



# HY-END MSM 60DF

**ACTIVE INGREDIENT:**

Metsulfuron methyl: Methyl 2-[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino]sulfonyl]benzoate.....60%

**OTHER INGREDIENTS:**.....40%

**TOTAL:**.....100%

**KEEP OUT OF REACH OF CHILDREN**

## CAUTION

[Refer To Inside Of Booklet For Precautionary Statements, Storage and Disposal, And Use Directions.]

FIRST AID	
If on skin or clothing:	<ul style="list-style-type: none"> <li>• Take off contaminated clothing.</li> <li>• Rinse skin immediately with plenty of water for 15-20 minutes.</li> <li>• Call a poison control center or doctor for treatment advice.</li> </ul>
If in eyes:	<ul style="list-style-type: none"> <li>• Hold eye open and rinse slowly and gently with water for 15-20 minutes.</li> <li>• Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.</li> <li>• Call a poison control center or doctor for treatment advice.</li> </ul>
HOTLINE NUMBER	
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact Chemtrec at 1-800-424-9300 for emergency medical treatment information.	

EPA Reg. No.: 83851-3-83996

EPA Est. No.: 069845-CHN-002

NET WEIGHT: See Container

**Manufactured for:**  
NaturChem  
Lexington, SC

**PRECAUTIONARY STATEMENTS  
HAZARDS TO HUMANS AND DOMESTIC ANIMALS  
CAUTION**

Causes eye irritation. Avoid contact with skin, eyes or clothing. Avoid breathing dust or spray mist.

**PERSONAL PROTECTIVE EQUIPMENT**

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Shoes and socks

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

**USER SAFETY RECOMMENDATIONS**

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.

**Engineering Control Statements:**

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides (40CFR 170.240 (d) (4-6), the handler PPE requirements may be reduced or modified as specified in the WPS.

**IMPORTANT:** When reduced PPE is worn because a closed system is being used, handlers must be provided all PPE specified above for "applicators and other handlers" and have such PPE immediately available for use in an emergency, such as a spill or equipment breakdown.

**ENVIRONMENTAL HAZARDS**

Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash waters.

This herbicide is injurious to plants at extremely low concentrations. Nontarget plants may be adversely affected from drift and runoff.

**DIRECTIONS FOR USE**

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency in your State responsible for pesticide regulation.

**AGRICULTURAL USE REQUIREMENTS**

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to these statements on this label about personal protective equipment (PPE) and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

**DO NOT ENTER OR ALLOW WORKER ENTRY INTO TREATED AREAS DURING THE RESTRICTED-ENTRY INTERVAL (REI) OF 4 HOURS.**

PPE required for early entry that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is:

- Coveralls
- Shoes plus socks

### NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries or greenhouses.

**Non-crop industrial weed control, selective weed control in turf (industrial, unimproved only), and weed control in pastures and rangeland are not within the scope of the Worker Protection Standard.**

Keep unprotected persons out of treated areas until sprays have dried.

Do not use on food or feed crops except as recommended by this label.

#### IMPORTANT PRECAUTIONS

DO NOT USE ON FOOD OR FEED CROPS EXCEPT AS RECOMMENDED BY THIS LABEL. Injury to or loss of desirable trees or other plants may result if the precautions listed below are not followed.

- Do not apply HY-END MSM 60 DF (except as recommended), or drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend or in locations where the product may be washed or moved into contact with their roots.
- Do not use on lawns, walks, driveways, tennis courts, or similar areas except as recommended by this label.
- Prevent drift of spray to desirable plants.
- Do not contaminate any body of water, including irrigation water.
- Keep from contact with fertilizers, insecticides, fungicides and seeds.

Spraying and mixing equipment used with HY-END MSM 60 DF must not be used for subsequent applications to food or feed crops with the exception of pastures, rangeland, and wheat, as low rates of HY-END MSM 60 DF can kill or severely injure most food or feed crops.

HY-END MSM 60 DF should be used only in accordance with recommendations on this label. NaturChem will not be responsible for losses or damages resulting from the use of this product in any manner not specifically recommended by NaturChem. User assumes all risks associated with such non-recommended use.

#### TANK MIXES

HY-END MSM 60 DF may be tank mixed with other Herbicides registered for the use sites described in this label. Use only those tank mix partners which are labeled for the appropriate use site. When tank mixing, use the most restrictive label limitations for each of the products being used in the tank mix.

### IMPORTANT INFORMATION

#### PESTICIDE HANDLING

- Calibrate sprayers only with clean water away from the well site.
- Make scheduled checks of spray equipment.
- Assure accurate measurement of pesticides by all operation employees.
- Mix only enough product for the job at hand.
- Avoid overfilling of spray tank.
- Do not discharge excess material on the soil at a single spot in the field or mixing/loading station.
- Dilute and agitate excess solution and apply at labeled rates/uses.
- Avoid storage of pesticides near well sites.
- When triple rinsing the pesticide container, be sure to add the rinsate to the spray mix.
- Do not apply this product through any type of irrigation system.

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#### SPRAY EQUIPMENT

For specific application equipment, refer to the manufacturer's recommendations for additional information on GPA, pressure, speed, nozzle types and arrangements, nozzle heights above the target canopy, etc. Be sure to calibrate air or ground equipment properly before application. Select a spray volume and delivery system that will ensure thorough coverage and a uniform spray pattern with minimum drift. Use higher spray volumes to obtain better coverage when the crop canopy is dense. Avoid swath overlapping, and shutoff spray booms while starting, turning, slowing, or stopping to avoid crop injury.

Do not make applications using equipment and/or spray volumes or under weather conditions that might cause spray to drift onto nontarget sites. For additional information on spray drift, refer to the Spray Drift Management section of the label.

Continuous agitation is required to keep HY-END MSM 60 DF in suspension.

#### MIXING INSTRUCTIONS

1. Fill the tank ¼ to 1/3 full of water (if using liquid nitrogen fertilizer solution in place of water, see Tank Mixtures sections for additional details).
2. While agitating, add the required amount of HY-END MSM 60 DF.
3. Continue agitation until the HY-END MSM 60 DF is fully dispersed, at least 5 minutes.
4. Once the HY-END MSM 60 DF is fully dispersed, maintain agitation and continue filling tank with water. HY-END MSM 60 DF should be thoroughly mixed with water before adding any other material.
5. As the tank is filling, add tank mix partners (if desired) then add the necessary volume of nonionic surfactant. Always add surfactant last.
6. If the mixture is not continuously agitated, settling will occur. If settling occurs, thoroughly reagitrate before using.
7. Apply HY-END MSM 60 DF spray mixture with 24 hours of mixing to avoid product degradation.
8. If HY-END MSM 60 DF and a tank mix partner are to be applied in multiple loads, pre-slurry the HY-END MSM 60 DF in clean water prior to adding to the tank. This will prevent the tank mix partner from interfering with the dissolution of HY-END MSM 60 DF.

Do not use HY-END MSM 60 DF with spray additives that reduce the pH of the spray solution to below 3.0.

#### SPRAYER CLEANUP

Spray equipment must be cleaned before HY-END MSM 60 DF is sprayed. Follow the cleanup procedures specified on the labels of previously applied products. If no directions are provided, follow the six steps outlined in After Spraying HY-END MSM 60 DF section of this label.

#### At the End of the Day

When multiple loads of HY-END MSM 60 DF are applied, it is recommended that at the end of each day of spraying the interior of the tank be rinsed with fresh water and then partially filled, and the boom and hoses flushed. This will prevent the buildup of dried pesticide deposits that can accumulate in the application equipment.

To avoid subsequent injury to desirable crops, thoroughly clean all mixing and spray equipment immediately following applications of HY-END MSM 60 DF as follows:

1. Drain tank; thoroughly rinse spray tanks, boom, and hoses with clean water. Loosen and physically remove any visible deposits.
2. Fill the tank with clean water and 1 gal. of household ammonia\* (contains 3% active) for every 100 gal. of water. Flush the hoses, boom, and nozzles with the cleaning solution. Then add more water to completely fill the tank. Circulate the cleaning solution through the tank and hoses for at least 15 minutes. Flush the hoses, boom, and nozzles again with the cleaning solution, and then drain the tank.

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3. Remove the nozzles and screens and clean separately in a bucket containing cleaning agent and water.
4. Repeat Step 2.
5. Rinse the tank, boom, and hoses with clean water.
6. If only ammonia is used as a cleaner, the rinsate solution may be applied back to the crop(s) recommended on this label. Do not exceed the maximum-labeled use rate. If other cleaners are used, consult the cleaner label for rinsate disposal instructions. If no instructions are given, dispose of the rinsate on site or at an approved waste disposal facility.

\*Equivalent amounts of alternate-strength ammonia solution or a NatruChem approved cleaner can be used in the cleanout procedure. Carefully read and follow the individual cleaner instructions. Consult your agricultural dealer, applicator, or a NaturChem representative for a listing of approved cleaners.

**Notes:**

1. **Attention:** Do not use chlorine bleach with ammonia as dangerous gasses will form. Do not clean equipment in an enclosed area.
2. Steam-cleaning aerial spray tanks is recommended prior to performing the above cleanout procedure to facilitate the removal of any caked deposits.
3. When HY-END MSM 60 DF is tank mixed with other pesticides, all required cleanout procedures should be examined and the most rigorous procedure should be followed.
4. In addition to this cleanout procedure, all pre-cleanout guidelines on subsequently applied products should be followed as per the individual labels.
5. Where routine spraying practices include shared equipment frequently being switched between applications of HY-END MSM 60 DF and applications of other pesticides to HY-END MSM 60 DF sensitive crops during the same spray season, it is recommended that a sprayer be dedicated to HY-END MSM 60 DF to further reduce the chance of crop injury.

**SPRAY DRIFT MANAGEMENT**

The interaction of many equipment and weather-related factors determines the potential for spray drift. The applicator is responsible for considering all these factors when making application decisions.

**AVOIDING SPRAY DRIFT IS THE RESPONSIBILITY OF THE APPLICATOR.**

**IMPORTANCE OF DROPLET SIZE**

The most effective way to reduce drift potential is to apply large droplets (>150-200 microns). The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. The presence of sensitive species nearby, the environmental conditions, and pest pressure may affect how an applicator balances drift control and coverage. **APPLYING LARGER DROPLETS REDUCES DRIFT POTENTIAL, BUT WILL NOT PREVENT DRIFT IF APPLICATIONS ARE MADE IMPROPERLY OR UNDER UNFAVORABLE ENVIRONMENTAL CONDITIONS.** See, Wind, Temperature and Humidity, and Temperature Inversions section of this label.

**Controlling Droplet Size – General Techniques**

- Volume – Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- Pressure – Use the lower spray pressures recommended for the nozzle. Higher pressure reduces droplet size and does not improve canopy penetration. **WHEN HIGHER FLOW RATES ARE NEEDED, USE A HIGHER-CAPACITY NOZZLE INSTEAD OF INCREASING PRESSURE.**
- Nozzle Type – Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles.

**Controlling Droplet Size – Aircraft**

- Number of Nozzles – Use the minimum number of nozzles with the highest flow rate that provide uniform coverage.
- Nozzle Orientation – Orienting nozzles so that the spray is emitted backwards, parallel to the airstream will produce larger droplets than other orientations.
- Nozzle Type – Solid stream nozzles (such as disc and core with swirl plate removed) oriented straight back produce larger droplets than other nozzle types.
- Boom Length – The boom length should not exceed ¼ of the wing or rotor length; longer booms increase drift potential.
- Application Height – Application more than 10 ft. above the canopy increases the potential for spray drift.

**BOOM HEIGHT**

Setting boom at the lowest labeled height (if specified) which provides uniform coverage reduces the exposure of droplets to evaporation and wind. For ground equipment, the boom should remain level with the crop and have minimal bounce.

**WIND**

Drift potential increases at wind speeds of less than 3 mph (due to inversion potential) or more than 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given wind speed. **AVOID GUSTY OR WINDLESS CONDITIONS.**

Note: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

**TEMPERATURE AND HUMIDITY**

When making applications in hot and dry conditions, set up equipment to produce larger droplets to reduce effects of evaporation.

**TEMPERATURE INVERSIONS**

Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which causes small-suspended droplets to remain close to the ground and move laterally in a concentrated cloud. Temperature inversions are characterized by increasing temperature with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipated indicates good vertical air mixing.

**SHIELDED SPRAYERS**

Shielding the boom or individual nozzles can reduce the effects of wind. However, it is the responsibility of the applicator to verify that the shields are preventing drift and not interfering with uniform deposition of the product.

**AIR ASSISTED (AIR BLAST)**

**FIELD CROP SPRAYERS**

Air assisted field crop sprayers carry droplets to the target via a downward directed air stream. Some may reduce the potential for drift, but if a sprayer is unsuitable for the applications and/or set up improperly, high drift potential can result. It is the responsibility of the applicator to determine that a sprayer is suitable for the intended applications, is configured properly, and that drift is not occurring.

Note: Air assisted field sprayers can affect product performance by affecting spray coverage and canopy penetration. Consult the application equipment section of this label to determine if use of an air assisted sprayer is recommended.

#### RESISTANCE

When Herbicides that affect the same biological site of action are used repeatedly over several years to control the same weed species in the same field, naturally-occurring resistant biotypes may survive a correctly applied Herbicide treatment, propagate, and become dominant in that field. Adequate control of these resistant weed biotypes cannot be expected. If weed control is unsatisfactory, it may be necessary to retreat the problem area using a product affecting a different site of action.

To better manage Herbicide resistance through delaying the proliferation and possible dominance of Herbicide resistance weed biotypes, it may be necessary to change cultural practices within and between crop seasons, such as using a combination of tillage, retreatment, tank-mix partners and/or sequential Herbicide applications that have a different site of action. Weed escapes that are allowed to go to seed will promote the spread of resistant biotypes.

It is advisable to keep accurate records of pesticides applied to individual fields to help obtain information on the spread and dispersal of resistant biotypes. Consult your agricultural dealer, consultant, applicator, and/or appropriate state agricultural extension service representative for specific alternative cultural practices or Herbicide recommendations available in your area.

#### INTEGRATED PEST MANAGEMENT

This product may be used as a part of an Integrated Pest Management (IPM) program that can include biological, cultural, and genetic practices aimed at preventing economic pest damage. IPM principles and practices include field scouting or other detection methods, correct target pest identification, population monitoring and treating when target pest populations reach locally determined action thresholds. Consult your state cooperative extension service, professional consultants or other qualified authorities to determine appropriate action treatment threshold levels for treating specific pest/crop systems in your area.

#### CROP USES

For use on Wheat, Barley, Fallow, Pastures and Rangeland

##### Highlights

- For selective postemergence broadleaf weed control in winter and spring crops of wheat and barley, fallow, pastures, and rangeland.
- Recommended for land primarily dedicated to production of wheat, barley, pasture or rangeland (see Crop Rotation section for information).
- May be applied by ground or by air.
- Use rates are 1/10 oz. per acre in wheat and barley.
- Use rates are 1/10 to 4/10 oz. per acre as broadcast treatment in pasture or rangeland. Spot treatments allow up to 3/4 oz. per acre.
- No grazing restrictions on wheat, barley, pasture or rangeland.
- Applied one time per season, HY-END MSM 60 DF can be used in wheat and barley as follows:
  - In dryland crops – apply from 2-leaf stage, but before boot, except on Durum and Wampum varieties.
  - In Durum and Wampum varieties, apply only with 2,4-D at tillering stage but before boot.
  - In irrigated crops – apply at tillering stage but before boot.
  - As a harvest aid treatment with surfactant (or with 2,4-D + surfactant, or with Glyphosate containing herbicides®) during dough stages up to 10 days before harvest.
- Apply one time per season to pasture or rangeland for annual weed and selective perennial weed and brush control in several varieties of pasture grasses (also see section on Application Timing).
- Consult label text for complete instructions. Always read and follow label Directions for Use.

##### GENERAL INFORMATION

HY-END MSM 60 DF is recommended for use on land primarily dedicated to the production of wheat, barley, fallow, pasture and rangeland.

HY-END MSM 60 DF is recommended for use on wheat, barley, fallow, pasture, and rangeland in most states. Check your state extension or Dept. of Agriculture before use to be certain HY-END MSM 60 DF is registered in your state. HY-END MSM 60 DF is not registered for use in Alamosa, Conejos, Costilla, Rio Grande and Saquache counties of Colorado.

HY-END MSM 60 DF is a dry-flowable granule that controls weeds in wheat (including durum), barley, fallow, pasture, and rangeland grasses. HY-END MSM 60 DF is mixed in water or can be preslurried in water and added to liquid nitrogen carrier solutions and applied as a uniform spray mix unless otherwise specified on this label. HY-END MSM 60 DF is non-corrosive, nonflammable, nonvolatile, and does not freeze.

HY-END MSM 60 DF controls weeds by postemergence activity. For best results, apply HY-END MSM 60 DF to young, actively growing weeds. The use rates depend upon the weed spectrum and size of weeds at application. The degree and duration of control may depend on the following factors:

- Weed spectrum and infestation intensity
- Weed size at application
- Environmental condition at and following treatment

#### ENVIRONMENTAL CONDITIONS AND BIOLOGICAL ACTIVITY

HY-END MSM 60 DF is absorbed through the foliage of broadleaf weeds, rapidly inhibiting their growth. Leaves of susceptible plants appear chlorotic from 1 to 3 weeks after application and the growing point subsequently dies.

Application of HY-END MSM 60 DF provides the best control in vigorously growing crops that shade competitive weeds. Weed control in areas of thin crop stand or seeding skips may not be as satisfactory. However, a crop canopy that is too dense at application can intercept spray and reduce weed control.

HY-END MSM 60 DF may injure crops that are stressed from adverse environmental conditions (such as extreme temperatures or moisture), abnormal soil conditions, or cultural practices. In addition, different varieties of the crop may be sensitive to treatment with HY-END MSM 60 DF under otherwise normal conditions. Treatment of such varieties may injure crops.

In warm, moist conditions, the expression of Herbicide symptoms is accelerated in weeds; in cold, dry conditions, expression of Herbicide symptoms is delayed. In addition, weeds hardened-off by drought stress are less susceptible to HY-END MSM 60 DF.

Weed control may be reduced if rainfall or snowfall occurs soon after application.

#### APPLICATION INFORMATION

##### Use Rates

###### *Wheat (including durum), Barley and Triticale*

Apply 1/10 oz. HY-END MSM 60 DF per acre to wheat, barley or triticale. Make one application per use season.

###### *Harvest Aid*

Apply 1/10 oz. HY-END MSM 60 DF per acre in combination with 2,4-D or glyphosate containing products to aid in dry down of many broadleaved weeds, thereby aiding grain harvest.

###### *Fallow*

Apply HY-END MSM 60 DF at 1/10 oz. per acre.

###### *Pasture and Rangeland*

Apply 1/10 to 1 oz. HY-END MSM 60 DF per acre as a broadcast treatment to pasture and rangeland. For spot applications, use 1 oz. per 100 gal. of water. Do not exceed 1 2/3 oz. HY-END MSM 60 DF per acre.

##### Application Timing

###### *Dryland Wheat, Barley and Triticale (Except Durum or Wampum Variety)*

Make applications after the crop is in the 2-leaf stage but before boot. Make one application per use season.

###### *Durum and Wampum Variety Spring Wheat*

Make applications after the crop is tillering but before boot. Make one application per use season. Application to durum and wampum varieties should be made in combination with 2,4-D.

###### *Irrigated Wheat and Barley*

Make applications after the crop begins tillering but before boot. First post-treatment irrigation should be delayed for at least 3 days after treatment and should not exceed 1 inch of water. Make one application per use season.

###### *Wheat and Barley - Harvest Aid*

Make applications after the crop has reached the hard dough stage but no later than 10 days before harvest. See section on Harvest Aid tank mixtures.

###### *Fallow*

HY-END MSM 60 DF may be used as a fallow treatment, in the spring or fall when the majority of weeds have emerged and are actively growing.

Do not apply during boot or early heading, as crop injury may result.

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##### Pasture Grasses

HY-END MSM 60 DF may be used on some native grasses such as bluestems and grama, and on other pasture grasses such as bermudagrass, bluegrass, orchardgrass, bromegrass, fescue and timothy. Specific application information on several of these pasture grasses follows:

Pasture Grass	Minimum Time from Grass Establishment to HY-END MSM 60 DF Application
Bermudagrass	2 months
Bluegrass, Bromegrass, and Orchardgrass	6 months
Timothy	12 months
Fescue	24 months

##### Fescue Precautions:

Note that HY-END MSM 60 DF may temporarily stunt fescue, cause it to turn yellow, or cause seedhead suppression. To minimize these symptoms, take the following precautions:

- Tank mix HY-END MSM 60 DF with 2, 4-D.
- Use the lowest recommended rate for target weeds.
- Use surfactant at ½ to 1 pt. Per 100 gal. of spray solution (1/16 to 1/8% v/v).
- Make application later in the spring after the new growth is 5 to 6 inches tall, or in the fall.
- Do not use a surfactant when liquid nitrogen is used as a carrier.
- Do not use more than 1/10 oz./A HY-END MSM 60 DF.

The first cutting yields may be reduced due to seedhead suppression resulting from treatment with HY-END MSM 60 DF.

##### Timothy Precautions

Timothy should be at least 6" tall at application and be actively growing. Applications of HY-END MSM 60 DF to timothy under any other conditions may cause crop yellowing and/or stunting. To minimize these symptoms, take the following precautions:

- Tank mix HY-END MSM 60 DF with 2, 4-D.
- Use the lowest recommended rate for target weeds.
- Use surfactant at ½ pt. Per 100 gal. (1/16% v/v).
- Make applications in the later summer or fall.
- Do not use surfactant when liquid nitrogen is used as a carrier.
- Do not use more than 1/10 oz./A HY-END MSM 60 DF.

Application of HY-END MSM 60 DF to Pensacola bahiagrass, ryegrass (Italian or perennial) and Garrison's creeping foxtail may cause severe injury to and/or loss of pastures.

**Other Pasture and Rangeland Grasses:** Varieties and species of forage grasses differ in their tolerance to herbicides. When using HY-END MSM 60 DF on a particular grass for the first time, limit use to a small area. If no injury occurs throughout the season, larger acreage may be treated the following season. Broadleaf pasture species such as alfalfa and clover are highly sensitive to HY-END MSM 60 DF and will be severely stunted or injured by HY-END MSM 60 DF.

**WEEDS CONTROLLED**

Unless otherwise directed, treat when weeds are less than 4" tall or in diameter and are actively growing. Effectiveness may be reduced if rainfall occurs within 4 hours after application.

**Cereals, Pasture, Rangeland, and Fallow  
1/10 oz. per acre**

Blue/purple Mustard*
Bur Buttercup (testiculate)
Coast Fiddleneck (tarweed)
Common Chickweed
Common Purslane
Conical Catchfly
Cowcockle
False Chamomile
Field Pennycress (fanweed)
Filaree
Flixweed*
Groundsel (common)
Henbit
Kochia*
Lambsquarters (common, slimleaf)
Mayweed Chamomile

Miners Lettuce
Pigweed (redroot, smooth, tumble)
Plains Coreopsis
Prickly Lettuce*
Russian Thistle*
Shepherd's Purse
Smallseed Falseflax
Smartweed (green, ladythumb, pale)
Snow Speedwell
Tansymustard*
Treacle Mustard (Bushy Wallflower)
Tumble/Jim Hill Mustard
Volunteer Sunflower
Waterpod
Wild Mustard

**Additional Weeds in Pasture/Rangeland Only  
1/10 to 2/10 oz. per acre**

Bitler Sneezeweed
Buttercup
Carolina Geranium
Common Broomweed
Common Mullein
Curly Dock

Dandelion
Marestail
Plantain
Wild Garlic*
Woolly Croton*

**2/10 to 3/10 oz. per acre**

Annual Marshelder
Blackeyed Susan
Buckbrush **
Burclover
Common Yarrow
Dogfennel

Horsemint (beebalm)
Musk Thistle*
Pensacola Bahiagrass*
Purple Scabious
Western Snowberry**
Wild Carrot

**4/10 OZ. PER ACRE**  
Serecia Lespedeza\*

**WEEDS SUPPRESSED \*\***

**Cereals, Pasture, Rangeland, and Fallow  
1/10 oz. per acre**

Canada Thistle*
Common Sunflower*
Corn Gromwell*

Knotweed (prostrate)*
Sowthistle (annual)*
Wild Buckwheat*

**BRUSH SUPPRESSED\*\***

**3/10 OZ. PER ACRE**

Blackberry
Dewberry

Multiflora Rose*
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**WEED/BRUSH SUPPRESSED WITH SPOT APPLICATION  
(Pasture/Rangeland Only)**

**1 oz. per 100 gal. of water**

Blackberry*
Canada Thistle*

Dewberry*
Multiflora Rose*

\* See the Specific Weed Problems section

\*\* Weed suppression is a reduction in weed competition (reduced population and/or vigor) as visually compared to an untreated area. The degree of suppression varies with the rate used, the size of the weeds, and the environmental conditions following treatment.

**SPECIFIC WEED PROBLEMS**

Note: Thorough spray coverage of all weed species listed below is very important.

**Blue Mustard, Flixweed, and Tansymustard:** For best results, apply HY-END MSM 60 DF tank mixtures with 2,4-D or MCPA in the spring after the majority of thistles have emerged and are small (rosette stage to 6" elongating stems) and actively growing. The application will inhibit the ability of emerged thistles to compete with the crop.

For Spot applications to Canada Thistle in pasture and rangeland, apply as a foliar spray once plant is fully leafed. Apply to runoff and include a surfactant in the spray mix at 1 to 2 qt per 100 gal of spray solution. Complete coverage of all foliage and stems is required for control. On tall, dense stands, it is often necessary to spray from both sides to obtain adequate coverage.

**Corn Gromwell and Prostrate Knotweed:** Apply HY-END MSM 60 DF plus surfactant when weeds are actively growing, are no larger than 2" tall, and when crop canopy will allow thorough coverage. Tank mixing 2,4-D or MCPA with HY-END MSM 60 DF can improve results.

**Kochia, Russian thistle, Prickly lettuce:** Naturally occurring resistant biotypes of these weeds are known to occur. For best results, use HY-END MSM 60 DF in a tank mix with Dicamba and 2,4-D, or bromoxynil and 2,4-D (such as ¾ -1 pt Buctril® + ¼ - 3/8 lb active 2,4-D ester). HY-END MSM 60 DF should be applied in the spring when kochia, Russian thistle, and prickly lettuce are less than 2" tall or 2" across and are actively growing (refer to the Tank Mixtures section of this label for additional details).

**Sunflower (common/volunteer):** Apply either HY-END MSM 60 DF plus surfactant or HY-END MSM 60 DF plus 2,4-D or MCPA after the majority of sunflowers have emerged, are 2" to 4" tall and are actively growing. Use spray volumes of at least 3 gal by air or 5 gal by ground (10 gal by ground in pastures).

**Wild Buckwheat:** For best results, apply HY-END MSM 60 DF plus 2,4-D or MCPA when plants have no more than 3 true leaves (not counting the cotyledons). If plants are not actively growing, delay treatment until environmental conditions favor active weed growth.

**Musk Thistle:** Apply HY-END MSM 60 DF at 2/10 to 3/10 oz per acre in the spring or early summer prior to flowering or in the fall after newly emerged plants have reached the rosette stage of growth. Fall applications should be made before the soil freezes.

**Multiflora Rose:** For best control, apply HY-END MSM 60 DF as a broadcast application when multiflora rose is less than 3' tall. Application should be made in the spring, soon after multiflora rose is fully leafed.

For spot applications in pasture and rangeland, apply as a foliar spray once plant is fully leafed. Apply to runoff and include a surfactant in the spray mix at 1 to 2 qts per 100 gals of spray solution. Complete coverage of all foliage and stems is required for control. On tall, dense stands, it is often necessary to spray from both sides to obtain adequate coverage.

**Blackberry and Dewberry:** For spot applications in pasture and rangeland, apply as a foliar spray once plant is fully leafed. Apply to runoff and include a surfactant in the spray mix at 1 to 2 qts per 100 gals of spray solution. Complete coverage of all foliage and stems is required for control. On tall, dense strands, it is often necessary to spray from both sides to obtain adequate coverage.

**Pensacola bahiagrass control in established Bermudagrass pasture:**

Apply HY-END MSM 60 DF at 3/10 oz per acre plus surfactant. Apply after green-up in the spring but before bahiagrass seedhead formation. Application should be made when moisture is sufficient to enhance grass growth. HY-END MSM 60 DF is very effective for removal of bahiagrass from bermudagrass pastures. In highly infested pastures, the use of HY-END MSM 60 DF can clear the areas of useful forage until the bermudagrass has time to cover the area. Therefore, HY-END MSM 60 DF treatments should be spread out over a period of years. Do not apply to an entire farm or ranch in one year. Fertilization (particularly with nitrogen and potassium) and/or replanting may accelerate the process of reestablishment of bermudagrass.

Under heavy bahiagrass pressure, grazing pressure, or adverse weather conditions (heat and drought), bahiagrass regrowth may occur.

Note: HY-END MSM 60 DF should not be used for the control of common or Argentine bahiagrass. Also, HY-END MSM 60 DF should not be applied in liquid fertilizer solutions for Pensacola bahiagrass control, as poor control and/or regrowth may occur.

**Serecia lespedeza:** Apply HY-END MSM 60 DF at 4/10 oz per acre plus a surfactant at 1 to 2 qt per 100 gal of total spray solution. For best results, make applications to serecia lespedeza beginning at flower bud initiation through the full bloom stage of growth.

Note: Do not make applications if drought conditions exist at intended time of application.

**Wild Garlic:** Apply 1/10 to 2/10 oz per acre of HY-END MSM 60 DF in the early spring when wild garlic is less than 12" tall with 2" to 4" of new growth.

**Woolly Croton:** Apply 1/10 to 2/10 oz per acre of HY-END MSM 60 DF in the late spring or early summer at preemergence through 2 true leaf stage.

**SURFACTANTS**

**SPRAY ADJUVANTS**

Applications of HY-END MSM 60 DF must include either a nonionic surfactant or a crop oil concentrate. In addition, an ammonium nitrogen fertilizer may be used. Consult local fact sheets, technical bulletins and service policies prior to using other adjuvant systems. If another herbicide is tank mixed with HY-END MSM 60 DF select adjuvants authorized for use with both products. Products must contain only EPA-exempt ingredients (40CFR 1001).

Antifoaming agents may be needed. Consult your Ag dealer or applicator for a listing of recommended surfactants.

**Nonionic Surfactant (NIS)**

- Apply 0.06 to 0.5% v/v (1/2 to 4 pints per 100 gallons of spray solution). See Tank Mixtures section for additional information.
- Surfactant products must contain at least 60% nonionic surfactant with a hydrophilic/lipophilic balance (HLB) greater than 12.

Exceptions: On all spring wheat and spring or winter barley use ½ to 1 quart per 100 gallons.

**Petroleum Crop Oil Concentrate (COC) or Modified Seed Oil (MSO)**

- Apply at 1% v/v (1 gallon per 100 gallon spray solution) or 2% under arid conditions.
- Oil adjuvants must contain at least 80% high quality, petroleum (mineral) or modified vegetable seed oil with at least 15% surfactant emulsifiers.

**Ammonium Nitrogen Fertilizer**

- Use 2 quarts/acre of a high quality urea ammonium nitrate (UAN) such as 28N or 32%N, or 2 pounds/acre of a spray-grade ammonium sulfate (AMS). Use 4 quarts/acre UAN or 4 pounds/acre AMS under arid conditions.
- Do not use liquid nitrogen fertilizer as the total carrier solution.

**Special Adjuvant Types**

- Combination adjuvant products may be used at doses that provide the required amount of NIS, COC, MSO and/or ammonium nitrogen fertilizer. Consult product literature for use rates and restrictions.
- In addition to the adjuvants specified above, other adjuvant types may be used if they provide the same functionality and have been evaluated previously.

Antifoaming agents may be used if needed.

**Do not use low rates of liquid fertilizer as a substitute for surfactant.**

**With Liquid Nitrogen Solution Fertilizer**

Liquid nitrogen fertilizer solutions may be used as a carrier in place of water. Run a tank mix compatibility test before mixing HY-END MSM 60 DF in fertilizer solution.

HY-END MSM 60 DF must first be slurried with water and then added to liquid nitrogen solutions (e.g., 28-0-0, 32-0-0). Ensure that the agitator is running while the HY-END MSM 60 DF is added. Use of this mixture may result in temporary crop yellowing and stunting.

If using low rates of liquid nitrogen fertilizer in the spray solution (less than 50% of the spray solution volume), the addition of surfactant is necessary. Add surfactant at ¼ pt. per 100 gal. of spray solution (0.03% v/v).

When using high rates of liquid nitrogen fertilizer in the spray solution, adding surfactant increases the risk of crop injury. Consult your agricultural dealer, consultant, fieldman, or an NaturChem representative for a specific recommendation before adding an adjuvant to these tank mixtures.

If 2,4-D or MCPA is included with HY-END MSM 60 DF and fertilizer mixture, ester formulations tend to be more compatible. (See manufacturer's label.) Do not add surfactant when using HY-END MSM 60 DF in tank mix with 2,4-D ester and liquid nitrogen fertilizer solutions.

**Note:** In certain areas east of the Mississippi river unacceptable crop response may occur with use of straight or dilute nitrogen fertilizer carrier solutions where cold temperatures or widely fluctuating day/night temperatures exist. In these areas consult your agricultural dealer, consultant, field advisor, or NaturChem representative for a specific recommendation before using nitrogen fertilizer carrier solutions.

Liquid nitrogen fertilizer solutions that contain sulfur can increase crop response.

Do not use low rates of liquid fertilizer as a substitute for a surfactant.

Do not use with liquid fertilizer solutions with a pH less than 3.0.

## GROUND APPLICATION

To obtain optimum spray distribution and thorough coverage, use flat-fan or low-volume flood nozzles.

For flood nozzles on 30" spacings, use at least 10 gallons per acre (GPA), flood nozzles no larger than TK10 (or equivalent), and pressure of at least 30 pounds per square inch (PSI). For 40" nozzle spacings, use at least 13 GPA; for 60" spacings use at least 20 GPA. It is essential to overlap the nozzles 100% for all spacings.

With "raindrop RA" nozzles, use at least 30 GPA and ensure that nozzle spray patterns overlap 100%. For flat-fan nozzle, use at least 3 GPA for applications to wheat or barley. Use at least 10 GPA for application to pasture or rangeland.

Use 50-mesh screens or larger.

## AERIAL APPLICATION

Use nozzle types and arrangements that provide optimum spray distribution and maximum coverage.

**Wheat, Barley and Fallow** – Use 1 to 5 GPA. Use at least 3 GPA in Idaho, Oregon, or Utah.

**Pasture and Rangeland** - Use 2 to 5 GPA.

When applying HY-END MSM 60 DF by air in areas adjacent to sensitive crops, use solid stream nozzles oriented straight back. Adjust the swath to avoid spray drift damage to sensitive crops downwind and/or use ground equipment to treat the border edge of fields. See the **Spray Drift Management** section of this label.

## TANK MIXTURES

HY-END MSM 60 DF may be tank mixed with other suitable registered Herbicides to control weeds listed under **Weeds Suppressed**, weeds resistant to HY-END MSM 60 DF, or weeds not listed under **Weeds Controlled**. Read and follow all label instructions on timing, precautions and warnings for any companion products before using these tank mixtures. If those recommendations conflict with this label, do not tank mix that product with MSM 60 DF.

### *Tank Mixtures in Cereals (Wheat, Barley and Triticale)*

#### *With 2,4-D (amine or ester) or MCPA (amine or ester)*

HY-END MSM 60 DF can be used as a tank-mix treatment with 2,4-D or MCPA (ester formulations provide best results) Herbicides after weeds have emerged. For best results, use 1/10 oz. of HY-END MSM 60 DF per acre; add 2,4-D or MCPA Herbicides to the tank at ¼ to ½ lb. active ingredient. Surfactant may be added to the mixture at ½ to 1 qt. per 100 gal. of spray solution; however, adding surfactant may increase the potential for crop injury.

Apply HY-END MSM 60 DF plus MCPA after the 3- to 5-leaf stage but before boot (with Durum and Wampum varieties do not apply before tillering). Apply HY-END MSM 60 DF plus 2,4-D after tillering (refer to appropriate 2,4-D manufacturer's label), but before boot.

#### *With Dicamba*

For best results, apply HY-END MSM 60 DF at 1/10 oz. per acre; add 1/16 to 1/8 lb. active ingredient dicamba. Surfactant may be added to the mixture at ½ to 1 qt. per 100 gal. of spray solution; however, adding surfactant may increase the potential for crop injury. Also refer to dicamba labels for application timing and restrictions.

#### *With 2,4-D (amine or ester) and Dicamba*

HY-END MSM 60 DF may be applied in a 3-way tank mix with formulations of dicamba and 2,4-D. Observe all applicable directions, restrictions and precautions on labels of all products used.

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Make applications at 1/10 oz. of HY-END MSM 60 DF + 1/16 - 1/12 pound active ingredient dicamba + 4-6 oz. active 2,4-D Ester or Amine per acre. Use higher rates when weed infestation is heavy. Add 1-2 pts. of surfactant to the 3-way mixture, where necessary, as deemed by local recommendations. Use of additional surfactant may not be needed with the higher phenoxy rates and ester phenoxy formulations. Consult the specific 2,4-D or dicamba label, or local recommendations for more information.

Apply this 3-way combination to winter wheat after the crop is tillering and prior to jointing (first node). In spring wheat (including Durum wheat) apply after the crop is tillering and before it exceeds the 5-leaf stage.

Do not apply this 3-way mixture at high rates more than once a year or more than twice per year at the low rates.

#### *With Bromoxynil (such as Buctril®, Bronate®)*

HY-END MSM 60 DF may be tank mixed with bromoxynil containing herbicides registered for use on wheat, barley, or fallow. For best results, add bromoxynil containing Herbicides to the tank at 3 to 6 oz. active ingredient per acre (such as Bronate® or Buctril® at ¼ - 1/2 pt. per acre).

#### *With Starane®*

For improved control of Kochia (2-4" tall), Russian thistle, mustard species, and wild buckwheat, HY-END MSM 60 DF may be tank mixed with 1/3 to 1 1/3 pints per acre of Starane®.

#### *With Starane® + Salvo®*

For improved control of Kochia (2-4" tall), Russian thistle, mustard species, and wild buckwheat, HY-END MSM 60 DF may be tank mixed with 2/3 to 2 2/3 pints per acre of Starane® + Salvo®.

#### *With Starane® + Sword®*

For improved control of Kochia (2-4" tall), Russian thistle, mustard species, and wild buckwheat, HY-END MSM 60 DF may be tank mixed with 3/4 to 2 3/4 pints per acre of Starane® + Sword®.

#### *With Maverick®*

HY-END MSM 60 DF can be tank mixed with Maverick® herbicide for improved control of weeds in wheat.

#### *With Aim®*

HY-END MSM 60 DF can be tank mixed with Aim® herbicide for improved control of weeds in wheat and barley.

#### *With Stinger®, Curtail® or Curtail® M or Widematch®*

HY-END MSM 60 DF can be tank mixed with Stinger®, Curtail®, or Curtail® M herbicides for improved control of weeds in wheat and barley.

#### *With EXPRESS®*

HY-END MSM 60 DF F may be tank mixed with EXPRESS® based on local recommendations.

#### *With HARMONY® EXTRA*

HY-END MSM 60 DF may be tank mixed with HARMONY® EXTRA based on local recommendations.

#### *With Grass Control Products*

Tank mixtures of HY-END MSM 60 DF and grass control products may result in poor grass control. NaturChem recommends that you first consult your state experiment station, university, or extension agent, agricultural dealer, or an NaturChem representative as to the potential for antagonism before using the mixture. If no information is available, limit the initial use of HY-END MSM 60 DF and the grass product to a small area.

To control wild oat, tank mix HY-END MSM 60 DF with Avenge® or Assert®.

Do not tank mix HY-END MSM 60 DF with HOELON® 3EC as grass control may be reduced.

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**With Asser® herbicide or Avenge® herbicide**

HY-END MSM 60 DF may be tank mixed with Avenge® or Assert®. When tank mixing HY-END MSM 60 DF with Assert®, always include another broadleaf weed herbicide with a different mode of action (for example: 2, 4-D ester, MCPA ester, Buctril® or Bronate®). Tank mixed applications of EXPRESS plus Assert may cause temporary crop discoloration, stunting, or injury when heavy rainfall occurs shortly after application.

**With Puma**

HY-END MSM 60 DF may be tank mixed with Puma herbicide for improved control of weeds in wheat and barley.

**With Discover NG**

HY-END MSM 60 DF may be tank mixed with Discover NG herbicide for improved control of weeds in spring wheat.

**With Everest**

HY-END MSM 60 DF may be tank mixed with Everest herbicide for improved control of weeds in wheat and barley.

**With Insecticides and Fungicides**

HY-END MSM 60 DF may be tank-mixed or used sequentially with insecticides and fungicides registered for use on cereal grains.

However, under certain conditions (drought stress, cold weather, or if the crop is in the 2-4 leaf stage), tank mixes or sequential applications of HY-END MSM 60 DF with organophosphate insecticides (such as parathion, "Di-Syston") may produce temporary crop yellowing or, in severe cases, crop injury.

The potential for crop injury is greatest when wide fluctuations in day/night temperatures occur just prior to or soon after applications.

Test these mixtures in a small area before treating large areas.

Do not apply HY-END MSM 60 DF within 60 days of crop emergence where organophosphate insecticide (such as "Di-Syston") has been applied as an in-furrow treatment, as crop injury may result.

Do not use HY-END MSM 60 DF plus Malathion, as crop injury will result.

**With Liquid Nitrogen Solution Fertilizer**

Liquid nitrogen fertilizer solutions may be used as a carrier in place of water. Run a tank mix compatibility test before mixing HY-END MSM 60 DF in fertilizer solution.

HY-END MSM 60 DF must first be slurried with water and then added to liquid nitrogen solutions (e.g., 28-0-0, 32-0-0). Ensure that the agitator is running while the HY-END MSM 60 DF is added. Use of this mixture may result in temporary crop yellowing and stunting.

If using low rates of liquid nitrogen fertilizer in the spray solution (less than 50% of the spray solution volume), the addition of surfactant is necessary. Add surfactant at ½ pt. – 1 qt. per 100 gal. of spray solution (0.06-0.25% v/v) based on local recommendations.

When using high rates of liquid nitrogen fertilizer in the spray solution, adding surfactant increases the risk of crop injury. Consult your agricultural dealer, consultant, fieldman, or an NaturChem representative for specific recommendation before adding an adjuvant to these tank mixtures.

If 2, 4-D or MCPA is included with HY-END MSM 60 DF and fertilizer mixture, ester formulations tend to be more compatible (see manufacturer's label). Do not add surfactant when using HY-END MSM 60 DF in tank mix with 2, 4-D ester of MCPA ester and liquid nitrogen fertilizer solutions.

**Note:** In certain areas east of the Mississippi river unacceptable crop response may occur with use of straight or dilute nitrogen fertilizer carrier solutions where cold temperatures or widely fluctuating day/night temperatures exist. In these areas consult your agricultural dealer, consultant, field advisor, or NaturChem representative for a specific recommendation before using nitrogen fertilizer carrier solutions.

Liquid nitrogen fertilizer solutions that contain sulfur can increase crop response.

Do not use low rates of liquid fertilizer as a substitute for a surfactant.

Do not use with liquid fertilizer solutions with pH less than 3.0.

**Tank Mixtures in Harvest Aid**

A tank mix of HY-END MSM 60 DF plus 2,4-D and surfactant, or glyphosate containing products, will typically aid in dry down of many broadleaved weeds, thereby aiding grain harvest. Postemergence applications should be made to actively growing weeds after the crop is in the hard dough stage. If weeds are not dry within 10 days after application, delay harvest until weeds are dry.

See weeds listed in Weeds Controlled chart of this label.

**With 2,4-D**

Use 1/10 oz. HY-END MSM 60 DF plus ¼ to ½ active ingredient 2,4-D per acre on moderate weed infestations; higher rates of 2,4-D may be used on large weeds if permitted by the 2,4-D brand labeling. Include 1 to 2 qt surfactant per 100 gal of spray solution.

In addition to the weeds listed in the Weeds Controlled chart of this label, the 2,4-D combination will also dry down common cocklebur, marestail, puncturevine and common and wild sunflower. In areas where 2,4-D use is restricted, apply HY-END MSM 60 DF with surfactant only; however, this treatment may be less effective.

**With Glyphosate Containing Products**

Use 1/10 oz. HY-END MSM 60 DF plus the locally recommended rate of glyphosate containing products (refer to the glyphosate label for maximum seasonal rate). HY-END MSM 60 DF requires the use of adjuvant for optimum activity. Consult the glyphosate label or local recommendation for the amount of adjuvant to include.

**Tank Mixtures in Fallow**

HY-END MSM 60 DF may be used as a fallow treatment, and may be tank mixed with other herbicides that are registered for use in fallow. If those recommendations conflict with this label, do not tank mix that product with HY-END MSM 60 DF. Read and follow all label instructions on timing, precautions and warnings for any companion products before using these tank mixtures. Follow the most restrictive labeling.

**Tank Mixtures in Pastures or Rangeland**

HY-END MSM 60 DF can be applied in a tank-mix combination with Grazon™ P+D, Picloram (such as Tordon® 22K), 2,4-D, Dicamba, or Weedmaster® in states where these products are labeled for postemergence control of the following weeds:

Annual marshelder	Common ragweed
Burclover	Giant ragweed
Carolina horsenettle	Prickly lettuce
Common cocklebur	Sunflower
Common milkweed	Western ragweed

For best results, apply HY-END MSM 60 DF at 1/10 to 2/10 oz per acre with one of the following products:

Product	Rate (oz/A)
Grazon™ P+D	8 to 32
Picloram (such as Tordon® 22K)	4 to 16
Weedmaster®	8 to 32
Triclopyr BEE (such as Remedy®)	8
Amber®	0.35*
2,4-D	16 to 32
Dicamba (such as Banvel® or Clarity®)	4 to 32
2,4-D + Dicamba	1 + 2.87 to 4 + 11.48

\* For suppression of Western Ragweed in Phenoxy Restricted and Herbicide Regulated Counties

#### With Liquid Nitrogen Solution Fertilizer

Liquid nitrogen fertilizer solutions may be used as a carrier in place of water. Run a tank mix compatibility test before mixing HY-END MSM 60 DF in fertilizer solution.

HY-END MSM 60 DF must first be slurried with water and then added to liquid nitrogen solutions (e.g. 28-0-0, 32-0-0). Ensure that the agitator is running while the HY-END MSM 60 DF is added. Use of this mixture may result in temporary crop yellowing and stunting.

If using low rates of liquid nitrogen fertilizer in the spray solution (less than 50% of the spray solution volume), the addition of surfactant is necessary. Add surfactant at ¼ pt per 100 gal of spray solution (0.03% v/v).

When using high rates of liquid nitrogen fertilizer in the spray solution, adding surfactant increases the risk of crop injury. Consult your agricultural dealer, consultant, fieldman, or NaturChem representative for a specific recommendation before adding an adjuvant to these tank mixtures.

If 2,4-D or MCPA is included with HY-END MSM 60 DF and fertilizer mixture, ester formulations tend to be more compatible (See manufacturer's label). Do not add surfactant when using HY-END MSM 60 DF in tank mix with 2,4-D ester and liquid nitrogen fertilizer solutions.

Do not use low rates of liquid fertilizer as a substitute for a surfactant.

Do not use with liquid fertilizer solutions with a pH less than 3.0.

### HY-END MSM 60 DF WITH MCPA, 2,4-D AND/OR DICAMBA FOR SUPPRESSION OF WINTER ANNUAL BROADLEAF WEEDS IN WINTER WHEAT TO BE GRAZED OUT IN THE STATES OF TEXAS, OKLAHOMA, NEW MEXICO AND KANSAS

#### General Information

HY-END MSM 60 DF can be tank mixed with MCPA, 2,4-D and/or dicamba for suppression of winter annual broadleaf weeds in winter wheat to be grazed out and not harvested for grain, in the states of Texas, Oklahoma, New Mexico and Kansas.

#### Directions for Use

For the suppression of winter annual broadleaf weeds (such as henbit and mustards) in winter wheat in the states of Texas, Oklahoma, New Mexico and Kansas, HY-END MSM 60 DF at 0.05 (1/20) ounce per acre should be tank mixed with MCPA, 2,4-D and/or dicamba at label rates. Winter annual broadleaf weeds should be less than 1" tall or in the rosette stage for suppression. Add an NaturChem recommended nonionic surfactant having at least 80% active ingredient at 1 to 2 qts. per 100 gal. of spray solution (0.25 to 0.5% v/v).

HY-END MSM 60 DF can also be tank mixed at this rate with approved insecticides. This treatment can be applied by ground or air. However, under certain conditions (drought stress, cold weather, or if the crop is in the 2-4 leaf stage), tank mixes or sequential applications of HY-END MSM 60 DF with organophosphate insecticides (such as parathion, "Di-Syston") may produce temporary crop yellowing or, in severe cases, crop injury. The potential for crop injury is greatest when wide fluctuations in day/night temperatures occur just prior to or soon after application. Test these mixtures in a small area before treating large areas. Do not use HY-END MSM 60 DF plus Malathion as crop injury will result.

#### Rotation Intervals for Crops in Non-irrigated Land Following Use of HY-END MSM 60 DF at 0.05 (1/20) Ounces Per acre on Wheat That Will be Grazed Out

Crop	Soil pH	Minimum Cumulative Precipitation (inches)	Minimum Rotation Interval (months)
Sorghum, Grain	7.9 or lower	No restrictions	4
Cotton	7.9 or lower	No restrictions	10
Alfalfa	6.8 or lower	No restrictions	10
	6.9 to 7.9	No restrictions	22
Beans, Dry	6.8 or lower	No restrictions	10
	6.9 to 7.9	No restrictions	22

#### Rotation Intervals for crops not covered above following the use of HY-END MSM 60 DF at 0.05 (1/20) ounces per acre on wheat that will be grazed out.

The minimum rotation interval is 22 months with at least 18" of cumulative precipitation during the period:

- To any crop not listed in the rotation Intervals table above
- If the soil pH is not in the specified range

To rotate to a crop at an interval shorter than recommended, a field bioassay must be successfully completed to rotate to that crop. See section Field Bioassay in the EPA approved HY-END MSM 60 DF label for further information.

#### IMPORTANT RESTRICTIONS

This treatment is for use on winter wheat that will be grazed out and will not be harvested for grain.

### IMPORTANT PRECAUTIONS

HY-END MSM 60 DF suppresses weeds by postemergence activity. For best results, apply HY-END MSM 60 DF to young, actively growing weeds. The degree and duration of suppression at 1/20 ounce per acre may depend upon the following factors:

- Weed spectrum and infestation intensity
- Weed size at application
- Environmental condition at and following treatment

Refer to the HY-END MSM 60 DF and tank mix partner labels for additional use directions, restrictions, rotational crop intervals and precautions. The most restrictive provision on the applicable label shall apply. Read and follow all manufacturer label recommendations for the companion herbicides. If those recommendations conflict with this label, do not tank mix the herbicide with HY-END MSM 60 DF.

### GRAIN SORGHUM

#### GENERAL INFORMATION

HY-END MSM 60 DF is recommended for use on irrigated or dryland grain sorghum in Colorado, Kansas, Nebraska, Oklahoma, and Texas (North of I-20).

**Application Rates:** Apply HY-END MSM 60 DF at 1/20 oz. per acre plus ¼ lb. active ingredient 2, 4-D amine per acre. Do not use surfactant or crop oil.

**Crop Stage:** For optimum performance and crop safety, apply HY-END MSM 60 DF plus 2, 4-D amine when grain sorghum is 3 to 15 inches in height. If sorghum is taller than 10 inches to the top of the canopy, use drop nozzles and keep spray off the foliage. Apply only before the boot stage. Read and follow all other use instructions, warnings and precautions on companion herbicide labels.

Sorghum varieties vary in sensitivity to 2, 4-D amine. Spray only varieties known to be tolerant to 2,4-D amine. Contact seed company and Local County Extension Service for this information.

**Pest Stage:** Application of HY-END MSM 60 DF plus 2,4-D amine should be made when all or a majority of the weeds have germinated and emerged. For best results, spray when weeds are less than 6 inches tall.

#### Weeds Controlled with Tank Mix of HY-END MSM 60 DF plus 2,4-D Amine:

Pigweed Species  
Puncture Vine  
Velvetleaf

#### APPLICATION INFORMATION

HY-END MSM 60 DF may be applied to grain sorghum by properly calibrated ground or aerial equipment.

**Ground Application:** Apply uniformly by ground with a properly calibrated low pressure (20-40 PSI) boom sprayer equipped with flat fan nozzles. Use 10-30 GPA with ground equipment.

**Aerial Application:** Use orifice discs, cores and nozzle types and arrangements that will provide for optimum spray distribution and maximum coverage at 2 to 5 GPA. Do not apply during inversion conditions, when winds are gusty, or when other conditions will favor poor coverage and/or drift.

HY-END MSM 60 DF can be used on either dryland or irrigated grain sorghum. If application is made to irrigated sorghum, delay first post-treatment irrigation for at least 3 days after treatment. The first post-treatment irrigation should not exceed 1".

Use cultivation prior to HY-END MSM 60 DF + 2,4-D amine treatment to cover exposed brace roots of grain sorghum to minimize injury from 2,4-D amine.

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### PRECAUTIONS

- Temporary crop yellowing and/or stunting may occur soon after application, especially when crop is under stress conditions.
- Do not use on grain sorghum grown for seed production or syrup. Do not use on forage sorghum.
- Do not use for forage or silage within 30 days of application.
- Do not include surfactant or crop oil to the tank mix.
- Do not apply this treatment under cold, wet weather conditions or to grain sorghum growing under stress caused by weather, insects or disease as crop injury may result.
- Do not apply to long season grain sorghum varieties or grain sorghum that is planted after July 1, as crop injury or delayed maturity may occur.
- Do not exceed one (1) application per year.
- HY-END MSM 60 DF must be used with 2,4-D; in areas where 2,4-D use is restricted, follow requirement of the restriction. If 2,4-D use is prohibited, do not use HY-END MSM 60 DF on grain sorghum.

### CROP ROTATION

Before using HY-END MSM 60 DF, carefully consider your crop rotation plants and options. For rotational flexibility, do not treat all of your wheat, barley, triticale or fallow, pasture or rangeland acres at the same time.

#### Minimum Rotational Intervals

Minimum rotational intervals\* are determined by the rate of breakdown of HY-END MSM 60 DF applied. HY-END MSM 60 DF breakdown in the soil is affected by soil pH, presence of soil microorganisms, soil temperature, and soil moisture. Low soil pH, high soil temperature, and high soil moisture increase HY-END MSM 60 DF breakdown in soil, while high soil pH, low soil temperature, and low soil moisture slow HY-END MSM 60 DF breakdown.

Of these three factors, only soil pH remains relatively constant. Soil temperature, and, to a greater extent, soil moisture, can vary significantly from year to year and from area to area. For this reason, soil temperatures and soil moisture should be monitored regularly when considering crop rotations.

\*The minimum rotation interval represents the period of time from the last application to the anticipated date of the next planting.

#### Soil pH Limitations

HY-END MSM 60 DF should not be used on soils having a pH above 7.9, as extended soil residual activity could extend crop rotation intervals beyond normal. Under certain conditions, HY-END MSM 60 DF could remain in the soil for 34 months or more, injuring wheat and barley. In addition, other crops planted in high-pH soils can be extremely sensitive to low concentrations of HY-END MSM 60 DF.

#### Checking Soil pH

Before using HY-END MSM 60 DF, determine the soil pH of the areas of intended use. To obtain a representative pH value for the test area, take several 0" to 4" samples from different areas of the field and analyze them separately. Consult your local extension publications for additional information on recommended soil sampling procedures.

#### BIOASSAY

A field bioassay must be completed before rotating to any crop not listed (see the Rotation Intervals table), or if the soil pH is not in the specified range, or if the use rate applied is not specified in the table, or if the minimum cumulative precipitation has not occurred since application.

#### Field Bioassay

To conduct a field bioassay, grow test strips of the crop or crops you plan to grow the following year in fields previously treated with HY-END MSM 60 DF. Crop response to the bioassay will indicate whether or not to rotate to the crop(s) grown in the test strips.

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If a field bioassay is planned, check with your local agricultural dealer or an NaturChem representative for information detailing the field bioassay procedure.

**ROTATION INTERVALS FOR CEREALS**

All Areas – Following Use of HY-END MSM 60 DF at 1/10 oz. per Acre

Crop	Soil pH	Minimum Cumulative Precipitation (inches)	Minimum Rotation Interval (months)
Winter and Spring Wheat	7.9 or lower	No restrictions	1
Durum Wheat, Barley, Spring/Winter Oat	7.9 or lower	No restrictions	10

**ROTATION INTERVALS FOR CROPS IN NON-IRRIGATED LAND**

Following use of HY-END MSM 60 DF at 1/10 oz. per acre on Wheat, Barley, Triticale or Fallow

Location		Crop	Soil pH	Minimum Cumulative Precipitation (inches)	Minimum Rotation Interval (months)
State	County or Area				
Colorado	Statewide	Grain sorghum, Proso Millet	7.9 or lower	No restrictions	10
		Flax, Safflower, Sunflower	7.9 or lower	No restrictions	22
		Field corn	7.9 or lower	15	12
		IR Corn	7.9 or lower	No restrictions	4
		STS Soybeans	7.9 or lower	No restrictions	4
Idaho	Southern Idaho	Flax, Safflower, Sunflower	7.9 or lower	No restrictions	22
	Statewide	Peas	6.8 or lower	18	10
		Lentils	6.9 to 7.9	18	15
		Canola	6.9 to 7.9	18	34
		Canola	6.9 to 7.9	18	22
		Condiment mustard	7.3 or lower	10	10
		Condiment mustard	7.4 or higher	28	34
		Chickpeas	7.3 or lower	10	10
		Chickpeas	7.4 or higher	28	34

Location		Crop	Soil pH	Minimum Cumulative Precipitation (inches)	Minimum Rotation Interval (months)
State	County or Area				
Kansas	Statewide	Grain sorghum Proso millet	7.9 or lower	No restrictions	10
		Flax, Safflower, Sunflower	7.9 or lower	No restrictions	22
	Central and Western Kansas (west of the Flint Hills)	Field corn	7.9 or lower	15	12
		IR Corn	7.9 or lower	15	4
	Central Kansas; generally E of Hwy. 183 and W of the Flint Hills	Soybeans	7.9 or lower	15	12
		STS Soybeans	7.9 or lower	15	4
		Western Kansas, W. of Hwy. 183	Soybeans	7.5 or lower 7.6-7.9	22 33
Montana	Statewide	Grain sorghum, Proso millet, Field corn	7.9 or lower	22	22
		Alfalfa (hay only)	7.6-7.9	No restrictions	34
			7.5 or lower	No restrictions	22
		Flax, Safflower, Sunflower	7.9 or lower	No restrictions	22
Nebraska	Statewide	Flax, Safflower, Sunflower	7.9 or lower	No restrictions	22
		Grain sorghum, Proso millet	7.9 or lower	No restrictions	10
		IR Corn	7.9 or lower	No restrictions	4
		STS Soybeans	7.9 or lower	No restrictions	4
	Generally W. of Hwy. 77 and E of the Panhandle	Field corn	7.9 or lower	15	12
		Soybeans	7.5 or lower	22	22
			7.6 – 7.9	33	34

Location		Crop	Soil pH	Minimum Cumulative Precipitation (inches)	Minimum Rotation Interval (months)
State	County or Area				
New Mexico	Statewide	Grain sorghum Proso millet	7.9 or lower	No restrictions	10
		Flax, Safflower Sunflower	7.9 or lower	No restrictions	22
	Eastern New Mexico	Cotton (dryland Only)	7.9 or lower	30	22
North Dakota	W. of Hwy. 1	Grain sorghum, Proso millet, Field corn, Dry beans, Flax, Safflower, Soybean, Sunflower	7.9 or lower	22	22
	E. of Hwy. 1	Grain sorghum, Proso millet, Field corn, Dry beans, Flax, Safflower, Soybean, Sunflower	7.9 or lower	34	34
Oklahoma	Statewide	Grain sorghum, Proso millet	7.9 or lower	No restrictions	10
		Flax, Safflower, Sunflower	7.9 or lower	No restrictions	22
		IR Corn STS Soybeans	7.9 or lower	No restrictions	4
		Field corn	7.9 or lower	15	12
	Panhandle	Cotton (dryland only)	7.9 or lower	30	22
	E. of the Panhandle	Cotton (dryland only)	7.9 or lower	25	14

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Location		Crop	Soil pH	Minimum Cumulative Precipitation (inches)	Minimum Rotation Interval (months)
State	County or Area				
Oregon	Statewide	Condiment mustard	7.3 or lower	10	10
		Condiment mustard	7.4 or higher	28	34
		Chickpeas	7.3 or lower	10	10
		Chickpeas	7.4 or higher	28	34
		Peas Lentils Canola	6.8 or lower	18	10
		Peas	6.9 to 7.9	18	15
		Lentils	6.9 to 7.9	18	34
		Canola	6.9 to 7.9	18	22
South Dakota	Statewide	Flax, Safflower, Soybean, Sunflower	7.9 or lower	No restrictions	22
	S. of Hwy. 212 & E. of the Missouri River, & S. of Hwy. 34 & W. of Missouri River.	Grain sorghum, Proso millet	7.9 or lower	13	12
	Generally E. of Missouri River & S. of Hwy. 14, & W. of Missouri River	Field corn	7.9 or lower	15	12
Texas	Statewide	Grain sorghum, Proso millet	7.9 or lower	No restrictions	10
		Flax Safflower Soybean, Sunflower	7.9 or lower	No restrictions	22
	Panhandle	Field corn	7.9 or lower	15	12
		Cotton (dryland only)	7.9 or lower	30	22

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Location		Crop	Soil pH	Minimum Cumulative Precipitation (inches)	Minimum Rotation Interval (months)
State	County or Area				
Texas	N. Central Texas*	Field corn	7.9 or lower	15	12
		Cotton (dryland only)	7.9 or lower	25	14
* The counties of N. Central Texas are: Archer, Baylor, Bell, Bosque, Bowie, Callahan, Camp, Cass, Clay, Collin, Cooke, Coryell, Dallas, Delta, Denton, Eastland, Ellis, Falls, Fannin, Foard, Franklin, Grayson, Hardeman, Haskell, Hill, Hood, Hopkins, Hunt, Jack, Johnson, Kaufman, Knox, Lamar, Limestone, McLennan, Mlham, Montague, Morris, Nafarro, Palo Pinto, Parker, Rains, Red River, Robertson, Rockwall, Shackelford, Somervell, Stephens, Tarrant, Throckmorton, Titus, Upshur, Van Zandt, Wilbarger, Wichita, Williamson, Wise, Wood, Young					
Washington	Statewide	Peas	6.8 or lower	18	10
		Lentils			
		Canola			
		Peas	6.9 to 7.9	18	15
		Lentils	6.9 to 7.9	18	34
		Canola	6.9 to 7.9	18	22
		Condiment mustard	7.3 or lower	10	10
Utah	Statewide	Condiment mustard	7.4 or higher	28	34
		Chickpeas	7.3 or lower	10	10
		Chickpeas	7.4 or higher	28	34
		Flax	7.9 or lower	No restrictions	22
Wyoming	Statewide	Safflower			
		Sunflower			
	Southern Wyoming	Flax	7.9 or lower	No restrictions	22
		Safflower			
Northern Wyoming	Sunflower				
	Grain sorghum, Proso millet	7.9 or lower	No restrictions	10	
Southern Wyoming (Goshen, Laramie, and Platte counties only)	Field corn	7.9 or lower	15	12	
	Grain sorghum, Proso millet, Field corn	7.9 or lower	22	22	

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**Rotation Intervals not covered above-** The minimum rotation interval is 34 months with at least 28" of cumulative precipitation during the period:

- To any major field crop not listed (See the Rotation Intervals table)
- If the soil pH is not in the specified range
- If the use rate applied is not specified in the table
- Or if the minimum cumulative precipitation has not occurred since application.

To rotate to a major field crop at an interval shorter than recommended, a field bioassay must be successfully completed to that crop. A field bioassay must be successfully completed before rotation to any minor crops (as determined by the USDA criteria). See section on Field Bioassay for further information.

**RECRIPPING INTERVALS FOR GRASSES ON CONSERVATION RESERVE PROGRAM (CRP)**

Whenever MSM 60 DF has previously been used in wheat, barley, triticale or fallow, the following grasses may be planted after the intervals specified in the tables below. The planting of grass and legume mixtures is not recommended as injury to the legume may occur.

- Bentgrasses
- Blue grama
- Bluestems – Big, Little, Plains, Sand, WW Spar
- Buffalograss
- Galleta
- Green needlegrass
- Green sprangletop
- Indian ricegrass
- Lovegrasses – Sand, Weeping
- Orchardgrassnot (excluding Plaute)
- Prairie sandreed
- Sand dropseed
- Sheep fescue
- Sideoats grama
- Switchgrass
- Wild ryegrasses – Beardless, Russian
- Wheatgrasses – Crested, Intermediate, Pubescent, Slender, Streambank, Tall, Thickspike, Western

**ROTATION INTERVALS**

**MN, MT, ND, SD and Northern WY:**

Soil pH	Use Rate (ounces/Acre)	Minimum Interval for Planting Grasses
7.5 or lower	1/10	4 months (all grasses)
7.6 to 7.9	1/10	4 months (Wheatgrasses only)

**AR, CO, ID, KS, LA, NE, MN, OK, OR, TX, UT, WA, Southern WY:**

Soil pH	Use Rate (ounces/Acre)	Minimum Interval for Planting Grasses
7.9 or lower	1/10	2 months (all grasses)

**GRAZING**

There are no grazing restrictions on HY-END MSM 60 DF.

**IMPORTANT PRECAUTIONS**

Treated vegetation may be cut for forage or hay. Coveralls, shoes plus socks must be worn if cutting within 4 hours of treatment.

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## PRECAUTIONS

- Injury to or loss of desirable trees or vegetation may result from failure to observe the following:
- Do not apply, drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots.
- Do not use on lawns, walks, driveways, tennis courts, golf courses, athletic fields, commercial sod operations, or other high-maintenance, fine turfgrass areas, or similar areas.
- Do not use on grasses grown for seed.
- Do not apply to irrigated land where tailwater will be used to irrigate crops other than wheat and barley.
- Do not apply to frozen ground as surface runoff may occur.
- Do not apply to snow-covered ground.
- Wheat and barley varieties may differ in their response to various Herbicides. NaturChem recommends that you first consult your state experiment station, university, or extension agent as to sensitivity to any Herbicide. If no information is available, limit the initial use of HY-END MSM 60 DF to a small area.
- Under certain conditions such as heavy rainfall, prolonged cold weather, or wide fluctuations in day/night temperatures prior to or soon after HY-END MSM 60 DF applications, temporary discoloration and/or crop injury may occur. HY-END MSM 60 DF should not be applied to wheat or barley that is stressed by severe weather conditions, drought, low fertility, water-saturated soil, disease, or insect damage or crop injury may result. Risk of injury is greatest when crop is in the 2 to 5 leaf stage. Severe winter stress, drought, disease, or insect damage following application also may result in crop injury.
- The combined treatment effects of HY-END MSM 60 DF postemergence preceded by preemergence wild oat Herbicides may cause crop injury to spring wheat when crop stress (soil crusting, planting too deep, prolonged cold weather, or drought) causes poor seedling vigor.
- In the Pacific Northwest, to prevent cold weather-related crop injury, avoid making applications during winter months when weather conditions are unpredictable and can be severe.
- Do not apply to wheat, barley or pastures undersown with legumes, as injury to the forage may result.
- To reduce the potential for movement of treated soil due to wind erosion, do not apply to powdery dry or light sandy soils until they have been stabilized by rainfall, trashy mulch, reduced tillage, or other cultural practices. Injury to immediately adjacent crops may occur when treated soil is blown onto land used to produce crops other than cereal grains or pasture/rangeland.
- For ground applications applied to weeds when dry, dusty field conditions exist, control of weeds in wheat tract areas may be reduced. The addition of 2,4-D or MCPA should improve weed control under these conditions.
- Preplant or preemergence applications of 2,4-D made within 2 weeks of planting spring cereals may cause crop injury when used in conjunction with early postemergence applications of HY-END MSM 60 DF. For increased crop safety, delay HY-END MSM 60 DF treatment until crop tillering has begun.

## NON-CROP USES

### GENERAL INFORMATION

HY-END MSM 60 DF is a dispersible granule that is mixed in water and applied as a spray. HY-END MSM 60 DF controls many annual and perennial weeds and woody plants in non-crop areas, conifer and hardwood plantations. HY-END MSM 60 DF may also be used on pastures, or CRP as well as selected uncultivated agricultural areas (fence rows, farmyards, and rights-of-way) directly adjacent to treated pastures or rangeland, where grazing or harvesting for animal feed may occur.

HY-END MSM 60 DF may be used for general weed and brush control and for the control of certain noxious weeds on noncrop sites, ditch banks or dry drainage ditches and for selective weed control in certain types of unimproved turf grass. Do not use on irrigation ditches. HY-END MSM 60 DF can also be used for controlling and suppressing undesirable weeds and hardwoods in conifer plantations and weeds in hardwood plantations.

HY-END MSM 60 DF controls weeds and woody plants primarily by post emergent activity. HY-END MSM 60 DF has preemergence activity, best results are generally obtained when HY-END MSM 60 DF is applied to foliage after emergence or dormancy break. Generally, for the control of annual weeds, HY-END MSM 60 DF provides best results when applied to young, actively growing weeds. For the control of perennial weeds, applications made at the bud/bloom stage or while the target weeds are in the fall rosette stage may provide the best results. The use rate depends upon the weed species and size at the time of application.

The degree and duration of control may depend on the following:

- Weed spectrum and infestation intensity
- Weed size at application
- Environmental conditions of and following treatment
- Soil pH, soil moisture, and soil organic matter

HY-END MSM 60 DF may be applied on conifer and hardwood plantations and noncrop sites that contain areas of temporary surface water caused by the collection of water between planting beds, in equipment ruts, or in other depressions created by management activities. It is permissible to treat intermittently flooded low-lying sites when no water is present. It is also permissible to treat marshes, swamps, and bogs after water has receded as well as seasonally dry food deltas. DO NOT make applications to natural or man-made bodies of water such as lakes, reservoirs, ponds, streams and canals.

Do not apply more than 4 ounces HY-END MSM 60 DF E per acre per year.

### ENVIRONMENTAL CONDITIONS AND BIOLOGICAL ACTIVITY

HY-END MSM 60 DF is absorbed primarily through the foliage of plants, and by the roots to a lesser degree. Plant cell division is generally inhibited in sensitive plants within a few hours following uptake. Two to 4 weeks after application, leaf growth slows followed by discoloration and tissue death. The final effects on annual weeds are evident about 4 to 6 weeks after application. The ultimate effect on perennial weeds on woody plants occurs in the growing season following application.

Warm, moist conditions following treatment promote the activity of HY-END MSM 60 DF while cold dry conditions may reduce or delay activity. Weeds and brush hardened off by cold weather or drought stress may not be controlled.

One to two inches of rainfall or sprinkler irrigation (enough to wet the top 2-3 inches of soil profile) may be needed to move HY-END MSM 60 DF into the weed root zone before the next flush of weeds emerge. The amount of moisture required for sufficient activation increases with crop or weed residue and for finer textured soils. Without sufficient rainfall or sprinkler irrigation to move HY-END MSM 60 DF into the weed root zone, weeds that germinate after treatment will not be controlled.

Application of HY-END MSM 60 DF provides the best control in vigorously growing grasses that shade competitive weeds. Weed control in areas of thin grass may not be as satisfactory. However, a grass canopy that is too dense at application can intercept a spray and reduce weed control.

HY-END MSM 60 DF is safe to grasses under normal conditions. However, grasses that are stressed from adverse environmental conditions (such as extreme temperatures or moisture), abnormal soil conditions, or cultural practices may be injured by applications of HY-END MSM 60 DF. In addition, different species of grass may be sensitive to treatment with HY-END MSM 60 DF under otherwise normal conditions. Application of HY-END MSM 60 DF to these species may result in injury.

The use of a surfactant is recommended to enhance the control of susceptible plants, except where noted. Apply at a minimum rate (concentration) of ¼% volume/volume (1 quart per 100 gallons of spray solution) or at the manufacturer's recommended rate. Use only EPA approved surfactants containing at least 80% active ingredient. Certain types of surfactants, such as those incorporating acetic acid (i.e., LI-700), may not be compatible with HY-END MSM 60 DF and may result in decreased performance. Certain surfactants may not be suitable for use on desirable plants such as turf and conifers, listed on this label. Consult the surfactant manufacturer's label for appropriate uses.

Weed and brush control may be reduced if rainfall, snowfall or sprinkler irrigation occurs within 4 hours following application.

## AGRICULTURAL USES

### CONIFER PLANTATIONS

#### Application Information

HY-END MSM 60 DF is recommended for the control of many species of weeds and deciduous trees on sites where conifers are growing or are to be planted. Apply by ground equipment or by air (helicopter only). Refer to the "Weeds Controlled" and "Brush Species Controlled" for a listing of susceptible species.

#### Application Timing

Apply HY-END MSM 60 DF after weeds have emerged or after undesirable hardwoods have broken winter dormancy and have reached the point of full leaf expansion.

#### Conifer Site Preparation

##### Application Before Transplanting

After consulting the "Weeds Controlled" and "Brush Species Controlled" tables, apply the rates of HY-END MSM 60 DF recommended for the most difficult to control species on the site.

**Southeast** – Apply up to 4 ounces per acre for loblolly and slash pines. Transplant the following planting season.

**Northeast and Lake States** – Apply up to 2 ounces per acre for red pine. Transplant the following planting season. Apply up to 2 ounces per acre for black, white and Norway spruce. Transplant the following spring.

**West** – Apply up to 2 ounces per acre prior to planting Douglas fir, Sitka Spruce, Western Red Cedar, Western Hemlock, Ponderosa Pine, and Grand Fir in the Coast Rangeland and western slope of the Cascades in Oregon and Washington. These conifer species listed can be planted anytime after application. Other conifer species can be planted providing the user has prior experience indicating acceptable tolerance to HY-END MSM 60 DF soil residues.

Without prior experience, it is recommended that other species be planted on a small scale to determine selectivity before large-scale plantings are made as unacceptable injury may occur. NaturChem will not assume responsibility for injury to any conifer species not listed on this label.

### TANK MIX COMBINATIONS

For broader spectrum control, the following products are recommended in combination with HY-END MSM 60 DF.

#### Accord™

Tank mix 1 to 2 ounces of HY-END MSM 60 DF with 10 to 24 fluid ounces of Accord™ per acre. Refer to the product container for a list of species controlled.

#### Arsenal® Applicator's Concentrate

Tank mix 1 to 2 ounces of HY-END MSM 60 DF with 10 to 24 fluid ounces of Arsenal® Applicator's Concentrate per acre. Loblolly and slash pines may be transplanted the planting season following the application. This combination controls ash, black gum, cherry, hawthorn, honeysuckle, hophornbeam, persimmon, oaks (red, white and water), sassafras, sweetgum, Vaccinium species, and suppresses blackberry, dogwood, elms, myrtle dahoon, hickories, and red maple.

#### Accord™ + Arsenal® Applicators Concentrate

Tank mix ½ to 1 ounce of HY-END MSM 60 DF with 16 to 64 fluid ounces of Accord™ and 10 to 12 fluid ounces of Arsenal® Applicator's Concentrate per acre. Slash and loblolly pines may be transplanted the planting season following application. This combination controls cherry, dogwood, elms, oaks (red and water), persimmon, sassafras, sweetgum and suppresses hickory.

#### VELPAR® L or VELPAR® DF

Tank mix 1 to 2 ounces of HY-END MSM 60 DF per acre with VELPAR® L or VELPAR® DF at the rates recommended on the container for various soil textures. Loblolly and slash pines may be transplanted the planting season following application. Refer to the product container for a list of species controlled.

#### OUST® EXTRA

Tank mix ½ to 1-½ ounces of HY-END MSM 60 DF with 2 to 3 ounces of OUST® EXTRA per acre for herbaceous weed control. Refer to the product container and the "Weeds Controlled" section of this label for a listing of the weeds controlled. Loblolly and slash pines may be transplanted the planting season following application. Tank mix 2 ounces of HY-END MSM 60 DF with 3 ounces of OUST® EXTRA per acre for herbaceous weed control and early spring suppression of bull thistle and Canada thistle in the Coast Rangeland and western slope of the Cascade Mountains. Douglas Fir may be transplanted at least 90 days following application.

#### RELEASE—HARDWOOD CONTROL AND SUPPRESSION

HY-END MSM 60 DF is recommended for application over the top of established slash and loblolly pine to control the species listed in "Weeds Controlled" and "Brush Species Controlled" section of this label. Apply 1 to 4 ounces per acre to control the species indicated, including kudzu.

#### Tank Mix Combinations

For broader spectrum control, the following products are recommended in combination with HY-END MSM 60 DF.

**Arsenal® Applicator's Concentrate**

Tank mix 1 to 2 ounces of HY-END MSM 60 DF with 8 to 16 fluid ounces of Arsenal® Applicator's Concentrate per acre for application to loblolly pine. Refer to the Arsenal® Applicator's Concentrate label regarding the use of surfactants and the appropriate application timing with respect to the age and development stage of the pines. This combination controls ash, black gum, cherry, hawthorn, honeysuckle, hophornbeam, oaks (red, white and water), sassafras, sweetgum, Vaccinium species and suppresses blackberry, dogwood, elms, myrtle dahoon, hickories, persimmon, and red maple.

**VELPAR® L or VELPAR® DF**

Tank mix 1 to 2 ounces of HY-END MSM 60 DF with VELPAR® L or VELPAR® DF at the rates recommended on the container for various soil textures. This combination may be applied to loblolly and slash pines.

**RELEASE—HERBACEOUS WEED CONTROL**

HY-END MSM 60 DF may be applied to transplanted loblolly and slash pine for the control of herbaceous competition. Consult the "Weeds Controlled" for a listing of the susceptible species and recommended application rates. Best results are obtained when HY-END MSM 60 DF is applied just before weed emergence until shortly after weed emergence.

**Tank Mix Combinations**

For broader spectrum control, the following products are recommended in combination with HY-END MSM 60 DF.

**Arsenal® Applicators Concentrate**

Tank mix ½ to 1 ounce of HY-END MSM 60 DF with 4 fluid ounces of Arsenal® Applicators Concentrate per acre. The tank mix may be used on loblolly pine.

**OUST® XP**

Tank mix ½ to 1 ½ ounces of HY-END MSM 60 DF with 2 to 3 ounces of OUST® XP per acre. Best results are obtained when HY-END MSM 60 DF is applied just before weed emergence until shortly after weed emergence. This tank mix may be used on loblolly and slash pine.

**VELPAR® L or VELPAR® DF**

Tank mix ½ to 1 ounce of HY-END MSM 60 DF with VELPAR® L or VELPAR® DF at the rates recommended on the container for various soil textures. This combination may be applied to loblolly and slash pines.

**IMPORTANT PRECAUTIONS—CONIFER PLANTATIONS ONLY**

- Applications of HY-END MSM 60 DF made to conifers that are suffering from loss of vigor caused by insects, disease, drought, winter damage, animal damage, excessive soil moisture, planting shock or other stresses may injure or kill the trees.
- Applications of HY-END MSM 60 DF made for herbaceous release should only be made after adequate rainfall has closed the planting slit and settled the soil around the roots following transplanting.
- Do not apply HY-END MSM 60 DF to conifers grown as ornamentals
- HY-END MSM 60 DF applications may result in damage and mortality to other species of conifers when they are present on sites with those listed in the preceding recommendations for conifer plantations

**HARDWOOD PLANTATIONS****Application Information**

HY-END MSM 60 DF is recommended at rates of up to 2 ounces per acre for the control of many weed species on sites where yellow poplar is growing or is to be planted, and on sites where red alder is to be planted. Apply by ground equipment or by air (helicopter only). Refer to the "Weeds Controlled" section of this label for a listing of susceptible species.

**Application Timing**

HY-END MSM 60 DF may be applied as a site preparation treatment prior to planting red alder or yellow poplar. As a prior to planting site preparation treatment for red alder, HY-END MSM 60 DF may be tank mixed with other Herbicides labeled for this use.

HY-END MSM 60 DF may also be applied over-the-top of planted yellow poplar seedlings after the soil has settled around the root system, but before the seedlings have broken dormancy (prior to bud break).

**Release—Herbaceous Weed Control**

HY-END MSM 60 DF may be applied to yellow poplar for the control of herbaceous competition. Consult the "Weeds Controlled" for a listing of the susceptible species and recommended application rates. Best results are obtained when HY-END MSM 60 DF is applied just before weed emergence until shortly after weed emergence.

**Tank Mix Combinations**

Tank mix ½ ounce of HY-END MSM 60 DF with 4 to 6 pints of VELPAR® L as recommended on the package label for "RELEASE - HERBACEOUS WEED CONTROL" in pine plantations in the eastern U.S. Follow the VELPAR® L label recommendations regarding altering the application rate by soil texture.

**IMPORTANT PRECAUTIONS—HARDWOOD PLANTATIONS ONLY**

- Application of VELPAR® L and HY-END MSM 60 DF made to yellow poplar that are suffering from loss of vigor caused by insects, disease, drought, winter damage, animal damage, excessive soil moisture, planting shock or other stresses may injure or kill the seedlings.
- Applications of HY-END MSM 60 DF made for release should only be made after adequate rainfall has closed the planting slit and settled the soil around the roots following transplanting.
- The use of surfactant is not recommended for applications made over the tops of trees.
- Careful consideration must be given by an experienced and knowledgeable forester to match the requirements of yellow poplar and/or red alder to conditions of the site. Treatment of yellow poplar and/or red alder planted on a site inadequate to meet its requirements may injure or kill the seedlings.

**PASTURE RANGELAND AND CONSERVATION RESERVE PROGRAM (CRP)****APPLICATION INFORMATION FOR GRASS ESTABLISHMENT IN PASTURE, RANGELAND AND CONSERVATION RESERVE PROGRAM (CRP)**

Use HY-END MSM 60 DF for the suppression or control of broadleaf weeds to aid in the establishment of the following perennial native or improved grasses planted in pasture, rangeland or acres enrolled in the Conservation Reserve Program (CRP):

Blue grama	Klein grass	Wheat grasses – bluebunch, crested, intermediate,
Bluestems – big, little, plains, sand, WW spar	Love grasses – atherstone, sand, weeping, wilman	pubescent, Siberian, Slender,
Buffalo grass	Orchard grass	Streambank, Tall, thickspike,
Green sprangletop	Sideoats grama	western
Indian grass	Switch grass – Blackwell	Wild rye grass – Russian

Consult with the Natural Resources and conservation Service or other local experts concerning planting techniques and other cultural practices to maximize potential for grass establishment.

Due to the inability of newly planted grass stands to sufficiently compete with weeds, and the severity of weed pressure in new grass stands, performance from HY-END MSM 60 DF may not always be satisfactory. An additional Herbicide application or mowing may be needed.

**Use Rates and Application Timing for Grass Establishment in Pasture, Rangeland and CRP**

**Preplant (prior to planting) or Preemergence (after planting but before grass emergence)**

Apply HY-END MSM 60 DF preplant or preemergence at 1/10 ounce/acre on all labeled grasses except orchard grass and Russian wild rye grass. Do not apply HY-END MSM 60 DF preplant or preemergence to orchard grass and Russian wild rye grass as severe crop injury may result.

**Early Postemergence to New Plantings**

Apply HY-END MSM 60 DF at 1/10 ounce/acre, plus a non-ionic surfactant at the rate of 2 to 4 pints/100 gallons of spray solution on all labeled grasses anytime after grass emergence. Do not use a spray adjuvant other than non-ionic surfactant.

Because grass species differ in time of emergence, apply only after majority of grasses are in the 3 to 4 leaf stage.

**Postemergence to stands with 1-5 leaf grasses planted the previous season**

Apply HY-END MSM 60 DF at 1/10 ounce/acre plus a non-ionic surfactant at the rate of 2 to 4 pints/100 gallons of spray solution, on all labeled grasses when the majority of the grasses have one or more leaves. Do not use a spray adjuvant other than non-ionic surfactant.

**APPLICATION INFORMATION FOR ESTABLISHED GRASSES IN PASTURE, RANGELAND AND CONSERVATION RESERVE PROGRAM (CRP)**

**Use Rates for Established Pastures, Rangeland and CRP**

Apply 1/10 to 1 ounce of HY-END MSM 60 DF per acre as a broadcast application to established grasses in pasture rangeland and CRP. For spot application, use 1 ounce per 100 gallons of water. Do not apply more than 1 2/3 ounces of HY-END MSM 60 DF per acre per year.

**Application Timing – Established Pastures, Rangeland and CRP**

HY-END MSM 60 DF may be applied to established native grasses such as bluestems and grama, and on other established pasture grasses such as bermudagrass, bluegrass, orchardgrass, bromegrass, fescue and timothy that were planted the previous growing season (or earlier) and are fully tillered, unless otherwise directed on this label. Specific application timing information on several of these grass species follows:

Pasture Grass	Minimum time from grass establishment to HY-END MSM 60 DF application
Bermudagrass	2 months
Bluegrass, bromegrass, and orchardgrass	6 months
Timothy	12 months
Fescue	24 months

**Fescue Precautions:**

Note that HY-END MSM 60 DF may temporarily stunt fescue, cause yellowing or seedhead suppression. To minimize these symptoms, take the following precautions:

- Do not use more than 4/10 oz./A of HY-END MSM 60 DF
- Tank mix HY-END MSM 60 DF with 2,4-D
- Use the lowest recommended rate for target weeds
- Use a non-ionic surfactant at ½ to 1 pint per 100 gallons of spray solution (1/16 to 1/8% v/v)
- Make application later in the spring after the new growth is 5 to 6 inches tall, or in the fall
- Do not use surfactant when liquid nitrogen is used as a carrier
- Do not use a spray adjuvant other than non-ionic surfactant

The first cutting yields may be reduced due to seedhead suppression resulting from treatment with HY-END MSM 60 DF.

**Timothy Precautions:**

Timothy should be at least 6" tall at application and be actively growing. Applications of HY-END MSM 60 DF to timothy under any other conditions may cause crop yellowing and/or stunting. To minimize these symptoms, take the following precautions:

- Do not use more than 4/10 oz./A of HY-END MSM 60 DF
- Tank mix HY-END MSM 60 DF with 2,4-D
- Use the lowest recommended rate for target weeds
- Use a non-ionic surfactant at ½ pint per 100 gallons
- Make application in the late summer or fall
- Do not use surfactant when liquid nitrogen is used as a carrier
- Do not use a spray adjuvant other than non-ionic surfactant

**Application of HY-END MSM 60 DF to Pensacola bahiagrass, ryegrass (Italian or perennial) and Garrison's creeping foxtail may cause severe injury to and/or loss of pastures.**

**Other Pasture and Rangeland Grasses:** Varieties and species of forage grasses differ in their tolerance to herbicides. When using HY-END MSM 60 DF on a particular grass for the first time, limit use to a small area. If no injury occurs throughout the season, larger acreage may be treated the following season. Broadleaf pasture species such as alfalfa and clover are highly sensitive to HY-END MSM 60 DF and will be severely stunted or injured by HY-END MSM 60 DF.

**WEEDS AND BRUSH CONTROLLED OR SUPPRESSED IN PASTURES, RANGELAND AND CONSERVATION RESERVE PROGRAM (CRP)**

Unless otherwise directed, treat when weeds are less than 4" tall or in diameter and are actively growing.

Before using HY-END MSM 60 DF, carefully consider your crop rotation plans and options. For rotational flexibility, do not treat all of your pasture, rangeland or CRP acres at the same time.

**1/10 OUNCE PER ACRE**

Bitter sneezeweed	Marestail
Blue/purple mustard*	Mayweed chamomile
Broomweed, common	Miners lettuce
Bur buttercup (testiculate)	Pigweed (redroot, smooth, tumble)
Buttercup	Plains coreopsis
Canada thistle* ‡	Plantain
Carolina geranium	Prickly lettuce*
Coast fiddleneck (tarweed)	Prostrate knotweed* ‡
Common chickweed	Russian thistle*
Common mullein	Shepherd's purse
Common Purslane	Smallseed falseflax
Conical catchfly	Smartweed (green, ladysthumb, pale)
Corn growwell* ‡	Snow speedwell
Cowcockle	Tansymustard*
Curly dock	Treacle mustard (Bushy Wallflower)
Cutleaf evening primrose* ‡	Tumble/Jim Hill mustard
Dandelion	Volunteer sunflower*
False chamomile	Waterpod
Field pennycress (fanweed)	Wild buckwheat* ‡
Filaree	Wild garlic*
Flixweed*	Wild mustard
Groundsel (common)	Wild sunflower* ‡
Henbit	Woolly croton*
Kochia*	
Lambsquarters (common, slimleaf)	

**2/10 OUNCE PER ACRE**

Annual marshelder	Horsemint (beebalm)
Blackeyed-Susan	Musk thistle*
Buckbrush ‡	Purple scabious
Burclover	Scotch thistle*
Common yarrow	Western snowberry ‡
Dogfennel	Wild carrot

**3/10 to 1/2 OUNCE PER ACRE**

Annual sowthistle	Pensacola bahiagrass*
Aster	Redstem filaree
Bittercress	Rough fleabane
Chicory	Seaside arrowgrass
Clover	Sericea lespedeza*
Cocklebur	Silky crazywood (locoweed)
Corn cockle	Sweet clover
Crown vetch	Wild lettuce
Goldenrod	Wood sorrel
Maximillion sunflower	Yankeeweed
Multiflora rose* ‡	
Pennsylvania smartweed	

**1/2 to 1 OUNCE PER ACRE**

Black henbane	Honeysuckle
Blackberry	Multiflora rose and other wild roses*
Broom snakeweed	Plumeless thistle
Buckhorn plantain	Rosering gaillardia
Common crupina	Spotted knapweed*
Dewberry	Teasel
Dyer's woad	Wild caraway
Gorse	Yucca* ‡
Halogeton	

**1 OUNCE PER ACRE**

Bull thistle	Rush skeletonweed* ‡
Common tansy	Salsify
Field bindweed ‡	Scouringrush
Gumweed	Snowberry
Houndstongue	St. Johnswort
Perennial Pepperweed	Western salsify
Poison hemlock	Whitetop (hoary cress)
Purple loosestrife	

\*See the Specific Weed Problems section of this label.

‡Weed suppression is a reduction in weed competition (reduced population and/or vigor) as visually compared to an untreated area. The degree of suppression varies with the rate used, the size of the weeds, and the environmental conditions following treatment.

## SPOT APPLICATIONS FOR THE SUPPRESSION OF WEEDS AND BRUSH

### APPLICATION INFORMATION FOR SPOT APPLICATIONS

HY-END MSM 60 DF is recommended for the suppression of the following undesirable weed and brush species growing in pastures, rangeland or CRP using spot applications. Spot applications may be made by using equipment such as back pack sprayers or hand sprayers. HY-END MSM 60 DF should be applied as a spray to the foliage and stems. The application volume required will vary with the height and density of the brush and the application equipment used. Regardless of the application volume and equipment used, thorough coverage of the foliage and stems is necessary to optimize results. On tall, dense stands, it is often necessary to spray from both sides to obtain adequate coverage. Add a non-ionic surfactant having at least 80% active ingredient at 2-4 pints per 100 gallons of spray solution.

#### Use Rates for Spot Application

Mix 1 ounce of HY-END MSM 60 DF per 100 gallons of water.

#### Application Timing for Spot Applications

Make a foliar application of the recommended rate of HY-END MSM 60 DF during the period from full leaf expansion in the spring until the development of full fall coloration.

#### Weed and Brush Species Suppressed with Spot Applications

Blackberry†	Dewberry†
Canada Thistle*†	Multiflora Rose†

\*See the Specific Weed Problems section.

†Weed and brush suppression is a reduction in weed and brush competition (reduced population and/or vigor) as visually compared to an untreated area. The degree of suppression varies with the rate used, the size of the weeds, and the environmental conditions following treatment.

### SPECIFIC WEED PROBLEMS

**Note:** Thorough spray coverage of all weed species listed below is very important.

**Blue/Purple Mustard, Flixweed, and Tansymustard:** For best results, apply HY-END MSM 60 DF tank mixtures with 2,4-D or MCPA postemergence to mustards, but before bloom.

**Broom Snakeweed:** For best results, apply HY-END MSM 60 DF at ½ ounce/acre in the fall. Applications of HY-END MSM 60 DF in the spring will provide suppression only.

**Canada Thistle:** For suppression with broadcast applications, apply either HY-END MSM 60 DF or HY-END MSM 60 DF plus 2,4-D or MCPA in the spring after the majority of thistles have emerged and are small (rosette stage to 6' elongating stems) and actively growing. The application will inhibit the ability of emerged thistles to compete with grass.

For suppression with spot applications, apply as a foliar spray once plant is fully leaved.

**Corn Gromwell, Cutleaf Evening Primrose and Prostrate Knotweed:** Apply HY-END MSM 60 DF when weeds are actively growing, are no larger than 2" tall, and when crop canopy will allow thorough coverage. Tank mixing 2,4-D or MCPA with HY-END MSM 60 DF can improve results.

**Kochia, Russian thistle, Prickly lettuce:** Naturally occurring resistant biotypes of these weeds are known to occur. For best results, use HY-END MSM 60 DF in a tank mix with Dicamba (such as Banvel or Clarity) and 2,4-D. HY-END MSM 60 DF should be applied in the spring when kochia, Russian thistle, and prickly lettuce are less than 2" tall or 2' across and are actively growing.

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**Multiflora Rose:** For control with broadcast applications, apply HY-END MSM 60 DF at ½ ounce per acre as a broadcast application. For control with foliar applied spot applications, apply HY-END MSM 60 DF at 1 ounce per 100 gallons of water.

For suppression with broadcast applications, apply HY-END MSM 60 DF at rates of 3/10 up to ½ ounce per acre. Applications should be made in the spring, soon after multiflora rose is fully leaved and is less than 3 feet tall.

For control with Spotgun Basal Soil Treatment, prepare a spray suspension of HY-END MSM 60 DF by mixing 1 ounce per gallon water. Mix vigorously until the HY-END MSM 60 DF is dispersed and agitate periodically while applying the spray suspension. Apply the spray preparation with an exact delivery handgun applicator. Apply at the rate of 4 ml for each 2 feet of rose canopy diameter. Direct the treatment to the soil within 2 feet of the stem union. When treating large plants and more than one delivery is required, make applications on opposite sides of the plant.

Make applications from early spring to summer.

**Musk Thistle, Scotch Thistle:** Apply HY-END MSM 60 DF at 2/10 to ¾ ounce per acre in the spring or early summer prior to flowering or in the fall after newly emerged plants have reached the rosette stage of growth. Certain biotypes of Musk and Scotch Thistles are less sensitive to HY-END MSM 60 DF and may not be controlled with HY-END MSM 60 DF rates less than ¾ ounce per acre. Consult with your local NaturChem representative, dealer or applicator for specific use rate and tank mix recommendations for your area. Fall applications should be made before the soil freezes.

**Pensacola bahiagrass control in established Bermudagrass pasture:** Apply HY-END MSM 60 DF at 3/10 ounce per acre after green-up in the spring but before bahiagrass seedhead formation. Application should be made when moisture is sufficient to enhance grass growth.

HY-END MSM 60 DF is very effective for removal of bahiagrass from bermudagrass pastures. In highly infested pastures, the use of HY-END MSM 60 DF can clear the areas of useful forage until the bermudagrass has time to cover the area. Therefore, HY-END MSM 60 DF treatments should be spread out over a period of years. Do not apply to an entire farm or ranch in one year. Fertilization (particularly with nitrogen and potassium) and/or replanting may accelerate the process of reestablishment of bermudagrass.

Under heavy bahiagrass pressure, grazing pressure, or adverse weather conditions (heat and drought), bahiagrass regrowth may occur.

Do not use HY-END MSM 60 DF for control of common or Argentine bahiagrass. Also, do not use HY-END MSM 60 DF in liquid fertilizer solutions for Pensacola bahiagrass control as poor control and/or regrowth may occur.

**Rush skeletonweed:** For best results, apply HY-END MSM 60 DF at 1 ounce per acre with 8 fluid ounces of dicamba (such as Banvel or Clarity) and 16 fluid ounces of 2,4-D.

**Sericea lespedeza:** For best results, apply HY-END MSM 60 DF at 4/10 to ½ ounce per acre beginning at flower bud initiation through the full bloom stage of growth. Consult with your local NaturChem representative, dealer or applicator for specific use rate recommendations for your area. Do not make applications if drought conditions exist at intended time of application.

**Spotted Knapweed:** For best results, apply HY-END MSM 60 DF at ½ ounce per acre with 8 fluid ounces of dicamba (such as Banvel or Clarity) and 16 ounces active ingredient per acre of 2,4-D.

**Sunflower (wild or volunteer):** Apply either HY-END MSM 60 DF or HY-END MSM 60 DF plus 2,4-D or MCPA after the majority of sunflowers have emerged, are 2" to 4" tall and are actively growing. Use spray volumes of at least 3 gallons by air or 10 gallons by ground.

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**Wild Buckwheat:** For best results, apply HY-END MSM 60 DF plus 2,4-D or MCPA when plants have no more than 3 true leaves (not counting cotyledons). If plants are not actively growing, delay treatment until environmental conditions favor active weed growth.

**Wild Garlic:** Apply 1/10 to 2/10 ounce per acre of HY-END MSM 60 DF in the early spring when wild garlic is less than 12" tall with 2" to 4" of new growth.

**Woolly Croton:** Apply 1/10 to 2/10 ounce per acre of HY-END MSM 60 DF in the late spring or early summer from cotyledon through 2 true leaf stage.

**Yucca:** For best results, apply HY-END MSM 60 DF at ½ to ¾ ounce per acre plus 2,4-D, dicamba, dicamba plus 2,4-D, or Triclopyr BEE (such as Remedy®) from two weeks before blooming to two weeks after blooming.

#### SPRAY ADJUVANTS

Unless otherwise directed on this label, HY-END MSM 60 DF applications must include either a crop oil concentrate or a nonionic surfactant. In addition, an ammonium nitrogen fertilizer can be used unless specifically prohibited by tank mix partner labeling. Consult your local NaturChem representative prior to using other adjuvant systems. If another herbicide is tank mixed with HY-END MSM 60 DF, select adjuvants authorized for use with both products. Products must contain only EPA exempt ingredients (40 CFR 1001).

##### *Petroleum Crop Oil Concentrate (COC) or Modified Seed Oil (MSO)*

- Apply at 1% v/v (1 gallon per 100 gallons spray solution) or 2% under arid conditions.
- MSO adjuvants may be used at 0.5% v/v (0.5 gallons per 100 gallons spray solution) if specifically noted on adjuvant product labeling.
- Oil adjuvants must contain at least 80% high quality, petroleum (mineral) or modified vegetable seed oil with at least 15% surfactant emulsifiers.

##### *Nonionic Surfactants (NIS)*

- Apply at 0.25% v/v (1 quart per 100 gallons spray solution) or 0.5% under arid conditions.
- Surfactant products must contain at least 60% nonionic surfactant with a hydrophilic/lipophilic balance (HLB) greater than 12.

##### *Ammonium Nitrogen Fertilizer*

- Use 2 quarts/acre of a high-quality urea ammonium nitrate (UAN), such as 28%N or 32%N, or 2 pounds/acre of a spray grade ammonium sulfate (AMS). Use 4 quarts/acre UAN or 4 pounds/acre AMS under arid conditions.

##### *Special Adjuvant Types*

- Combination adjuvant products may be used at doses that provide the required amount of NIS, COC, MSO and/or ammonium nitrogen fertilizer. Consult product literature for use rates and restrictions.
- In addition to the adjuvants specified above, other adjuvant types may be used if they provide the same functionality and have been evaluated and approved by NaturChem. Consult your local NaturChem representative before using adjuvant types not specified on this label.

**Exceptions:** (1) On Fescue pastures use ½ to 1-pint non-ionic surfactant per 100 gallons; (2) on Timothy pastures use ½ pint non-ionic surfactant per 100 gallons.

Antifoaming agents may be used if needed.

Do not use low rates of liquid fertilizer as a substitute for surfactant.

#### GROUND APPLICATION

To obtain optimum spray distribution and thorough coverage, use flat-fan or low-volume flood nozzles.

For flood nozzles on 30" spacings, use at least 10 gallons per acre (GPA), flood nozzles no larger than TK10 (or equivalent), and a pressure of at least 30 pounds per square inch (psi). For 40" nozzle spacings, use at least 13 GPA; for 60" spacings, use at least 20 GPA. It is essential to overlap the nozzles 100% for all spacings.

With "Raindrop RA" nozzles, use at least 30 GPA and ensure that nozzle spray patterns overlap 100%.

For flat-fan nozzles, use at least 10 GPA for broadcast applications to pasture, rangeland or CRP.

Use 50-mesh screens or larger.

#### AERIAL APPLICATION

Use nozzle types and arrangements that provide optimum spray distribution and maximum coverage. Use a minimum of 2 GPA. In Idaho, Oregon and Washington, use a minimum of 3 GPA.

When applying HY-END MSM 60 DF by air in areas adjacent to sensitive crops, use solid stream nozzles oriented straight back. Adjust the swath to avoid spray drift damage to sensitive crops downwind and/or use ground equipment to treat the border edge of fields. See the Spray Drift Management section of this label.

#### TANK MIXTURES

##### *With Insecticides and Fungicides*

HY-END MSM 60 DF may be tank-mixed or used sequentially with insecticides and fungicides registered for use on pastures, rangeland or CRP. However, under certain conditions (drought stress or cold weather), tank mixes or sequential applications of HY-END MSM 60 DF with organophosphate insecticides (such as parathion) may produce temporary grass yellowing or, in severe cases, grass injury.

The potential for grass injury is greatest when wide fluctuations in day/night temperatures occur just prior to or soon after application.

Test these tank mixtures in a small area before treating large areas. Do not use HY-END MSM 60 DF plus Malathion, as grass injury will result.

##### *With Herbicides*

HY-END MSM 60 DF may be tank mixed with other suitable registered herbicides to control weeds listed under Weeds Suppressed, weeds resistant to HY-END MSM 60 DF, or weeds not listed under Weeds Controlled. Read and follow all manufacturer's label recommendations for the companion herbicide. If those recommendations conflict with this label, do not tank mix the herbicide with HY-END MSM 60 DF.

##### *Herbicide Tank Mixtures for Pastures or Rangeland*

For postemergence control of the following weeds in pastures or rangeland:

Annual marshelder	Common milkweed
Burclover	Common ragweed
Carolina horsenettle	Giant ragweed
Common cocklebur	Western ragweed

Apply HY-END MSM 60 DF at 1/10 to 1 ounce per acre in a tank mix with one of the following products. Refer to companion herbicide labels to confirm that the product is labeled for control of the weeds listed above and is registered for use in your state.

Product	Rate (ounce product/A)
Grazon P+D	8 to 32
Picloram (such as Tordon® 22K)	4 to 16
Weedmaster	8 to 32
Triclopyr BEE (such as Remedy®)	8
Amber®	0.35*

\*For suppression of Western Ragweed in Phenoxy Restricted and Herbicide Regulated counties.

Product	Rate (ounces a.i./A)
2,4-D	8 to 16
Dicamba (such as Banvel or Clarity)	2 to 16
2,4-D + Dicamba	1 + 2.87 to 4 + 11.48

#### Herbicide Tank Mixtures for CRP

##### Preplant

HY-END MSM 60 DF may be tank mixed with glyphosate as a pre-plant (prior to the planting of CRP grasses) treatment to control broadleaf and grassy weeds. When using a glyphosate tank mix, allow at least 7 days after application before planting grasses. Refer to glyphosate containing product fact sheets and labels for all use instructions, label rates, weed control claims, and precautions.

##### Postemergence

For best weed control performance in CRP, use HY-END MSM 60 DF in a tank mix with 2,4-D (ester formulations perform best) or dicamba (such as Banvel or Clarity).

HY-END MSM 60 DF can be tank mixed with 2,4-D at ¼ pound a.i./A for all labeled grasses larger than the 5-leaf stage. For fully tillered stands, up to ½ pound a.i./A of 2,4-D may be used. A spray adjuvant may be added. However, the addition of spray adjuvant may increase the chance of grass injury.

HY-END MSM 60 DF can also be tank mixed with dicamba (such as Banvel or Clarity). Use not more than 1/8 to ¼ pound a.i./A of dicamba plus HY-END MSM 60 DF after majority of grasses are in the 3-leaf stage. In established grasses (2<sup>nd</sup> year stands), use not more than ¼ to ½ pound a.i./A dicamba plus HY-END MSM 60 DF. A spray adjuvant may be added. However, the addition of spray adjuvant may increase the chance of grass injury.

##### With Liquid Nitrogen Solution Fertilizer

Liquid nitrogen fertilizer solutions may be used as a carrier in place of water. Run a tank mix compatibility test before mixing HY-END MSM 60 DF in fertilizer solution.

HY-END MSM 60 DF must first be slurried with water and then added to liquid nitrogen solutions (e.g., 28-0-0, 32-0-0). Ensure that the agitator is running while the HY-END MSM 60 DF is added. Use of this mixture may result in temporary grass yellowing and stunting.

If using low rates of liquid nitrogen fertilizer (between 5% and 50% of the spray solution volume) in the spray solution, the addition of a non-ionic surfactant is necessary. Add surfactant at ¼ pint per 100 gallons of spray solution (0.03% v/v).

Do not use a spray adjuvant other than non-ionic surfactant.

When using high rates of liquid nitrogen fertilizer (greater than or equal to 50% of the spray solution volume) in the spray solution, adding spray adjuvant(s) increases the risk of grass injury. Consult your agricultural dealer, consultant, fieldman, or NaturChem representative for a specific recommendation before adding an adjuvant to these tank mixtures.

If 2,4-D or MCPA is included with HY-END MSM 60 DF and liquid nitrogen fertilizer mixture, ester formulations tend to be more compatible (see manufacturer's label). Do not add spray adjuvants when using HY-END MSM 60 DF in tank mix with 2,4-D ester and liquid nitrogen fertilizer solutions greater than 5% of the spray volume.

The use of liquid nitrogen fertilizer solutions greater than 5% of the spray volume with HY-END MSM 60 DF rates greater than 0.5 ounce/acre may cause grass injury.

Do not use low rates of liquid fertilizer as a substitute for spray adjuvants.

Do not use with liquid fertilizer solutions with a pH less than 3.0.

#### CROP ROTATION

Before using HY-END MSM 60 DF, carefully consider your crop rotation plans and options. For rotational flexibility, do not treat all of your pasture, rangeland or CRP acres at the same time.

##### Minimum Rotational Intervals

Minimum rotation intervals\* are determined by the rate of breakdown of HY-END MSM 60 DF applied. HY-END MSM 60 DF in the soil is affected by soil pH, presence of soil microorganisms, soil temperature, and soil moisture. Low soil pH, high soil temperature, and high soil moisture increase HY-END MSM 60 DF breakdown in soil, while high soil pH, low soil temperature, and low soil moisture slow HY-END MSM 60 DF breakdown.

Of these 3 factors, only soil pH remains relatively constant. Soil temperature, and to a greater extent, soil moisture, can vary significantly from year to year and from area to area. For this reason, soil temperatures and soil moisture should be monitored regularly when considering crop rotations.

\*The minimum rotation interval represents the period of time from the last application to the anticipated date of the next planting.

##### Soil pH Limitations

Do not apply HY-END MSM 60 DF on soils having a pH above 7.9, as extended soil residual activity could extend crop rotation intervals beyond normal. Under certain conditions, HY-END MSM 60 DF could remain in the soil for 34 months or more, injuring wheat and barley. In addition, other crops planted in high-pH soils can be extremely sensitive to low concentrations of HY-END MSM 60 DF.

##### Checking Soil pH

Before using HY-END MSM 60 DF, determine the soil pH of the areas of intended use. To obtain a representative pH value for the test area, take several 0" to 4" samples from different areas of the field and analyze them separately. Consult local extension publications for additional information on recommended soil sampling procedures.

##### Bioassay

A field bioassay must be completed before rotating to any crop or grass species/variety not listed in the Rotation Intervals Table, or if the soil pH is not in the specified range, or if the use rate applied is not specified in the table.

To conduct a field bioassay, grow test strips of the crop(s) or grass(es) you plant to grow the following year in fields previously treated with HY-END MSM 60 DF. Crop or grass response to the bioassay will indicate whether or not to rotate to the crop(s) or grass(es) grown in the test strips.

If a field bioassay is planned, check with your local Agricultural dealer or NaturChem representative for information detailing the field bioassay procedure.

**Grazing/Haying**

There are no grazing or haying restrictions for HY-END MSM 60 DF. Coveralls, shoes plus socks must be worn if cutting within 4 hours of treatment.

**Rotation Intervals in Pasture, Rangeland or CRP for Overseeding and Renovation**

Location	Crop or Grass Species	Maximum HY-END MSM 60 DF Rate on Pasture (ounce/acre)	Minimum Rotation Interval (months)
AL, AR, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA, WV	Alfalfa, red clover, white clover, sweet clover, bermudagrass, bluegrass, ryegrass, tall fescue	1/10 to 3/10	4
	Wheat (except durum)	1/10 to 3/10	1
	Durum, barley, oat	1/10 to 3/10	10
All states not included above	Red clover, white clover and sweet clover	1/10 to 2/10	12
	Bermudagrass, bluegrass, ryegrass	1/10 to 2/10	6
	Tall Fescue	1/10 to 2/10	18
	Wheat (except durum)	1/10 to 2/10	1
All areas with soil pH of 7.5 or less	Russian wildrye	1/10 to 1/2	1
	Green needlegrass, switchgrass, sheep fescue	1/10 to 1	1
	Meadow brome, smooth brome, alta fescue, red fescue, meadow foxtail, orchardgrass, Russian wildrye, timothy	1/10 to 1	2
All areas with soil pH of 7.9 or less	Alkali sacaton, mountain brome, blue grama, thickspike wheatgrass	1/10 to 1	1
	Sideoats grama, switchgrass	1/10 to 1/2	2
	Western wheatgrass	1/10 to 1	2
	Sideoats grama, switchgrass, big bluestem	1/10 to 1	3
AL, AR, FL, GA, KS, KY, LA, MS, MO, NC, OK, SC, TN, TX, VA, WV, with soil pH of 7.0 or less	STS soybeans	1/10 to 2/10	6
	Field corn	1/10 to 2/10	12

**NON-AGRICULTURAL USES**

**WEEDS CONTROLLED**

**1/3 to 1/2 Ounce Per Acre**

Annual sow thistle	Cow cockle	Rough fleabane
Aster	Crown vetch	Shepherd's-purse
Bahiagrass	Dandelion	Silky crazyweed (locoweed)
Beebalm	Dogfennel	Smallseed falseflax
Bittercrass	False chamomile	Smooth pigweed
Bitter sneezeweed	Fiddleneck tarweed	Sweet clover
Blackeyed Susan	Field pennycress	Tansymustard
Blue mustard	Flix weed	Treacle mustard
Bur buttercup	Goldenrod	Tumble mustard
Chicory	Lambsquarters	Wild carrot
Clover	Marestail/horseweed ****	Wild garlic
Cocklebur	Maximillion sunflower	Wild lettuce
Common chickweed	Miners lettuce	Wild mustard
Common groundsel	Pennsylvania smartweed	Woolly Croton
Common purslane	Plains coreopsis	Wood sorrel
Common yarrow	Plantain	Yankeweed
Conical catchfly	Redroot pigweed	
Corn cockle	Redstem filaree	

**1/2 to 1 Ounce Per Acre**

Blackberry	Dyer's woad	Prostrate knotweed
Black henbane	Gorse	Rosering gaillardia
Broom snakeweed	Halogeton	Seaside arrowgrass
Buckhorn plantain	Henbit	Sericea lespedeza
Bull thistle	Honeysuckle	Tansy ragwort
Common crupina	Multiflora rose and other wild roses	Teasel
Common sunflower	Musk thistle***	Wild caraway
Curly dock	Oxeye daisy	
Dewberry	Plumeless thistle	

**1 to 2 Ounces Per Acre**

Common mullein	Old world climbing fern	Scouringrush
Common tansy	(Lygodium)	Salsify
Field bindweed**	Perennial pepperwood	Snowberry
Greasewood	Poison hemlock	St. Johnswort
Gumweed	Purple loosestrife	Sulphur cinquefoil
Houndstongue	Purple scabious	Western salsify
Lupine	Scotch thistle	Whitetop (hoary cress)
		Wild iris

**1-1/2 to 2 Ounces Per Acre**

Canada thistle**	Russian knapweed**	Wild parsnip
Dalmatian toadflax**	Tall larkspur	Yellow toadflax**
Duncecap larkspur		

**3 to 4 Ounces Per Acre**

Kudzu

\* Apply fall through spring.  
 \*\* Suppression, which is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. Apply as a full coverage spray for best performance.  
 \*\*\* Certain biotypes of musk thistle are more sensitive to HY-END MSM 60 DF and may be controlled with rates of ¼ to ½ ounce per acre. Treatments of HY-END MSM 60 DF may be applied from rosette through bloom stages of development.  
 \*\*\*\* Certain biotypes of maretail/horsetail are less sensitive to HY-END MSM 60 DF and may be controlled by tank mixes with Herbicides with a different mode of action.

**PROBLEM WEED CONTROL**

For broader spectrum control and for use on certain biotypes of broadleaf weeds, which may be resistant to HY-END MSM 60 DF and Herbicides with the same mode of action, the following tank mixes are recommended.

**Dicamba + 2,4-D**

Weed	Rate of HY-END MSM 60 DF (ounces per acre)	Rate of Dicamba (fl oz/acre)	Rate of 2,4-D (fl oz/acre)
Kochia control	1/2	8	16
Spotted knapweed control	½	8	16
Rush skeleton weed suppression	1	8	16

**NON-CROP SITES**

**Application Information**

HY-END MSM 60 DF is recommended for general weed control on private, public and military lands as follows: Uncultivated areas (such as airports, highway, railroad and utility rights-of-way, sewage disposal areas, etc.); uncultivated agricultural areas – non-crop producing (such as farmyards, fuel storage areas, fence rows, soil bank land, barrier strips, etc.); industrial sites – outdoor (such as lumberyards, pipeline and tank farms, etc.). It is also recommended for the control of certain noxious and troublesome weeds.

Consult the "Weeds Controlled" and "Brush Species Controlled" tables to determine the appropriate application rate.

HY-END MSM 60 DF may be applied in tank mixture with other Herbicides labeled for use on non-crop sites. Fully read the labels and follow all the directions and restrictions on each label.

Applications may be made by ground or air. Use a sufficient volume of water to ensure thorough coverage of the target vegetation with the application equipment being used.

**Application Timing**

For best results, HY-END MSM 60 DF should be applied postemergence to young, actively growing weeds. Applications may be made at any time of the year, except when the ground is frozen.

**GRASS REPLANT INTERVALS**

Following an application of HY-END MSM 60 DF to non-crop areas, the treated sites may be replanted with various species of grasses at the intervals recommended below.

**For soils with a pH of 7.5 or less, observe the following replant intervals:**

Species	Rate (ounces per acre)	Replant Interval (months)
Brome, Meadow	½ - 1	2
	1-2	3
Brome, Smooth	½ - 1	2
	1-2	4
Fescue, Alta	½ - 1	2
	1-2	4
Fescue, Red	½ - 1	2
	1-2	4
Fescue, Sheep	½ - 1	1
	1-2	4
Foxtail, Meadow	½ - 1	2
	1-2	4
Green Needlegrass	½ - 2	1
Orchard grass	½ - 1	2
	1-2	4
Russian Wild rye	½ - 1	1
	1	2
	2	3
Switch grass	½ - 1	1
	1-2	3
Timothy	½ - 1	2
	1-2	4
Wheatgrass, Western	½ - 1	2
	1-2	3

**For soils with a pH of 7.5 or greater, observe the following replant intervals:**

Species	Rate (ounces per acre)	Replant Interval (months)
Alkali Sacaton	½ - 1	1
	1-2	3
Bluestem, Big	½ - 2	3
Brome, Mountain	½ - 1	1
	1 - 2	2
Gamma, Blue	½ - 2	1

Species	Rate (ounces per acre)	Replant Interval (months)
Gamma, Sideoats	½	2
	>½	>3
Switch grass	½	2
	>½	>3
Wheatgrass, Thickspike	½ - 2	1
Wheatgrass, Western	1 - 2	2
	½ - 1	3

The recommended intervals are for applications made in the spring to early summer. Because HY-END MSM 60 DF degradation is slowed by cold or frozen soils, applications made in the late summer or fall should consider the intervals as beginning in the spring following treatment.

Testing has indicated that there is considerable variation in response among the species of grasses when seeded into areas treated with HY-END MSM 60 DF. If species other than those listed above are to be planted into areas treated with HY-END MSM 60 DF, a field bioassay should be performed, or previous experience may be used, to determine the feasibility of replanting treated sites.

#### TURF, INDUSTRIAL (UNIMPROVED ONLY)

##### Application Information

HY-END MSM 60 DF is recommended for selective weed control in unimproved industrial turf where certain grasses are well established and desired as ground cover. HY-END MSM 60 DF is also recommended for the control of certain noxious and troublesome weeds in turf.

In addition to conventional spray equipment, HY-END MSM 60 DF may also be applied with invert emulsion equipment. When using an invert emulsion, mix the prescribed rate of HY-END MSM 60 DF in the water phase.

Consult the "Weeds Controlled" table to determine which weeds will be controlled by the following recommendations.

Turf Type	Rate of HY-END MSM 60 DF (ounces/acre)
Fescue and Bluegrass	¼ to ½
Crested Wheatgrass and Smooth Brome	¼ to 1
Bermudagrass	¼ to 2

##### Application Timing

Applications may be made at any time of the year, except when the soil is frozen.

When a spring application is made on fescue or bluegrass, a second application may be made during the summer after full seedhead maturation.

#### GROWTH SUPPRESSION AND SEEDHEAD INHIBITION (Chemical Mowing)

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##### Application Information

HY-END MSM 60 DF is recommended for growth suppression and seedhead inhibition in well-established fescue and bluegrass turf at the use rate of ¼ to ½ ounce per acre.

##### Tank Mix Combination

HY-END MSM 60 DF may be tank mixed with Embark® for improved performance in the regulation of growth and seedhead suppression. Tank mix ¼ to ½ ounce of HY-END MSM 60 DF with 1/8 to ¼ pint of Embark®.

##### Application Timing

Application may be made after at least 2 to 3 inches of new growth has emerged until the appearance of the seed stalk.

##### Fescue Precautions

HY-END MSM 60 DF may temporarily stunt tall fescue, cause it to turn yellow, or cause seedhead suppression. To minimize these symptoms, take the following precautions:

- Do not use more than 4/10 ounce per acre of HY-END MSM 60 DF.
- Tank mix HY-END MSM 60 DF with 2,4-D.
- Use the lowest recommended rate for target weeds.
- Use a non-ionic surfactant at ½ to 1 pint per 100 gallons of spray solution.
- Make application later in the spring after the new growth is 5 to 6 inches tall, or in the fall.
- Do not use a surfactant when liquid nitrogen is used as a carrier.
- Do not use a spray adjuvant other than non-ionic surfactant.
- The yields from the first cutting may be reduced due to seedhead suppression resulting from treatment with HY-END MSM 60 DF.

#### IMPORTANT INFORMATION--INDUSTRIAL TURF ONLY

- An application of HY-END MSM 60 DF may cause temporary discoloration (chlorosis) of the grasses. Use the lower recommended rates for minimum discoloration.
- With fescue and bluegrass, sequential applications made during the same or consecutive growth period (i.e., spring and fall) may result in excessive injury to turf.
- Excessive injury may result when HY-END MSM 60 DF is applied to turf that is under stress from drought, insects, disease, cold temperatures (winter injury) or poor fertility.
- HY-END MSM 60 DF is not recommended for use on bahiagrass.

#### NATIVE GRASSES

HY-END MSM 60 DF is recommended for weed control and suppression in the establishment and maintenance of native grasses. It may be used where blue grama, bluestems (big, little, plains, sand, ww spar) bromegrasses (meadow), buffalograss, green sprangletop, indiagrass, kleingrass, lovegrasses (atherstone, sand, weeping, wilman), orchardgrass, sideoats grama, switchgrass (Blackwell), wheatgrass (bluebunch, intermediate, pubescent, Siberian, slender streamband, tall, thickspike, western), and Russian wildrye are established. It may also be applied over these species in the seedling stage, except for orchardgrass and Russian wildrye.

##### Application Information

Apply HY-END MSM 60 DF at the rate of 1/10 ounce per acre for the control and suppression\* of bur buttercup (testiculate), common purslane, common sunflower\*, cutleaf evening primrose\*, flixweed\*, lambsquarters\* (common and stimeleaf), marestail\*, pigweed (redroot and tumble), snow speedwell, tansymustard\* and tumble mustard (Jim Hill mustard).

\*Suppression is a visual reduction in weed competition (reduced population or vigor) as compared to untreated areas. Degree of suppression will vary with the size of weed and environmental conditions following treatment.

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**Application Timing**

For established grasses, apply when weeds are in the seedling stage.

For grasses in the seedling stage, apply preplant or preemergence where the soil (seedbed) has been cultivated.

**IMPORTANT PRECAUTIONS--NATIVE GRASSES**

- Grass species or varieties may differ in their response to various Herbicides. NaturChem recommends that you first consult your state experimental station, university, or extension agent as to sensitivity to any Herbicide. If no information is available, limit the initial use of HY-END MSM 60 DF to a small area. Components in a grass seed mixture will vary in tolerance to HY-END MSM 60 DF, so the final stand may not reflect the seed ratio.
- Under certain conditions such as heavy rainfall, high pH, prolonged cold weather, or wide fluctuations in day/night temperatures prior to or soon after HY-END MSM 60 DF application, temporary discoloration and/or grass injury may occur. HY-END MSM 60 DF should not be applied to grass that is stressed by severe weather conditions, drought, low fertility, water-saturated soils, disease, or insect damage as grass injury may result. Severe winter stress drought, disease, or insect damage before or following application also may result in grass injury.

**BRUSH CONTROL****Application Information**

HY-END MSM 60 DF is recommended for the control of undesirable brush growing in non-crop areas. Applications may be made by air, high volume ground application, low volume ground application, and ultra-low volume ground application. Except as noted for multiflora rose, HY-END MSM 60 DF should be applied as a spray to the foliage.

The application volume required will vary with the height and density of the brush and the application equipment used. Generally, aerial applications will require 15 to 25 gallons of water per acre; high volume ground application will require 100 to 400 gallons of water per acre; and low volume ground application will require 20 to 50 gallons of water per acre; and ultra-low volume ground application will require 10 to 20 gallons of water per acre.

Regardless of application volume and equipment used, thorough coverage of the foliage, particularly the terminal growing points, is necessary to optimize results.

**BRUSH SPECIES CONTROLLED**

Species	High-Volume Rate (ounces/100 gallons)	Broadcast Rate (ounces/acre)
Ash	1-2	1-3
Aspen	1-2	1-3
Black Locust	1-2	1-3
Blackberry	1-2	1-3
Camelthorn	1-2	1-3
Cherry	1-2	1-3
Cottonwood	1-2	2-3
Eastern Red Cedar	1-2	2-3
Elder	1-2	2-3
Elm	1-2	1-3
Firs	3	1-2

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Species	High-Volume Rate (ounces/100 gallons)	Broadcast Rate (ounces/acre)
Hawthorn	1-2	1-3
Honeysuckle	1-2	½-1
Mulberry	1-2	2-3
Multiflora Rose	1-2	1-3
Muscadine (Wild Grape)	1-2	2-3
Oaks	1-2	1-3
Ocean Spray ( <i>Holodiscus</i> )	1-2	2-3
Osage Orange	1-2	2-3
Red Maple	1-2	2-3
Salmonberry	½-1	1-3
Snowberry	½-1	1-3
Spruce (Black and White)	3	2-3
Thimbleberry	½-1	1-3
Tree of Heaven ( <i>Ailanthus</i> )	1-2	1-2
Tulip Tree	½-1	1-3
Wild Roses	½-1	1-3
Willow	½-1	1-3

For low volume and ultra-low volume ground applications, mix 4 to 8 ounces of HY-END MSM 60 DF per 100 gallons of spray solution.

**Application Timing**

Make a foliar application of the recommended rate of HY-END MSM 60 DF during the period of full leaf expansion in the spring until the development of full fall coloration on the deciduous species to be controlled. Coniferous species may be treated at anytime during the growing season.

**Tank Mix Combinations-**

HY-END MSM 60 DF may be tank mixed with any product labeled for noncrop brush control at the application rates specified on the companion product's label for the pests specified on the product's companion label. Read and follow the label instructions of both products when tank mixing. Follow the most restrictive limitations of any of the products labels being tank mixed.

**Low Rate Applications****Arsenal® herbicide**

Combine 1 to 2 ounces of HY-END MSM 60 DF with 1 to 4 pints of Arsenal® herbicide per acre and apply as a broadcast spray. Aerial applications should use a minimum of 15 gallons per acre spray volume. In addition to species listed above controlled by HY-END MSM 60 DF, this combination controls black gum, hophornbeam, sassafras, sweetgum, Vaccinium species, dogwood, myrtle dahoon, hickories, and persimmon.

**Picloram (such as Tordon® K) + Arsenal® herbicide**

Combine 1 to 1 ½ ounce of HY-END MSM 60 DF with 2 to 8 fluid ounces of Arsenal® and 1 to 2 pints of Picloram (such as Tordon® K) per 100 gallons of water. Apply as a high volume spray. This tank mix controls cherry, elms, box elder, maples, hackberry, redbud, ash, oaks (including shingle oak), black locust and sassafras.

Picloram (such as Tordon® K) is a restricted use pesticide

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**Spotgun Basal Soil Treatment**

For control of multiflora rose, prepare a spray suspension of HY-END MSM 60 DF by mixing 1 ounce per gallon of water. Mix vigorously until the HY-END MSM 60 DF is dispersed and agitate periodically while applying the spray suspension.

Apply the spray preparation with an exact delivery handgun applicator. Apply at the rate of 4 milliliters for each 2 feet of rose canopy diameter. Direct the treatment to the soil within 2 feet of stem union. When treating large plants and more than one delivery is required, make applications on opposite sides of the plant.

Applications should be made from early spring to summer.

**IMPORTANT PRECAUTIONS--NON-CROP BRUSH ONLY**

When using tank mixtures of HY-END MSM 60 DF with companion Herbicides, read and follow all the use instructions, application rates, warnings and precautions appearing on the labels. Follow the most restrictive label instruction for each of the Herbicides used.

**SPRAY EQUIPMENT**

Spraying and mixing equipment used with HY-END MSM 60 DF must not be used for subsequent application to food or feed crops with the exception of pastures, rangeland and wheat, as low rates of HY-END MSM 60 DF can kill or severely injure most food or feed crops.

The selected sprayer should be equipped with an agitation system to keep HY-END MSM 60 DF suspended in the spray tank.

Use a sufficient volume of water to thoroughly cover the foliage of undesirable weeds, generally 10 to 40 gallons per acre. Select a spray volume and delivery system that will deliver a uniform spray pattern. Be sure the sprayer is calibrated before use. Avoid overlapping and shut off spray booms while starting, turning, slowing, or stopping, to avoid injury to desired plants.

Refer to the brush control section of this label for information unique to that particular use.

**USE PRECAUTIONS**

- Do not drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the product may be washed or moved into contact with their roots, as injury or loss of desirable trees or other plants may result.
- Treatment of powdery, dry soil or light, sandy soil when there is little likelihood of rainfall soon after treatment may result in off target movement and possible damage to susceptible crops when soil particles are moved by wind or water. Injury to crops may result if treated soil is washed, blown, or moved onto land used to produce crops. Exposure to HY-END MSM 60 DF may injure or kill most crops. Injury may be more severe when crops are irrigated. Do not apply HY-END MSM 60 DF when these conditions are identified and powdery, dry soil or light, and sandy soils are known to be prevalent in the area being treated.
- Applications made where runoff water flows onto agricultural land may injure crops. Applications made during periods of intense rainfall, to soils saturated with water, to surfaces paved with materials such as asphalt or concrete, or to soils through which rainfall will not readily penetrate may result in runoff and movement of HY-END MSM 60 DF. Do not treat frozen soil. Treated soil should be left undisturbed to reduce the potential for HY-END MSM 60 DF movement by soil erosion due to wind or water.
- Do not use on lawns, walks, driveways, tennis courts, or similar areas.
- Do not apply through any type of irrigation system.
- Do not apply to irrigated land where the tailwater will be used to irrigate crops.

- Do not apply to snow-covered ground.
- Spraying and mixing equipment used with HY-END MSM 60 DF must not be used for subsequent application to food or feed crops with the exception of pastures, rangeland, and wheat, as low rates of HY-END MSM 60 DF can kill or severely injure most food or feed crops.
- Applications of HY-END MSM 60 DF to pastures, rangeland or CRP undersown with legumes may cause injury to the legumes. Legumes in a seeding mixture may be severely injured or killed following an application of HY-END MSM 60 DF.
- When used as directed, there are no grazing or haying restrictions for use rates of 1 2/3 ounces per acre and less. At the use rates of 1 2/3 to 3 1/3 ounces per acre, forage grasses may be cut for hay, fodder, or green forage and fed to livestock, including lactating animals, 3 days after treatment.
- Do not use this product in the following counties of Colorado: Saguache, Rio Grande, Alamosa, Costilla and Conejos
- Do not use this product in California.
- Do not use on grasses grown for seed.

## TURF AND ORNAMENTAL USES

### GENERAL INFORMATION

HY-END MSM 60 DF IS FOR USE ON Ornamental Turf, such as Lawns, Parks, Cemeteries, and Golf Courses (Fairways, Aprons, Tees and Roughs). This product may also be used on Sod Farms.

HY-END MSM 60 DF controls the following perennial and annual weedy grasses:

Annual Sowthistle	Crown Vetch	Redroot Pigweed
Aster	Curly Dock	Redstem Filaree
Bittercress	Dandelion	Shepherdspurse
Blue Mustard	Dog Fennel	Smallseed Flaxweed
Buckhorn	False Chamomile	Smooth Pigweed
Bur Buttercup	Fiddleneck Tarweed	Spurge (prostrate)
Canada Thistle	Field Pennycress	Sweet Clover
Carolina Geranium	Flixweed	Tansy Mustard
Chicory	Goldenrod	Treacle Mustard
Clover (white)	Henbit	Tumble Mustard
Common Chickweed	Hoary Cress (whiteweed)	Virginia Buttonweed
Common Groundsel	Kochia	Wild Carrot
Common Mullein	Lambsquarters	Wild Celery
Common Purslane	Miners Lettuce	Wild Garlic
Common Sunflower	Pennsylvania Smartweed	Wild Lettuce
Common Yarrow	Plantain	Wild Mustard
Conical Catchfly	Prickly Lettuce	Wild Onion
Cow Cockle	Prostrate Knotweed	Wood Sorrel (oxalis)

For use only on Kentucky Bluegrass, fine Fescue, Bermudagrass and St. Augustine grass turf areas.

### USE PRECAUTIONS

Use lower rates for minimum chlorosis of the turf.

Do not apply HY-END MSM 60 DF to turf under stress from drought, insects, disease, cold temperatures, high temperatures of above 85°F on cool season grasses, or poor fertility as injury may result.

Do not apply to turf less than 1 year old.

Do not use on bahiagrass where it is the desired turf, as severe injury may result.

Do not plant ornamentals such as shrubs, and trees in treated areas for at least 1 year after the last application, or bedding plants for at least 2 years.

### IMPORTANT

Addition of non-ionic surfactant of at least 80% active ingredient at 0.25 percent by volume (1 qt/gal) provides maximum performance, but may temporarily increase chlorosis of the turf.

Allow one week between the application of HY-END MSM 60 DF and other control (pesticide containing) products. (This guideline can be relaxed where severe insect or disease attack requires immediate treatment).

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**DO NOT USE ON FOOD OR FEED CROPS.** Injury to or loss of desirable trees or other plants may result from failure to observe the following: Do not apply HY-END MSM 60 DF (except as recommended) or drain or flush equipment on or near desirable trees or other plants. Or on areas where their roots may extend or in locations where the chemical may be washed or moved into contact with their roots.

When overseeding, wait 2 months (8 weeks) after application. Do not apply to any body of water including streams, irrigation water or wells. Do not apply where runoff water may flow onto agricultural land, as injury to crops may result.

Do not allow spray drift onto adjacent crops or other desirable plants or trees as injury may occur.

Follow these practices to minimize drift:

- Stop spraying if wind speed becomes excessive. Spray drift can occur at wind speeds less than 10 mph. If sensitive plants are downwind, extreme caution must be used. Do not spray if winds are gusty.
- High temperatures, drought and low relative humidity increase the possibility of harmful spray drift. Caution must be used when these conditions are present and sensitive plants are nearby.
- Use large droplet size sprays to minimize drift.
- Use spray pressures of 35 psi or less when applying this product.

### HOW TO USE

Use spray volumes of 20 to 80 gal/acre and pressures of 25 to 35 psi at the following rates of HY-END MSM 60 DF for the weeds listed below:

#### 0.125 to 0.25 oz. PRODUCT/ACRE

Ryegrass (greens)

#### 0.25 to 0.33 oz. PRODUCT/ACRE

Bittercress	Clover (white)	Parsley-piert
Blue Mustard	Creeping Beggarweed	Prostrate Spurge
Bur Buttercup	Dandelion	Redstem Filaree
Chickweed	Field Pennycress	Spurweed
Chicory	Ground Ivy (Fall)	Wild Carrot

#### 0.33 to 0.5 oz. PRODUCT/ACRE

Annual Sowthistle	Miners Lettuce	Sweet Clover
Aster	Plantain	Tansy Mustard
Carolina Geranium	Prickly Lettuce	Treacle Mustard
Common Yarrow	Ragweed	Tumble Mustard
Crown Vetch	Redroot Pigweed	Wild Celery
Florida Betony	Ryegrass (fairways)	Wild Garlic
Ground Ivy (Spring*)	Seedling Dogfennel	Wild Lettuce
Henbit	Shepherdspurse	Wild Onion
Lambsquarters	Smooth Pigweed	Woodsorrels (oxalis)
Lespedeza	Smallseed Falseflax	

#### 0.25 to 0.75 oz. PRODUCT/ACRE

Bahiagrass\*

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#### 0.5 to 1 oz. PRODUCT/ACRE

Brazil Parsley	Crabgrass	Pennsylvania Smartweed
Buckhorn Plantain	Dogfennel	Plantain
Canada Thistle**	Dollarweed*	Prostrate Knotweed
Curly Dock	Florida Pusley	Sida (southern)
Common Groundsel	Foxtail	Virginia Buttonweed***
Common Purslane	Hoarycross (whiteweed)	Wild Mustard
Common Sunflower	Kochia	

\* A repeat application may be required in 4 to 6 weeks.

\*\* Suppression only involving a visual reduction in competition compared to an untreated area.

\*\*\* Controls seedling Virginia Buttonweed. Suppression only of more mature plants. Repeat application may be required in 4 to 6 weeks.

The required amount of HY-END MSM 60 DF should be added when the spray tank is half full of water and, with agitator running, add the proper amount of product. Finish adding the required amount of water. Continuous agitation is required to keep the product in suspension.

Spray preparations of this product may degrade in acid solutions if not used in 24 hours; it is stable in alkaline solutions. Thoroughly reagituate before using.

Tank mixes with other registered Herbicides should be tested for compatibility before full scale mixing. Use mechanical or bypass agitation to thoroughly mix the spray suspension. It is not necessary to premix this product with water in a separate container prior to adding it to the spray tank. This product should always be added to the tank first, before any other Herbicides or adjuvants.

#### Use on Kentucky Bluegrass and Fine Fescue

Apply 0.25 to 0.5 oz. of HY-END MSM 60 DF per acre for control of the listed weeds. Do not exceed 0.5 oz. per acre within a 9-months period.

#### Use on St. Augustinegrass, Bermudagrass and Zoysiagrass (Meyers and Emerald)

Apply 0.25 to 1.0 oz. HY-END MSM 60 DF per acre for weed control. Some chlorosis or stunting of the turfgrass may occur following application.

#### Bahiagrass Control

For the selective control of Bahiagrass in Bermudagrass turf, use 0.25 to 0.75 oz. of HY-END MSM 60 DF per acre. Use the higher rates of the range on Argentine, Common and Paraguayan Bahiagrass. Apply a repeat treatment in 4 to 6 weeks if necessary. Some chlorosis or stunting of the Bermudagrass may occur following the application.

#### Use on Centipedegrass

Apply 0.25 to 0.5 oz. of this product per acre for weed control. Some chlorosis or stunting of the turfgrass may occur following the application.

#### IMPORTANT

Addition of a nonionic surfactant of at least 80% active ingredient at 0.25% by volume (1 qt/100 gals) provides maximum performance, but may temporarily increase chlorosis of the turf.

Allow one week between the application of HY-END MSM 60 DF and other control (pesticide-containing) products. (This guideline can be relaxed where a severe insect or disease attack requires immediate treatment.)

#### **STORAGE AND DISPOSAL**

Do not contaminate water, food, or feed by storage or disposal.

**PESTICIDE STORAGE:** Store product in original container only. Store in cool, dry place.

**PESTICIDE DISPOSAL:** Wastes resulting from the use of this product may be disposed of on site or at an approved waste facility.

**CONTAINER DISPOSAL:**

Plastic Containers: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

#### **CONDITIONS OF SALE AND LIMITATION OF WARRANTY AND LIABILITY**

**NOTICE:** Read the entire Directions for Use and Conditions of Sale and Limitation of Warranty and Liability before buying or using this product. If the terms are not acceptable, return the product at once, unopened, and the purchase price will be refunded.

NaturChem warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated in the Directions for Use, subject to the inherent risks referred to above, when used in accordance with directions under normal use conditions. This warranty does not extend to the use of this product contrary to label instructions, or under abnormal conditions or under conditions not reasonably foreseeable to or beyond the control of Seller or NaturChem, and Buyer and User assumes the risk of any such use. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, NATURCHEM MAKES NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ABOVE.

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