
6	Place a container under a single nozzle, turn on the sprayer for the time you calculated to go the distance in step #5. Take the volume caught from the single nozzle and multiply it by the number of nozzles on the boom. This will give you the total volume of spray solution you will apply at the speed you will be traveling over 1000 ft^2. Multiply this total amount by 43.56 to obtain your spray solution per acre.
7	With this information, you can review the pesticide label to determine the amount of each product to be applied per 1000 ft^2, or per acre.
8	If you want to apply more or less spray solution per area, you can: A) Adjust your travel speed. This is the simplest way to adjust spray volume, as it does not require adjusting your spray equipment. Once travel speed is adjusted, go back through steps 6-7 to ensure your spray volume matches your needs. B) Increase or decrease the spray pressure. C) Change the nozzle size.

For Handheld Sprayers

There are multiple types of handheld spray guns, so it is important to understand the type of sprayer and nozzle you plan to use. Some handheld spray guns have adjustable spray nozzles that can be set from a cone pattern (typically a hollow cone) to a narrow stream, while others come with a standard nozzle that offers no adjustment aside from changing pressure.

Another type of application tool, a spray wand, can be attached to a backpack, hand can or a large spray tank. All types of nozzles, including flat fan, cone, or air induction nozzles can be used on spray wands. It is important to note that spray tools do not necessarily use universal fittings, so ensure fittings are compatible.

How you spray with a handheld wand is determined by the nozzle type. Any type of flat fan nozzle needs to be held stationary as if it was a boom sprayer. Any cone type nozzle, either hollow or solid cone, can be held stationary or used in a swinging arm motion. If a flat fan nozzle is used in a swinging arm motion, skips will occur in a zig-zag pattern.

Calibration for a flat fan or cone nozzle held in a stationary position is similar to the calibration of the boom sprayer. Measure the width of the spray pattern at the height that the nozzle is being held above the ground. Divide this number into 1000. This will determine how far you must walk to obtain 1000 ft^2 of spray coverage. Walk that distance, noting how long it takes. Spray into a container for the calculated time. This will determine your spray volume for 1000 ft^2.

Calibrating a cone nozzle is similar to the flat fan nozzle. Walk a short distance, swinging the nozzle, and measure the width of the spray pattern (this will be wider than holding the wand stationary). The rest of the steps in calibrating a swinging arm motion handgun with a cone nozzle are identical to calibrating with a flat fan nozzle.

For Boom-Buster Sprayers

Fill the spray tank with water. Determine the correct pressure to use with the nozzles you have selected.

Turn on the spray and measure the distance, or spray width (SW) in feet that your sprayer covers.

Place a container under the nozzle, turn the sprayer on and collect the spray water for 30 seconds. Measure the volume of the water collected in ounces, multiply by 2 to determine the number of ounces per minute. Then divide the ounces per minute by 128 to calculate gallons per minute (GPM).

Determine the speed you will be traveling in MPH that allows you to apply a uniform application.

You can now determine your gallons per acre (GPA), by inserting the information from above into the formula below.

$$\frac{(495 \times GPM)}{(MPH \times SW)} = GPA$$

Remember: Effective application begins with ensuring your equipment is properly maintained and calibrated.

Herbicide Resistance Management

Everyone likes to rely on what works for them. A favorite truck. A comfortable hat or pair of jeans. You'd think the same would work with herbicides - once you find a specific herbicide or tank mix that works well for your bare ground needs, you want to stick with it.

> **The Problem**: Unfortunately, many plant populations have become resistant to our favorite herbicides.

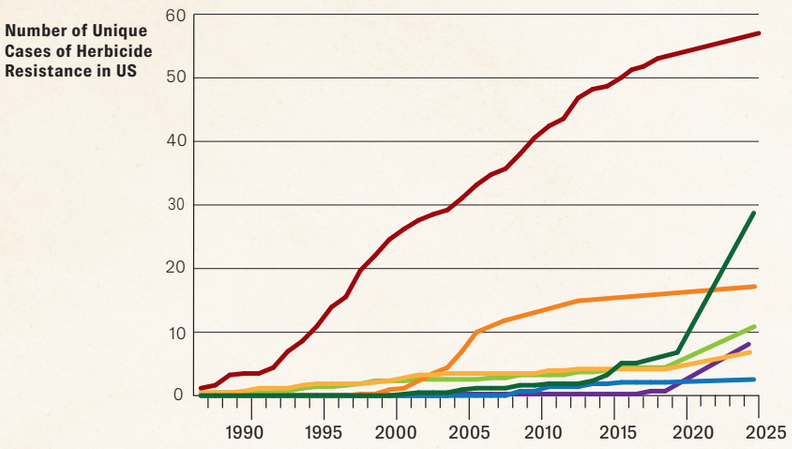
Continued use of the same herbicide favors individual plants in a population with a resistant trait, and they add more resistant seeds to the seed bank every year, growing an ever-larger patch of herbicide resistant weeds. Awareness and knowledge are key to successfully breaking this cycle of herbicide resistance.

When a herbicide application fails to control target weeds, first look to all other possibilities for failure before considering herbicide resistance. Chances are greater that there was insufficient herbicide applied, that some weed types were not considered, or that there was an application issue rather than a resistance issue (see page 9 for more details).

To avoid the potential for increasing herbicide resistance, we first need to understand how herbicides work, specifically their Mode of Action (MOA). Simply put, the MOA of a herbicide is the method by which the active ingredient (AI) kills target plants. There are at least 28 MOAs, with every herbicide operating to disrupt a particular biological process that plants need to grow and develop. Within each enzymatic pathway (MOA), there can be several different sites of action (SOA) where the AI will attach to disrupt that specific biological process of the plant. These SOAs can operate independent of each other and develop resistance to a particular AI on an individual SOA basis. Because of this, a plant might become resistant to an ALS inhibitor, such as Imazapyr, and still be controlled by another ALS inhibitor, such as chlorsulfuron or penoxsulam, if each of those AIs operate at different SOAs. In current academic circles, if a weed is resistant to a herbicide within a particular MOA, that weed is considered to be resistant to all herbicides with the same MOA, but this issue requires much more research to better understand whether such a distinction is accurate.

Of the 28 MOAs, there are resistant cases reported for all but three. Looked at another way, there are 262 weed species worldwide that are resistant to herbicides with a specific MOA (152 are broadleaf, 110 are grass or grass-like). Of these, 58 species are resistant to two MOAs, 20 are resistant to three MOAs, and 13 are resistant to four MOAs.

As the following chart shows, plant resistance to bare ground herbicides has been growing since the 1980s, with resistance being reported in seven MOAs that are routinely targeted for bare ground use. ALS and EPSPS inhibitors currently show the largest numbers of resistant cases.



ALS inhibitors (57 species; 41states)
EPSPS inhibitors (18species; 41states)
PPO inhibitors (7 species; 18 states)
Synthetic auxins (11 species; 17 states)
PSII inhibitors (29 species; 41 states)
HPPD inhibitors (3 species; 6 states)
VLCFA inhibitors (8 species; 7 states)

Source: *Heap, I. The International Herbicide-Resistant Weed Database. Online. Tuesday, October 9, 2025. Available at weedscience.org*

A common weed in the Midwest, tall waterhemp *(Amaranthus tuberculatus),* serves as an example of resistance to multiple MOAs. In Illinois, Iowa, and Nebraska, tall waterhemp individuals were found resistant to four MOAs: **PSII, ALS, PPO, and EPSPS inhibitors.**

The Solution: Management of herbicide resistant weeds is possible, and the most effective method is to tank mix herbicides with different MOAs.

Many bare ground control programs rely heavily upon PSII inhibitors (bromacil, diuron, prometon), and ALS inhibitors (imazapyr, imazapic, rimsulfuron, sulfometuron)

To adequately control weed species that are known to be resistant to these MOAs, weed resistance researchers recommend tank mixing one or more additional herbicides with different MOAs to cover the gaps in resistance control.

It is imperative that the herbicide(s) used to close the resistance gap effectively control the resistant target weed species.

In other words, if some target plant populations are suspected to be resistant to a specific MOA, it is important to include an additional MOA that is known to control the target plant to ensure resistant species are killed and their seeds cannot enter the seed bank.

Relying on a favored herbicide for your bare ground needs may lead to increasing the population of resistant weeds. While herbicide resistance is most problematic and increasing in areas of high agricultural production, resistant species are found in almost every state. But it can be managed by tank mixing herbicides with different MOAs or by rotating to AIs with different MOAs for subsequent applications to the same site. Please consult your Alligare representative for a prescriptive AI blend for your situation.

Applying Right the First Time

Occasionally a Bare-Ground Application Fails to Provide the Expected Results.

The reasons for failure can be numerous, but the cause often relates to one of three major issues.

1) Insufficient Herbicide Applied

Insufficient application rate of herbicide is the most frequent reason for poor results. When a range of herbicide rates are given for bare ground use, it's best to apply at the highest recommended rate to ensure success.

> Often, it costs less to apply a little more chemical up front to all application sites to avoid costly retreatments later in the season.

Most bare-ground programs also include a burndown herbicide, such as glyphosate, to kill existing vegetation at the time of application, and it's imperative to use enough burndown herbicide to ensure success.

Using sufficient herbicide is especially important when addressing new bare ground sites that have not been managed in the past. The total cost of retreatment will far exceed the minimal savings you get from using a lower application rate.

2) Weed Spectrum Not Fully Considered

The second most common problem is failing to identify the presence of perennial weeds, or to identify potentially herbicide resistant weeds.

Perennial weeds can be difficult to control, often requiring an additional herbicide being added to the tank mix. Fortunately in many existing bare ground situations, total vegetation control has been achieved for years, eliminating perennials, but they should not be ignored because the soil seed bank for some perennials can remain viable for decades.

If the target site is new to an applicator, a full pre-application survey of the area can help identify the full weed spectrum. A careful examination of a dead stand from the previous year can also help
identify species presence, especially for perennial weed species. Learn more about herbicide resistant weeds on pages 8 and 9.

3) Improper Preparation or Application

Improper preparation, improper calibration of nozzles, or failure to account for weather during and after application can also lead to poor results. For more application tips, please refer to pages 6 and 7.

Reapplication Costs

Reapplication can be very costly when all expenses are considered. During the initial treatment, application sites are usually relatively close together and multiple sites can be treated per day, reducing overhead cost on things such as lodging for applicators, fuel, labor hours, equipment depreciation and other factors. During retreatments, however, the individual cost per application greatly increases since often the retreatment site is far from headquarters and individual sites are more spread out. While the cost of chemical per site remains the same, overhead costs per site must be considered when thinking about the initial treatment.

It's important to maintain accurate spray records, which can help guide future herbicide selection and spray rates. Bottom line, it's best to invest a little extra time and chemistry to ensure a successful application. But if reapplication is ever needed, Alligare is here to listen and learn of your needs, and to deliver products and expertise to help resolve the issue.

Matching Herbicides with Weeds

Alligare
A member of the ADAMA Group

Alligare	Active Ingredients	WSSA Mode of Action	KOC (ml/g)	Water Solubility (mg/L)	Labeled use Rate/ Acre	Perennial grasses	Annual grasses	Ragweeds	Field bindweed	Kochia	Horseweed/Marestail	Morningglories	Russian thistle	Prickly lettuce	Pigweeds	Puncturevine	Annual mustards	Annual spurges	Curly dock	Sedges/Nutsedges
Alligare Ballast®	Flumioxazin Imazapyr	14 & 2	557 & 100	1.79 & 11,272	32-48 fl oz															
Alligare Bromacil 40/40	Bromacil Diuron	5 7	32 480	815 42	6 – 30 lb															
Alligare Bromacil 80	Bromacil	5	32	815	3 – 15 lb															
Alligare Chlorsulfuron 75	Chlorsulfuron	2	40	28,310	1 – 3 oz															
Alligare Diuron 80 DF	Diuron	7	480	42	5 – 15 lb															
Alligare Flumigard®	Flumioxazin	14	557	1.79	8 – 12 fl oz															
Alligare Imazapyr 4 SL	Imazapyr	2	100	11,272	12 – 48 fl oz															
Alligare Laramie 25DF	Rimsulfuron	2	179	4,300	4 oz															
Alligare Mainline®	Flumioxazin Imazapic	14 & 2	557 & 112	1.79 & 2,200	16-24 fl oz															
Alligare Mojave 70 EG	Diuron Imazapyr	7 2	480 100	42 11,272	7 – 10 lb															
Alligare Panoramic 2SL	Imazapic	2	112	2,200	8 – 12 fl oz															
Alligare Provision™	Prodiamine	3	13,000	0.013	1 – 2.3 lb															
Alligare SFM 75	Sulfometuron	2	78	300	1.33 – 6 oz															
Alligare SFM Extra™	Sulfometuron Metsulfuron	2 2	78 35	300 2,790	0.5 – 8 oz															
Alligare Tebuthiuron 80 WG	Tebuthiuron	7	80	2,570	1.25 – 5 lb															
Alligare Triumph® 22K	Picloram	4	16	430	8 – 64 fl oz															
Alligare Whetstone®	Aminopyralid	4	11	207,000	4 – 7 fl oz															

Efficacy Ratings: EXCELLENT 90-100% | GOOD 80-89% | FAIR 65-79% | POOR < 65%

Mainstays in Bare-ground Chemistry

History

For years, the active ingredients bromacil and diuron have been mainstays of industrial bare ground vegetation management because of their efficacy. However, industrial herbicides continue to evolve and Alligare is always working to offer the most effective and comprehensive portfolio of solutions for bare ground applications.

The Good News

As additional chemistries become labeled for bare ground use, applicators will have more options.

For instance, many applicators now use flumioxazin and aminopyralid in addition to bromacil and diuron, taking advantage of their easy liquid formulations and lower use rates.

Even More Good News

Alligare will continue to lead the industrial bare ground IVM trends, while providing the mainstay products that you continue to request. You can find bromacil and diuron in the following Alligare brands:

Bromacil 80	Hyvar® X-L IVM	Diuron 80DF
Bromacil 40/40	Krovar® IVM	Mojave 70 EG
Hyvar® X IVM	Diuron 4L	

Product	Weed Problem	Label Details
	Provides broad spectrum control of annual and perennial grasses, broadleaf weeds and brush. • Season-long residual control • Controls annual and perennial weeds, including grasses • Excellent tank mix partner • Foundation of many bare ground programs	Signal Word CAUTION MOA Group 5
	Provides broad spectrum control of annual and perennial grasses, broadleaf weeds and brush. • Season-long residual control • Dual mode of action • Broad spectrum control of annuals and perennials, including grasses • Consistent performance	Signal Word CAUTION MOA Group 5 & 7

Flumigard® SC

FLUMIGARD SC Herbicide brings rapid knockdown to your weed control program, is tank-mix compatible with a wide range of active ingredients, and boosts your terrestrial preemergent programs.

Label Details:

- **Active Ingredients: Flumioxazin 4 lb/gal**
- **1 fl oz FLUMIGARD SC = 1 dry oz FLUMIGARD WDG**
- **CAUTION signal word**
- **Herbicide MOA 14 PPO inhibitor**

- Long Lasting Residual with No Ground Water Restrictions
- Fast-acting, contact herbicide in aquatic settings including rapid knockdown of filamentous algae in copper-sensitive locations
- Provides broad-spectrum control of young weed species in terrestrial settings with applications achieving pre- and post-emergent results
- Can be applied via surface and subsurface applications
- Excellent tank-mix partner to increase control of resistant weed species

Liquid Formulation

Less to Mix

Half the Storage Space

Provision™

NEW

Provision Herbicide is an easy-to-use, liquid pre-emergent solution that controls both grass and broadleaf weeds. From freeways to fairways, this broad-spectrum product provides reliable performance across diverse sites, even in sensitive environments.

Label Details:

- **Active Ingredients: PRODIAMINE 4 LB/GAL**
- **CAUTION signal word**
- **Herbicide MOA Group 3, Microtubule Inhibitor**

- Pairs easily with non-selective herbicides for extended bare-ground performance
- Efficient control, across diverse landscapes
- A mode-of-action that helps prevent resistant weed populations
- Liquid formulation, plus tank-mix flexibility, simplifies mixing and spraying

Safe for use in landscapes

Whetstone®

Adding the active ingredient aminopyralid to Alligare's toolbox of vegetation management solutions, Whetstone is perfect for weed control in non-crop industrial sites such as utility right-of-ways and pads, tank farms, substations, roadsides, railroads, CRPs, and other natural open spaces. Whetstone provides season-long control of selective annual, perennial & biennialbroadleaf weeds, including invasive and noxious weeds, certain woody plants, and vines.

- Registered under the EPA's Reduced Risk Pesticide Initiative
- Low use rate (4-7 oz./acre), easy mixing
- Can be used up to the water's edge
- For use with pre & post-emergent treatments
- Tank mix friendly formulation may be used alone or in combination with other herbicides to broaden target weeds and/or reduce herbicide resistance
- Targeted weeds: thistles, knapweeds, curly dock, marestail, kudzu, ironweed, nightshades, certain woody brush and vines, and others
- Excellent for controlling perennial broadleaf weeds on new and established bare ground sites

Label Details:

- **Active Ingredient: Aminopyralid 2 lb/gal**
- **CAUTION signal word**
- **Herbicide MOA Group 4**
- **Aminopyralid Stewardship**

Trusted Active Ingredient: Aminopyralid

Easy Mixing

Low Use Rate

Selective Industrial Weed Control

Ballast®

As a dual-action herbicide, Alligare's Ballast provides superior, long-lasting vegetation control for bare-ground sites.

With both PPO and ALS inhibitors, this non-selective, pre- and post-emergent solution quickly causes cell membrane destruction, slows plant growth, and prevents amino acid synthesis.

- Dual modes of action expand spectrum and aid with resistance management
- Ideal for oil and gas installations, railroads, industrial facilities, and other bare-ground sites
- Provides extended control of 235 annual, biennial, and perennial weeds, including woody plants and brush
- Utilizes two modes of action for long-lasting control of even the most invasive species
- Targeted weeds include kochia, marestail, pigweeds, Russian thistle, plantains, and grasses
- Can be combined with tank-mix partners to increase weed spectra and persistence

Label Details:

- Active Ingredients:
  Imazapyr 2.75 LB/GAL
  Flumioxazin 1 LB/GAL
- CAUTION signal word
- Herbicide MOA
  Groups 14 and 2

DO NOT Use Under Trees

Mainline®

For safe elimination of up to 170 weeds, Alligare's Mainline provides unparalleled flexibility and dual-action control for the most demanding environments.

As a total IVM herbicide with pre- and post-emergent control, Mainline's convenient versatility allows for low-rate, selective treatments in sensitive areas or total vegetation control at higher labeled rates.

- Utilizes both PPO and ALS inhibitors for long-term control and has good burndown activity on small weeds
- Remains stable in the soil to allow for flexible use-site options without undue risk or damage
- Multiple active ingredients to fight troublesome resistant species
- Targeted weeds include kochia, marestail, pigweeds, Johnson grass, foxtails, and ragweed
- Ideal for roadsides and highway medians, petroleum tank farms, pumping installations, industrial and utility plant sites, non-agricultural fencerows and storage areas, non-irrigation ditch banks, railroad rights-of-way and crossings, airports, and other non-crop areas

Label Details:

- Active Ingredients:
  Flumioxazin 2 LB/GAL
  Imazapic 1 LB/GAL
- CAUTION signal word
- Herbicide MOA
  Groups 14 and 2

Can Be Used Under Trees

Target Weeds and Labeled Rates

	2,4-D Amine	Ballast®	Bromacil 40/40	Bromacil 80	Chlorsulfuron 75	Diuron 80 DF	Flagstaff®	Flumigard®	Imazapyr 4SL	Laramie 25 DF
Canada thistle		48 oz/ac			2 oz/ac			12 oz/ac		
Carolina horsenettle							23 oz/ac			
Crabgrasses		48 oz/ac	12 lb/ac	6 lb/ac		8 lb/ac		12 oz/ac	32 oz/ac	4 oz/ac
Curly dock	64 oz ac		10 lb/ac		1 oz/ac		12 oz/ac		32 oz/ac	
Diffuse knapweed			8 lb/ac						32 oz/ac	
Dogfennel		48 oz/ac		10 lb/ac		10 lb/ac	12 oz/ac	12 oz/ac	32 oz/ac	
Downy brome		48 oz/ac		6 lb/ac					24 oz/ac	4 oz/ac
Field bindweed		48 oz/ac							32 oz/ac	
Foxtails		48 oz/ac	8 lb/ac	6 lb/ac		8 lb/ac		12 oz/ac	24 oz/ac	4 oz/ac
Hemp dogbane	64 oz/ac						12 oz/ac			
Hoary cress / whitetop	64 oz/ac				1 oz/ac				16 oz/ac	
Horseweed / marestail	48 oz/ac		12 lb/ac		3 oz/ac	10 lb/ac	12 oz/ac	12 oz/ac	24 oz/ac	4 oz/ac
Italian ryegrass		48 oz/ac	8 lb/ac	6 lb/ac		8 lb/ac			24 oz/ac	
Johnsongrass		48 oz/ac		12 lb/ac					24 oz/ac	
Kochia		48 oz/ac	12 lb/ac		1 oz/ac	10 lb/ac	23 oz/ac	12 oz/ac	24 oz/ac	
Kudzu									48 oz/ac	
Morning glories		48 oz/ac				12 lb/ac	12 oz/ac	12 oz/ac	32 oz/ac	
Nightshades		48 oz/ac						12 oz/ac		
Pigweeds		48 oz/ac	8 lb/ac		0.5 oz/ac	10 lb/ac		12 oz/ac	24 oz/ac	4 oz/ac
Prickly lettuce	48 oz/ac		8 lb/ac			10 lb/ac	12 oz/ac			
Prostrate spurge		48 oz/ac						12 oz/ac	32 oz/ac	
Puncturevine			12 lb/ac	6 lb/ac	1 oz/ac		12 oz/ac	12 oz/ac	32 oz/ac	4 oz/ac
Ragweeds	48 oz/ac	48 oz/ac	8 lb/ac	6 lb/ac	1 oz/ac	10 lb/ac	23 oz/ac	12 oz/ac	48 oz/ac	
Russian thistle	64 oz/ac	48 oz/ac	8 lb/ac					12 oz/ac	24 oz/ac	
Sandbur		48 oz/ac		8 lb/ac					24 oz/ac	
Silverleaf nightshade									48 oz/ac	
Spotted knapweed			12 lb/ac				23 oz/ac			
Spotted spurge		48 oz/ac					23 oz/ac	12 oz/ac	32 oz/ac	32 oz/ac

Rates indicated may represent pre- and/or post-emergent control. Rate options are to serve as a guide only and are not to be considered an alternative to label directions. Please consult individual product labels for additional information and specific application instructions.

Mainline®	Mojave 70 EG	MSM 60	Panoramic 2 SL	Prodiamine 65 WG5	SFM 75	Sonora™	Tebuthiuron 80WG5	Triclopyr 3	Triumph® 22K	Whetstone™
24 oz/ac						20 oz/ac	2 lb/ac		32 oz/ac	7 oz/ac
									32 oz/ac	5 oz/ac
24 oz/ac			6 oz/ac	36 oz/ac						
24 oz/ac		1 oz/ac	12 oz/ac		2 oz/ac	16 oz/ac	5 lb/ac	32 oz/ac	32 oz/ac	7 oz/ac
	13 lb/ac					16 oz/ac			32 oz/ac	7 oz/ac
24 oz/ac	13 lb/ac	0.5 oz/ac			5 oz/ac		5 lb/ac			
24 oz/ac	10 lb/ac		12 oz/ac		4 oz/ac		5 lb/ac			
24 oz/ac	10 lb/ac		12 oz/ac						64 oz/ac	
24 oz/ac	8 lb/ac		12 oz/ac	36 oz/ac	5 oz/ac		5 lb/ac			
24 oz/ac	10 lb/ac	2 oz/ac	12 oz/ac		4 oz/ac					
	10 lb/ac					16 oz/ac	5 lb/ac		32 oz/ac	7 oz/ac
24 oz/ac	10 lb/ac		12 oz/ac		4 oz/ac		5 lb/ac			
24 oz/ac	12 lb/ac		12 oz/ac		6 oz/ac					
24 oz/ac	12 lb/ac		12 oz/ac	36 oz/ac	5 oz/ac		5 lb/ac			
		4 oz/ac			6 oz/ac	20 oz/ac	5 lb/ac			7 oz/ac
24 oz/ac	12 lb/ac		12 oz/ac				5 lb/ac			
24 oz/ac						20 oz/ac				
24 oz/ac	12 lb/ac	0.5 oz/ac	12 oz/ac	36 oz/ac	5 oz/ac		5 lb/ac		64 oz/ac	
						20 oz/ac	1.5 lb/ac		32 oz/ac	
24 oz/ac	13 lb/ac			36 oz/ac			5 lb/ac			
24 oz/ac	12 lb/ac		12 oz/ac				5 lb/ac			7 oz/ac
24 oz/ac	15 lb/ac		12 oz/ac		5 oz/ac	20 oz/ac	2 lb/ac	32 oz/ac	32 oz/ac	7 oz/ac
24 oz/ac	12 lb/ac		12 oz/ac						32 oz/ac	7 oz/ac
24 oz/ac	12 lb/ac		12 oz/ac							
							5 lb/ac		32 oz/ac	7 oz/ac
						20 oz/ac			32 oz/ac	7 oz/ac
24 oz/ac			12 oz/ac		2 oz/ac		5 lb/ac			

Adjuvants

Non-ionic surfactant reduces surface tension of droplets, providing greater plant contact.

Adjuvants are products that are added to herbicides to enhance the results of the application. Some adjuvants are designed to improve the actual products in the spray tank solution, while others affect how the spray reacts on the plant surface.

For a herbicide to effectively work on existing weeds, it needs to be absorbed by the target plant. The leaf surface (cuticle) is composed of wax molecules, while other plant surfaces may be covered with hairs – both of which can hinder a herbicide from being absorbed. Certain adjuvants and surfactants increase the spray droplet's ability to more fully contact plant surfaces, promoting more herbicide absorption.

Below are the most frequently used types of adjuvants, and how they work. Each of these are typically tank mixed with the herbicide solution.

Water Conditioners – If water containing high levels of calcium and/or magnesium is used in the tank mix, it can negatively affect weak acid herbicides such as glyphosate and 2,4-D. Additionally, the pH of the spray solution, as well as the hardness of the water, can dramatically affect the success of a herbicide application. Water conditioners can be used to adjust these inputs, with some being designed for use with sulfonylurea herbicides.

Non-ionic Surfactant (NIS), also known as wetting agents – NIS water soluble surfactants reduce the surface tension of the herbicide mixture, causing the spray droplet to spread over the leaf surface, ensuring more AI is in greater contact with plant stem and leaves.

Crop Oil Concentrate (COC), also known as penetrating agents – When weeds are large, have a thick waxy coating,
or are under stress, oil-based surfactants work well. These petroleum-based oil adjuvants keep the wetted surface moist longer, allowing more time for the AI to penetrate waxy leaves and stem coatings. Oils and plant cuticles are attracted to each other, aiding AI penetration.

Methylated Seed Oil (MSO) – This is a vegetable oil-based adjuvant that acts much like COC, but since it has smaller molecules than COC, it penetrates the cuticle more effectively.

Defoaming Agents – Combining certain products into a tank mix can create foam, which complicates the mixing process. If foam starts, a defoaming agent (such as Alligare's Defoamer) should be added. Ensure that the defoaming agent will not interact with the active ingredients in the mix and realize that different volumes of defoamers may be needed depending on the tank mix. While Alligare Defoamer contains a polydimethylsiloxane, it does not replace the need for a surfactant as the active percentage is too low.

Note that herbicides may have specific surfactant or oil needs, and substitutions are not recommended. NISs are generally less expensive than oil-based surfactants, while oil-based adjuvants are best used on plants that are under stress, or on plants with waxy surfaces. Check your selected herbicide's label to determine if adjuvants are recommended (some herbicides are formulated to include certain adjuvants).

Create Efficiency

The success of many VM programs require the use of multiple active ingredients (AIs) and modes of action to fully control target plants, guarding against resistance and guaranteeing success. Typically, this requires purchasing the correct volumes of individually packaged components, hauling them, measuring and mixing them on the job site.

Working through distribution partnerships, our broad portfolio of concentrated herbicides can be custom blended to provide a truly tailored answer to your bare-ground, vegetation mangement needs.

> Alligare's distribution partners offer custom blending services that can provide a completely tailored formulation specific to tank size and weed control needs.

Simplify Planning and Logistics

- Alligare field specialists create unique blends specific to your needs
- Ensures accurate measuring of all tank mix components
- Only the specific volume needed is sold and shipped
- Eliminates the need to transport and store "leftovers"
- Reduces inventory management

Effortless Operations

- Blended material is shipped to end user, at jobsite or applicator's warehouse
- Eliminates inaccuracies in field measuring
- Reduces exposure during loading, handling, and mixing
- Reduces chances for spill and/or contamination
- Ease of tracking and record keeping in the field
- Eliminates damage to equipment from incompatible mixes
- Increases consistency of performance, productivity, and profitability

Easier and More Environmentally Friendly Disposal

- Reduces disposal of empty bags and jugs
- Reduces the volume of materials requiring triple rinsing and puncturing containers
- Reduces exposure during triple rinsing process

Contact an Alligare Technical Field Representative today at **(888) 255-4427** or **Alligare.com** to discuss your custom-blended vegetation management needs!

Liquid and Dry Measurement Equivalency

When creating to a tank mix, some products may be in a liquid form while others are dry, leading to potential confusion in measurement translations.

Liquid products are best measured using a graduated volumetric measuring device.

Dry products are best measured by weight.

Many of Alligare's products are formulated as dry products, such as Water Dispersible Granules (WDG), Dry Flowable (DF) or Soluble Granules (SG). Some are easier to mix and handle than others but a slurry is recommended when mixing any formulation in a spray solution.

Rates for dry products are always listed by weight rather than by volume. Since using a scale in the field is not always convenient, manufacturers often create measuring devices that should only be used for the intended product. Trying to measure a dry product with a volumetric device, such as a quart-sized measuring cup, or a measuring device intended for use with another dry product, will always result in measurement inaccuracies.

Note that net dry weight does not equal fluid volume. In this photo, the container on the left side contains 16 net weight ounces (1 pound) of Dryphosate 75SG, whereas the container on the right contains 16 fluid ounces (1 pint) of Dryphosate 75SG. In this case, measuring Dryphosate 75SG by fluid volume instead of by weight would result in applying close to half the intended rate of the product, likely resulting in a failed application. *Always measure dry products by net weight and liquid products by fluid volume.*

Liquid Volume Measure Equivalencies

Teaspoons	Tablespoons	Fluid Oz.	Cup	Misc.	mL
1	1/3	1/6	1/48		5 mL
3	1	1/2	1/16		15 mL / 15 cc
6	2	1	1/8		30 mL / 30 cc
12	4	2	1/4		59 mL
	5 + 1 teaspoon	2 2/3	1/3		79 mL
	8	4	1/2		118 mL
	10 + 2 teaspoons	5 1/3	2/3		158 mL
	12	6	3/4		177 mL
	16	8	1	1/2 pint	237 mL
	32	16	2	1 pint	473 mL
	64	32	4	2 pints/ 1 Qt.	946 mL
				1.057 Qt.	1000 mL / 1 Ltr
		128	16	4 Qt./ 1 Gal.	3785 mL/ 3.78 Ltr

Dry or Weight Measurement Equivalencies

Ounces	Pounds	Grams
1		28.3
2		55
3		85
4	1/4	124
8	1/2	240
12	3/4	375
16	1	454
32	2	907
35.2	2.2	1000/ 1 Kilogram

Responsible Herbicide Handling

There are inherent risks associated with all pesticides, thus anyone using them should be aware of the risks and how to reduce them. Every pesticide label provides information about proper safety and application. The label carries a "signal word" regarding how potentially harmful a product is, if it is ingested or comes in contact with an individual. "Caution" signifies the lowest classification, followed by "Warning" and "Danger" (highest classification). With each of these classifications, there are specific recommendations regarding handling safety.

Labels explain where and when applications can be made, when non-applicators can enter the treated area, nozzle size, and application rates. Review the label to ensure that the correct personal protective equipment (PPE) is worn to fully protect every worker. Pesticides in their concentrated form may require additional PPE due to the concentration of materials being handled. In these cases, refer to the label for mixer and loader PPE recommendations.

Beyond PPE, safe handling also includes:
Guard against spray materials moving off-target. Spray can migrate through either drift (which can be mechanically controlled through nozzle selection and droplet size) or volatilization (which can be mitigated by ensuring temps are in the acceptable range during application and for a few days after).

There is a trade-off regarding droplet size and drift:
Smaller droplets provide better coverage of target weeds, but they also increase the potential for drift. Smart applicators consider these tradeoffs prior to herbicide application.

Keep it clean:
Minimize potential for cross contamination with tank clean out. If tanks are not rinsed correctly after an application, dry residue may accumulate in the spray rig, particularly on filters and nozzles. This dry residue can break loose and damage sensitive plants during subsequent spraying.

If specific cleaning agents are required, they are usually noted on the product label. Ammonia or chlorine bleach are used to clean certain compounds, but *never* mix these two cleaning compounds as a dangerous chlorine gas is formed.

Modern herbicides are effective tools for industrial vegetation management, and they require users to be knowledgeable and cautious in handling techniques to ensure safety of people and property.

Alligare®

A member of the ADAMA Group

Call **888-255-4427** or visit **Alligare.com**
to find your Alligare Regional Specialist.

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