

Staff Report

for the Maintenance and Resources Management Committee Meeting of July 28, 2020

TO: Maintenance and Resources Committee

FROM: Jacqueline Longshore, Maintenance Manager

JL

DATE: July 21, 2020

SUBJECT: Standing Item – Integrated Vegetation Management Program

MAINTENANCE

RECOMMENDATION ACTION:

Receive an informational update on the status of the District Integrated Vegetation Management (IVM) Program and the IVM Phase 3 Study Report.

BACKGROUND:

Nevada Irrigation District provides water service to over 25,000 homes, businesses and farms throughout a 450 square-mile service area within portions of Nevada, Placer and Yuba counties. NID provides raw water, primarily for agricultural irrigation, and treated potable water for domestic, commercial, municipal, and industrial use. In an effort to deliver reliable and low-cost water to customers, the District's Integrated Vegetation Management (IVM) Program incorporates the use of biological, chemical, cultural, and mechanical treatments to control vegetation growth in and around District infrastructure.

Unmanaged vegetation in and around District facilities impedes water flow, chokes off canals, and reduces water storage capacity, contributes to wildfire hazards, and impacts water quality and public health. The District IVM Program is a critical element of District efforts to ensure reliable delivery of water for human consumption, irrigation, and fire suppression. The District IVM Program aims to continue implementation of adaptive management techniques that are environmentally sound, effective, efficient, fiscally prudent, and compliant with safety and environment regulatory requirements.

In researching new and innovative vegetation control methods to add to its IVM Program, District efforts have included trial studies on acetic acid (vinegar) with UC Davis researchers, barley straw, corn gluten, thermal steaming, burning, tarping, grazing, weed whacking, abrasive blasting, and organic herbicide testing. Recently, the IVM Program completed a Phase 3 Study of alternative herbicides, completed goat grazing at District facilities, and is in contracting for a Study of the Costs of Eliminating Glyphosate from the District IVM Program.

Phase 3 Study

The Phase 3 Study implemented applications and monitoring of Opportune, Weed Slayer and Scythe alternative herbicides – the resultant top performing alternative herbicides of the Phase 2 Study. Although the Phase 3 Study results presented average vegetation control responses outside of target impact ranges supportive of water quality and health, reliable delivery to customers, employee safety, and wildfire prevention – a modified protocol with increased application frequency may demonstrate the desired vegetation control at an additional resource cost. Due to the unavailability of the studied Opportune alternative herbicide on the open market, it is recommended that the District consider a future study focused on market available alternative herbicides with protocol of increased application frequency. (See attached Phase 3 Study Report)

Goat Grazing

The IVM Program successfully completed goat grazing vegetation control efforts at the Cunningham and Sugar Loaf Reservoir sites. Monitoring of the sites will continue as goats avoided full consumption of the gumweed (*Grindelia camporum*) and future seeding may increase weed stocking requiring additional control.

Glyphosate Costs Study

On May 15, 2020, the District issued a Request for Proposal (RFP) to perform a Study of the Costs of Eliminating Glyphosate from the District Integrated Vegetation Management Program. The Study is to produce a thorough investigation of available glyphosate alternatives and the costs associated with the deployment of each alternative as a replacement of Glyphosate. The Study is also expected to implement a survey of entities within California that have discontinued the use of Glyphosate, to gain information and insight into the results, impacts, and overall experience.

The RFP was sent to twelve consultants/firms with vegetation related experience with the District. Of the twelve consultants/firms that were sent the RFP, the District received five positive responses, six non-responses, and one proposal.

The proposal received from Blankinship & Associates, Inc. met requirements specified in the RFP. In addition, Blankinship & Associates, Inc. has over 20 years of experience providing IVM consulting services in support of water resource and agriculture clients throughout California. In addition, Blankinship & Associates, Inc. staff have recently presented talks on alternatives to glyphosate for professionals at the California Invasive Plant Council, California Weed Science Society, Western Aquatic Plant Management Society, UC Dais Aquatic Weed School and California Department of Fish and Wildlife Wildland IPM workshop. The District has awarded the contract to Blankinship & Associates, Inc. in accordance with the Procurement Policy.

BUDGETARY IMPACT:

No budgetary impact as the costs of the above IVM Program activities are within the approved 2020 Budget.

JSL

Attachments (1):

- Phase 3 Study Report

NEVADA IRRIGATION DISTRICT

INTEGRATED VEGETATION MANAGEMENT PROGRAM

PHASE 3 REPORT

BACKGROUND

Nevada Irrigation District (NID or District) is an independent special district located on the western slope of the Sierra Nevada mountain range. The District encompasses 287,000 acres with available water in wide areas of Nevada, Placer and Yuba counties and storage and distribution facilities in Sierra and Yuba counties. The District service area ranges from 138 feet to 6,600 feet in elevation and includes a variety of landscape cover types including conifer forest, oak woodland, grassland, foothill residential areas and lowland residential areas. NID is organized primarily to supply water for irrigation, municipal, domestic and industrial purposes.

In an effort to deliver a reliable low cost source of water to customers, the District's Integrated Vegetation Management (IVM) Program incorporates the use of biological, chemical, cultural, manual and mechanical treatments to control vegetation growth in and around District infrastructure. Unmanaged vegetation can choke off canals, reduce water storage capacity and impact water quality and public health. The District IVM Program is a critical element of canal and reservoir maintenance, supporting adequate water flow for human consumption, irrigation and fire suppression.

The District IVM Program aims to continue implementation of adaptive management techniques that are environmentally sound, effective, efficient, fiscally prudent and compliant with regulatory requirements. In researching new and innovative vegetation control methods to add to its IVM Program, District efforts have included trial studies with UC Davis researchers using acetic acid (vinegar), barley straw and corn gluten, thermal steaming, burning, tarping, grazing and organic herbicide testing.

Phase 1 Pilot Study

In 2017, NID initiated evaluation of alternative strategies to vegetation management through a Pilot Study (Phase 1). Phase 1 included two activities: 1) review and coordination with the Vegetation Management Working Group and 2) field testing of alternative herbicides and mechanical approaches.

The Vegetation Management Working Group comprised local farmers, ranchers, representatives of the agricultural industry and others (such as the Placer and Nevada County Ag Commissioners and the Nevada County Resource Conservation District). NID convened the group to obtain information and guidance regarding integrated approaches to vegetation management. The group met several times and provided information and guidance for the field-testing portion of Phase 1.

In fall of 2017, District staff and consultants designed a pilot field study and prepared a grant proposal for submission to the Department of Pesticide Regulation's Research Grants Program. Although the grant was not awarded, the process of developing the application helped the District to establish an IVM team and catalyzed the field study efforts. Beginning in spring 2018, the District initiated a Phase 1 field test of alternative herbicides, biological and mechanical treatment methods. The study design included

application, data collection and data analysis of treatment efficacy based on percent control and percent cover. Nine organic herbicides, two mechanical treatment methods (mowing and abrasion weeder) and goat grazing were tested. Phase 1 identified a number of organic herbicides that produced greater measurable results to support additional trial testing and served to collect cost and efficacy information on mechanical and grazing treatments.

Phase 2 Study

In 2018, NID initiated a Phase 2 Study that expanded the trials of alternative herbicides that demonstrated the greatest measurable results in Phase 1. The Phase 2 Study also included mechanical treatment using steam and burn treatments, as well as analysis of native vegetation plantings. The results of the Phase 2 Study identified Opportune, Weed Slayer and Scythe as the top performing alternatives. Results of the Phase 2 Study supported continued study of the top performing alternatives along longer segments of canals and a study of the costs of removing glyphosate from the District IVM Program.

Although the Phase 2 Study mechanical treatments (steam and flame) demonstrated application rates 15 to 30 times longer than current method application rates, the District is committed to continuing its collaboration with the vendor to explore fabrication of a boom style arm for more practical application. In addition, the District has continued monitoring of the native plantings and found significant overgrowth of the plantings which has required labor-intensive manual cutting and removal of the subsequent material off-site.

INTRODUCTION

The District IVM Program has maintained steady efforts in research and investigation of new and innovative vegetation control tools and techniques. In 2019, NID initiated a Phase 3 Study to evaluate the efficacy of Opportune, Weed Slayer and Scythe herbicides along segments of the District's Combie Phase III Canal and Auburn Ravine II Canal. As Opportune, Weed Slayer and Scythe were identified as the top performing alternative herbicides of the Phase 2 Study they were applied in trial applications along the test segments of the Combie Phase III Canal and Auburn Ravine II Canal.

MATERIALS AND METHODS

Study Plot Locations

The Phase 3 Study test plots were established on the Combie Phase III and Auburn Ravine II Canals. These sites were selected as the test plot locations because of the uniformity of vegetation type and density along contiguous segments of canal. The Phase 3 Study focused on two test plot segments due to the limited availability of the organic product Opportune. Opportune has yet to be released on the market.

The test site on the Combie Phase III Canal is located in Nevada County, at an elevation of 1,280 feet in a grassland vegetation type. The test site on the Auburn Ravine II Canal is located in Placer County, at an elevation of 340 feet in a grassland vegetation type. Each plot was 660 feet long and 8 feet wide. Table 1 provides Phase 3 trial locations summary information.

Table 1: Phase 3 Application Sites

Test Site	Elev. (FT)	Nearest City	County	Plot Acreage	Vegetation & Soil Type
Auburn Ravine II Canal	340	Newcastle	Placer	0.12	Vegetation Mediterranean California naturalized annual and perennial grassland [CNDDDB] Soil Caperton-Andregg course sandy loams [NRCS]
Combie Phase III Canal	1,280	Grass Valley	Nevada	0.12	Vegetation California naturalized annual and perennial grassland [CNDDDB] Soil Auburn-Rock outcrop complex [NRCS]

Alternative Herbicides Applications

The Phase 3 Study included Opportune, Weed Slayer and Scythe – the top performing alternative herbicides identified through the Phase 2 Study. Table 2 provides summary information about Opportune, Weed Slayer and Scythe. Table 3 lists application rates and product cost per acre for each alternative herbicide.

Table 2: Phase 3 Alternative Herbicides Summary Information

Product	Active Ingredient	EPA Signal Word ¹	Required Personal Protective Equipment
Opportune	Microbial compound (dead, non-viable <i>Streptomyces acidiscabies</i> strain RL-110T cells and spent fermentation media)	Caution	Long sleeve shirt, long pants, shoes plus socks waterproof gloves, filtering face piece respirator
Scythe	Pelargonic Acid	Warning	Coveralls over short-sleeve shirt and short pants, chemical resistant-gloves, chemical-resistant footwear plus socks and protective eyewear
Weed Slayer	Eugenol (essential oil of clove) and molasses	Exempt	Safety glasses and gloves

Table 3: Application Rates and Costs per Acre for Each Alternative Herbicides

Product	Recommended Application Rate	Cost per Acre ²	Vendor
Opportune	3 gallons/acre	Unavailable	Marrone Bio innovations
Scythe	7% concentrate	\$1,539.00	Gowan Company
Weed Slayer	32 oz. Part A/acre plus 32 oz. Part B (surfactant)/acre	\$138.75	Agro Research Intl. LLC

¹ Federal regulation groups pesticides into three categories according to toxicity and potential to injure people or the environment: DANGER, WARNING or CAUTION. Pesticides labels indicate these categories to show a product potential to cause injury if not used according to label instructions. Products with the signal word CAUTION are lower in toxicity and indicate the product is slightly toxic if eaten, absorbed through the skin, inhaled, or it causes slight eye or skin irritation. Products with the signal word WARNING indicate the pesticide is moderately toxic if eaten, absorbed through the skin, inhaled, or it causes moderate eye or skin irritation. DANGER means the product is highly toxic by at least one route of exposure – it may be corrosive, causing irreversible damage to the skin or eyes; and/or it may be highly toxic if eaten, absorbed through the skin, or inhaled.

² Cost per acre is calculated assuming 30 gallons of solution applied per acre.

District staff performed Phase 3 Study applications using a side-by-side boom sprayer. District staff mixed and applied the study herbicides according to the recommended protocol provided after the Phase 2 Study. District staff followed regulated material label and safety data sheet (SDS) instructions for use of personal protective equipment (PPE) during mixing and application and also adhered to the label and SDS specified environmental condition application limitations (e.g., wet and/or windy conditions).

Table 4 provides a summary of Phase 3 Study alternative herbicide applications.

Table 4: Phase 3 Alternative Herbicides Applications

Date	Location & Activity	Alternative Herbicide Applied
2019.12.05	Auburn Ravine II – Application #1	Opportune + Weed Slayer
2019.12.05	Combie Phase III – Application #1	Opportune + Weed Slayer
2020.01.10	Auburn Ravine II – Application #2	Opportune + Weed Slayer
2020.01.10	Combie Phase III – Application #2	Opportune + Weed Slayer
2020.03.06	Auburn Ravine II – Application #3	Scythe
2020.03.06	Combie Phase III – Application #3	Scythe

Monitoring and Data Collection

Monitoring and evaluating effectiveness of a treatment used the observed effect method to replicate the common field practice used for its efficiency of implementation. District staff monitored and evaluated the sites using the observed effect evaluation criteria also used during the Phase 2 Study. This observed effect monitoring evaluates percent control of vegetation, estimating overall plant response to the applied products based on set criteria categories as defined in Table 5.

Table 5: Phase 2 & 3 Study Percent Control Evaluation Criteria

% Impact	Observed Effect
0%	No effect.
10%	Minor plant stunting or curling of leaves and stems.
20%	Stunting or curling is more pronounced and plant is still mostly green.
30%	Leaf margin or chlorosis increase to approximately 1/3 of plant surface.
40%	Symptoms have increased with more severe leaf chlorosis but affecting less than 50% of plant surface or population in the treatment area.
50%	Approximately half of the weeds present in the treatment area display stunting, curling, chlorosis and/or necrosis on 50% of the plant leaves or stems.
60%	Slightly more than half of the weed population present in the treatment area display severe chlorosis or necrosis.
70%	Chlorosis and/or necrosis symptoms now present on most plants but still about 30% of plant tissue is green.
80%	Symptoms have expanded or increased to a majority of plants present but some still functioning tissue.
90%	A majority of plants in the treatment zone are displaying complete mortality but a few remaining plants have not been completely killed.
100%	All plants in treatment area are completely affected by the treatment and are dead.

Table 6 provides the categories used to further describe the range of control based on the observed percent impact.

Table 6: Range of Control Categories

% Impact Range	Category
0 – 50%	Poor Control (P)
51 – 80%	Fair Control (F)
80 - 95%	Good Control (G)
96 – 100%	Excellent Control (E)

Effort was made to collect data along the test sites at intervals close to 7, 14, 28, 45 and 60 days after application. Table 7 provides a summary of Phase 3 Study monitoring and evaluations events.

Table 7: Phase 3 Monitoring and Evaluation Dates

Date	Location & Activity
2019.12.11	Auburn Ravine II – Monitoring and Evaluation #1
2019.12.11	Combie Phase III – Monitoring and Evaluation #1
2019.12.19	Auburn Ravine II – Monitoring and Evaluation #2
2019.12.19	Combie Phase III – Monitoring and Evaluation #2
2020.01.06	Auburn Ravine II – Monitoring and Evaluation #3
2020.01.06	Combie Phase III – Monitoring and Evaluation #3
2020.01.21	Auburn Ravine II – Monitoring and Evaluation #4
2020.01.21 & 22	Combie Phase III – Monitoring and Evaluation #4
2020.02.07	Auburn Ravine II – Monitoring and Evaluation #5
2020.02.07	Combie Phase III – Monitoring and Evaluation #5
2020.03.05	Auburn Ravine II – Monitoring and Evaluation #6
2020.03.05	Combie Phase III – Monitoring and Evaluation #6
2020.03.12	Auburn Ravine II – Monitoring and Evaluation #7
2020.03.12	Combie Phase III – Monitoring and Evaluation #7
2020.03.30	Auburn Ravine II – Monitoring and Evaluation #8
2020.03.30	Combie Phase III – Monitoring and Evaluation #8
2020.04.28	Auburn Ravine II – Monitoring and Evaluation #9
2020.04.28	Combie Phase III – Monitoring and Evaluation #9

Data Analysis

As prescribed by the protocol that was informed and developed out of the Phase 2 Study, the Phase 3 data analysis was designed to show the efficacy of the alternative herbicide applications over greater study plot areas over time. Using the monitoring data collected, the analysis provided the opportunity to develop and forecast an alternative herbicide application schedule with the goal of fulfilling the necessary range of vegetation control that supports water quality and health, reliable delivery to customers, employee safety and wildfire prevention.

The following tables and graphs provide summary of the percent control data collected over the course of the Phase 3 Study. Line graphs display the range of control observed with the specific alternative herbicide application dates. Presenting the range of control data with the application dates aid in understanding the responsiveness of vegetation to the alternative herbicide applications, identify trends useful in forecasting control and consider the application schedule necessary to meet control targets.

Table 8: Percent Control Observed at Auburn Ravine II Canal

PLOT	DATE								
	Dec. 11, 2019	Dec. 19, 2019	January 6, 2020	January 21, 2020	February 7, 2020	March 5, 2020	March 12, 2020	March 30, 2020	April 28, 2020
AR2-01	10	70	10	80	90	0	50	80	0
AR2-02	70	70	10	80	80	0	60	60	0
AR2-03	70	70	10	80	70	0	30	60	0
AR2-04	70	70	10	70	90	0	60	20	0
AR2-05	10	70	10	90	80	0	70	20	0
AR2-06	20	70	20	90	90	0	70	40	0
AR2-07	20	70	10	50	60	0	60	30	0
AR2-08	20	70	15	80	60	0	70	70	0
AR2-09	20	50	15	85	90	0	70	40	0
AR2-10	20	60	10	50	90	0	40	30	0
AR2-11	10	40	5	70	60	0	40	40	0
AR2-12	10	10	10	50	50	0	30	10	0
AR2-13	10	20	10	50	50	0	65	30	0
AR2-14	10	20	5	75	50	0	40	10	0
AR2-15	10	10	5	90	90	0	70	10	0
AVERAGE	25	51	10	73	73	0	55	37	0

Graph 1: Percent Control Observed at Auburn Ravine II Canal

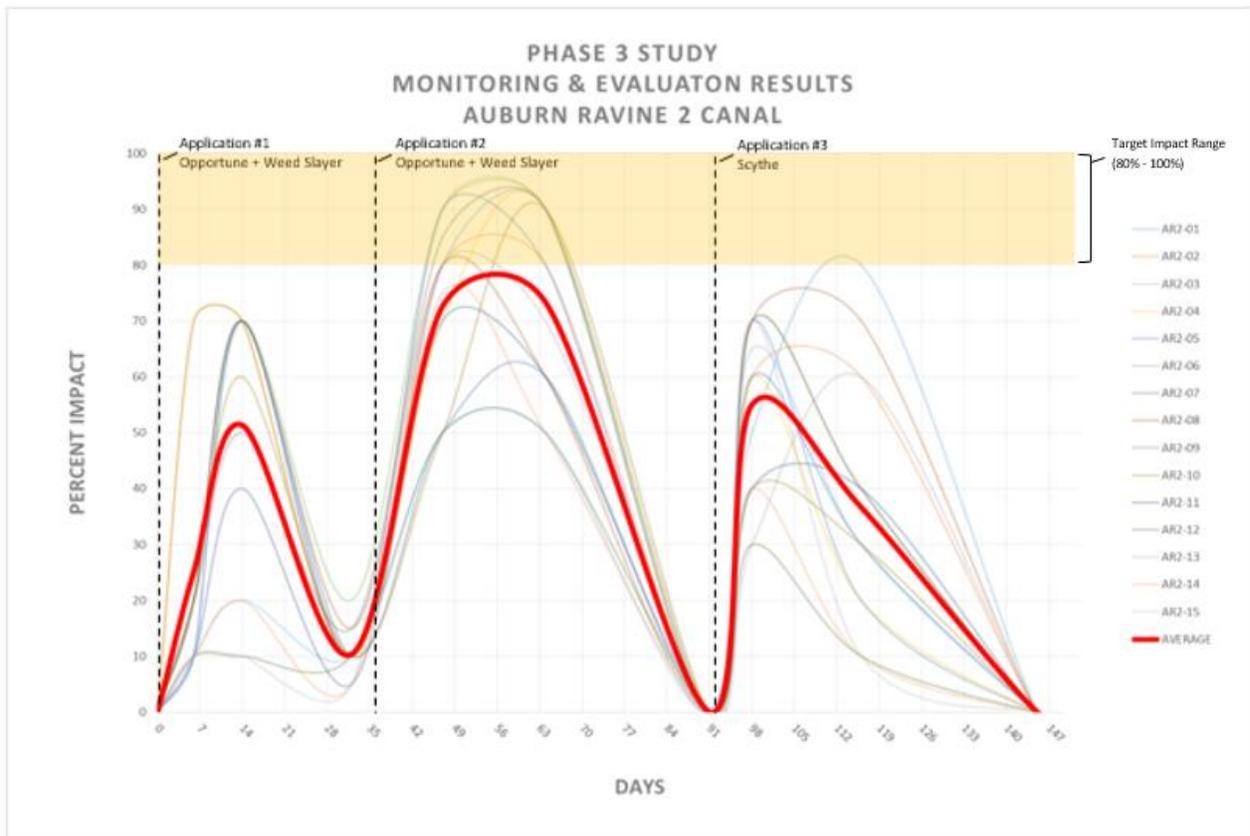
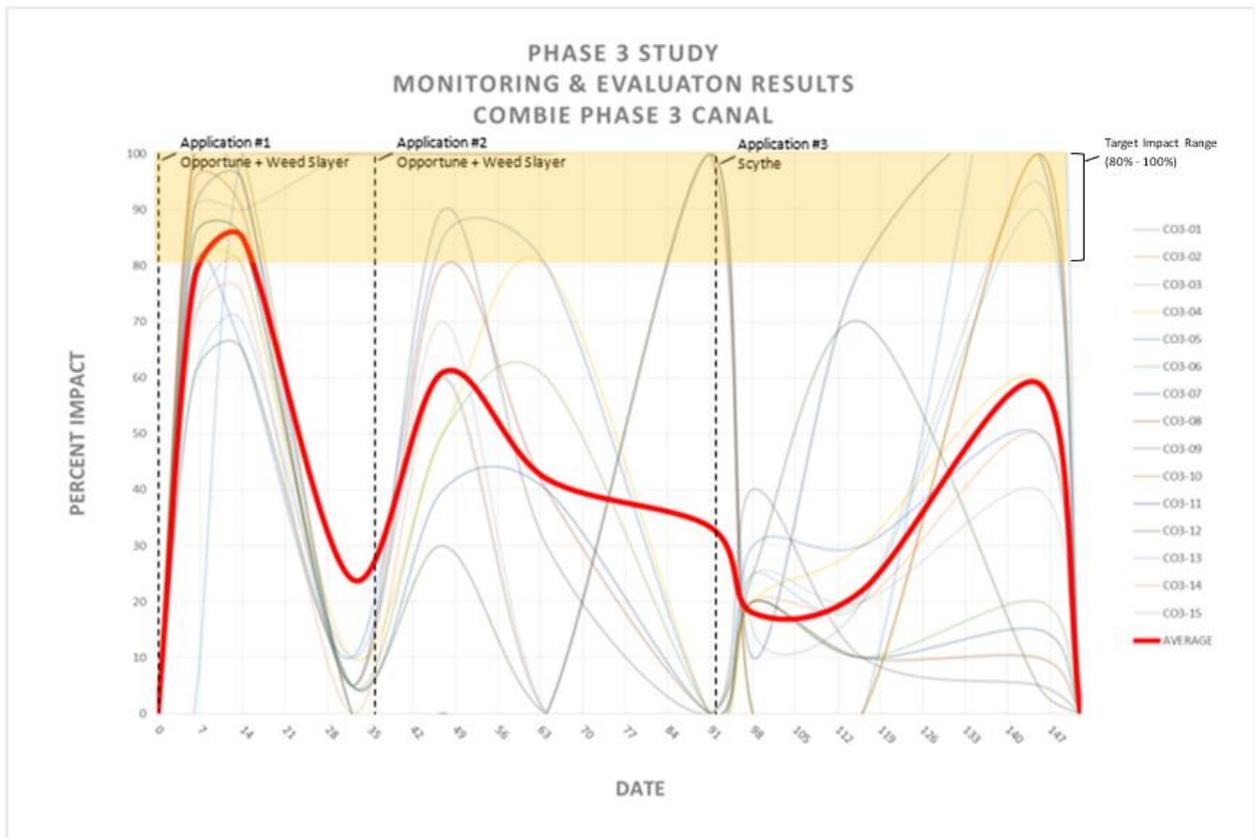


Table 9: Percent Control Observed at Combie Phase III Canal

PLOT	DATE								
	Dec. 11, 2019	Dec. 19, 2019	January 6, 2020	January 21&22, 2020	February 7, 2020	March 5, 2020	March 12, 2020	March 30, 2020	April 28, 2020
CO3-01	100	100	100	0	100	100	0	0	100
CO3-02	100	100	100	0	100	100	0	0	100
CO3-03	90	90	100	0	100	100	15	20	95
CO3-04	80	80	10	50	80	0	20	30	60
CO3-05	80	65	10	85	80	0	30	30	50
CO3-06	85	85	5	50	60	0	20	10	20
CO3-07	85	85	5	40	40	0	20	10	15
CO3-08	95	90	5	80	40	0	20	10	10
CO3-09	100	95	5	90	30	0	40	10	5
CO3-10	100	100	0	0	0	100	0	0	100
CO3-11	90	95	0	0	0	100	10	80	100
CO3-12	60	65	5	30	0	0	25	70	5
CO3-13	60	70	10	60	0	0	25	20	90
CO3-14	70	75	0	60	0	0	20	20	50
CO3-15	70	80	5	70	0	0	25	20	40
AVERAGE	84	85	24	41	42	33	18	22	56

Graph 2: Percent Control Observed at Combie Phase III Canal



RESULTS AND DISCUSSION

The Phase 3 Study has provided useful data on the efficacy of the alternative herbicides when applied across a greater application area. The data collected from the Phase 3 Study also provided an understanding of the trend in vegetation responsiveness to the alternative herbicide application. Understanding the trend in vegetation response is necessary in forecasting control, developing an application plan and schedule that meets control thresholds, support water quality and health, reliable delivery to customers, employee safety and wildfire prevention.

In reviewing the data set and graph for each application location, the general trend in data showed three distinct vegetation response peaks at both Auburn Ravine II Canal and Combie Phase III Canal test locations. In further review of the Combie Phase III data, an unanticipated response peak appeared to occur towards the end of the study period rather than the anticipated response immediately after the third application. After further investigation and review of the data, it appears that the Combie Phase III test site was likely exhibiting vegetation control influence from prior years' non-study related pre-emergent applications.

Although the Phase 3 alternative herbicide applications did not result in average impact ranges within target impact ranges (80% - 100%) supportive of water quality and health, reliable delivery to customers, employee safety and wildfire prevention – a modified protocol with increased application frequency may demonstrate and possibly sustain results of vegetation response in the target impact range. An increased application frequency will result in increased demand on resources including material and labor that must be considered in any future protocol development. In addition, the unavailability of the Opportune alternative herbicide on the market must also be considered in the development of a future test protocol.

RECOMMENDATIONS

Based on the data analysis, it is recommended that the District maintained its research and investigation efforts in identifying and testing alternative vegetation control methods including alternative herbicides and mechanical treatments. Specifically, it is recommended that the District study the use of Weed Slayer and Scythe alternative herbicides under a protocol with increased application frequency to investigate the ability and resources necessary to meet an average target impact range (80% - 100%) supportive of water quality and health, reliable delivery to customers, employee safety and wildfire prevention.

LIST OF APPENDICES

- A. Product Label

OPPORTUNE™

Pre and Post-Emergent Herbicide

For the control of listed annual grasses, broadleaf and sedge weeds.

Active ingredient: Killed, non-viable *Streptomyces acidiscabies* strain RL-110⁷ cells and spent fermentation media*17%
Other ingredients:.....83%
Total:.....100%

* Product contains not less than 4 mg/ml Thaxtomin A.

EPA Reg. No. 84059-12

EPA Est. No. 84059-MI-001

**KEEP OUT OF REACH OF CHILDREN
CAUTION**

FIRST AID

IF IN EYES:	Hold eye open and rinse slowly and gently with water for 15 – 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.
IF INHALED:	Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call poison control center or doctor for treatment advice.
IF SWALLOWED:	Call poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.
IF ON SKIN OR CLOTHING:	Take off contaminated clothing. Rinse skin immediately with plenty of water for 15 – 20 minutes. Call a poison control center or doctor for treatment advice.
HOT LINE 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 1-800-222-1222 for emergency medical treatment information.	



2121 Second St., Ste. B-107
Davis, CA 95618 USA
info@marronebio.com

NET CONTENTS: _____

OPP-13-01

Lot #:

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION: Causes moderate eye and skin irritation. Harmful if inhaled, swallowed or absorbed through skin. Avoid contact with eyes, skin or clothing. Avoid breathing spray mist. Wear goggles or safety glasses and waterproof gloves. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, using tobacco or using the toilet. Remove and wash contaminated clothing before reuse.

Personal Protective Equipment (PPE):

Applicators and other handlers must wear:

- Long sleeved shirt and long pants
- Shoes plus socks
- Waterproof gloves

Mixer/loaders and applicators, not in aircraft or enclosed cabs, must wear a filtering face piece respirator meeting NIOSH standards of at least N-95, R-95, or P-95. Repeated exposure to high concentrations of microbial proteins can cause allergic sensitization. Follow the manufacturer's instructions for cleaning/maintaining PPE. If no instructions are available, use detergent and hot water for washables. Keep and wash PPE separately from other laundry.

USER SAFETY RECOMMENDATIONS

Users should:

- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

Environmental Hazards: For terrestrial uses: 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 disposing of equipment washwater or rinsate.

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 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 exemptions pertaining to the statements on this label about personal protective equipment (PPE) and the restricted entry interval (REI). 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 to treated areas (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
- Waterproof gloves
- Shoes plus socks

Exception: If the product is soil-injected or soil incorporated, the Worker Protection Standard, under certain circumstances, allows workers to enter the treated areas if there will be no contact with anything that has been treated.

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PRODUCT INFORMATION

OPPORTUNE™ is a selective biological herbicide for use on specific weeds in crops listed. When applied as a pre-emergence herbicide, OPPORTUNE controls annual grasses, broadleaf, and sedge weeds as they germinate. OPPORTUNE is also a selective post-emergent herbicide for control or suppression of broadleaf and sedge weeds infesting labeled crops. The concentrate of OPPORTUNE must be mixed with water and applied as a spray with ground or aerial equipment equipped for conventional herbicide spraying.

Mode of action: OPPORTUNE inhibits cellulose biosynthesis in the meristem of sensitive plant species. When weeds germinate in the treated area, they contact the herbicide and both shoot and root growth stops.

Close scouting and early attention to infestations is highly recommended. Proper timing of application prior to weed germination and/or for targeting newly emerged weeds is important for optimal results.

USE RESTRICTIONS

Do not apply this product through any type of chemigation system.

Do not apply this product to the foliage of any broadleaf (dicotyledon) crop.

Do not apply this product when wind conditions will allow drift to adjacent, broadleaf ornamental plants or to crops.

Do not apply to pasture, grazing lands or grasses grown for hay.

**MIXING INSTRUCTIONS
- SHAKE WELL PRIOR TO USE -**

Important – Do not add OPPORTUNE to the mix tank before introducing the desired amount of water. Add water to the mix tank. Start the mechanical or hydraulic agitation to provide moderate circulation before adding OPPORTUNE. Add the desired volume of OPPORTUNE to the mix tank and continue circulation. Maintain circulation while loading and spraying. Do not mix more OPPORTUNE than can be used in 24 hours. Use a strainer no finer than 50 mesh in conventional spray systems.

TANK MIXING

This product can be tank mixed in accordance with the most restrictive of label limitations and precautions. No label dosage rates may be exceeded. This product cannot be mixed with any product containing a label prohibition against such mixing.

To ensure compatibility of tank mix combinations they must be evaluated prior to use. To determine the physical compatibility of this product with other products use a jar test. Using a quart jar, add the proportionate amounts of the products to one quart of water with agitation. Add dry formulations first, then flowables, then emulsifiable concentrates last. After thoroughly mixing, let this mixture stand for five minutes. If the combination remains mixed or can be readily be remixed, it is physically compatible. Once compatibility has been proven, use the same procedure for adding required ingredients to the spray tank.

APPLICATION INSTRUCTIONS

Under heavy weed populations, use the higher label rates and/or increase the spray volume to improve coverage.

GROUND APPLICATIONS

Apply OPPORTUNE with quantities of water sufficient to provide uniform coverage of the soil or foliage of targeted weed species. The amount of water needed per acre will depend upon application equipment.

Use sprayers equipped with appropriate nozzles that provide uniform and accurate spray distribution and minimize drift. Nozzle and in-line screens must be no finer than 50 mesh.

Ground Applications (Band)

Apply OPPORTUNE uniformly at the broadcast equivalent rate and volume per acre. To determine these:

$$\frac{\text{band width in inches}}{\text{row width in inches}} \times \text{broadcast rate per acre} = \text{band rate per acre}$$

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AERIAL DRIFT REDUCTION ADVISORY INFORMATION

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GENERAL: Avoiding spray drift at the application site is the responsibility of the applicator. The Interaction of many equipment and weather related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions. Where states have more stringent regulations, they should be observed. Note: This section is advisory in nature and does not supersede the mandatory label requirements.

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INFORMATION ON DROPLET SIZE: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply droplets large enough to provide sufficient coverage and control. 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).

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CONTROLLING DROPLET SIZE: Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets. Pressure - Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types lower pressure produces larger droplets. When high flow rates are needed, use higher flow rate nozzles instead of increasing pressure. Number of nozzles - Use the minimum number of nozzles that provide uniform coverage. Nozzle Orientation - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is the recommended practice. Significant deflection from horizontal will reduce droplet size and increase drift potential. 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. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.

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BOOM WIDTH: For aerial applications, the boom width must not exceed 75% of the wingspan or 90% of the rotary blade. Use upwind swath displacement and apply only when wind speed is 3-10 mph as measured by an anemometer. Use medium or coarser spray according to ASAE 572 definition for standard nozzles or VMD for spinning atomizer nozzles. If application includes a no-spray zone, do not release spray at a height greater than 10 feet above the ground or crop canopy.

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APPLICATION HEIGHT: Do not make application at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure to droplets to evaporation and wind.

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SWATH ADJUSTMENT: When applications are made with a crosswind, the swath will be displaced downward. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.).

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WIND: Drift potential is lowest between wind speeds of 2 - 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. NOTE: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

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TEMPERATURE AND HUMIDITY: When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

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TEMPERATURE INVERSIONS: Do not apply during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small, suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures 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 dissipates indicates good vertical air mixing.

nize drift.

SENSITIVE AREAS: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g. when wind is blowing away from the sensitive areas). Do not allow spray to drift from the application site and contact people, structures people occupy at any time and the associated property, parks and recreation areas, non-target crops, aquatic and wetland areas, woodlands, pastures, rangelands, or animals.

FOR USE SPECIFIC

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FOR USE AS A PRE-EMERGENT HERBICIDE ON THE FOLLOWING CROPS FOR CONTROL OF SPECIFIED WEEDS:

Applications must be made prior to transplanting or prior to crop emergence. Do not apply to emerged broadleaf crops except for ground applications made between the rows with the use of shielded applicators.

APPLICATION AND TIMINGS FOR ALL CROPS LISTED

OPPORTUNE will provide effective weed control when applied by ground or aerial equipment and subsequently incorporated into the soil by rainfall, sprinkler irrigation, or mechanical tillage prior to weed seedling emergence from soil.

Pre-plant Surface Applications: For use in minimum tillage or no-tillage production systems, apply OPPORTUNE alone or in tank mixes before planting. Rainfall or sprinkler irrigation after application is required to move this product into the upper soil surface where weed seeds germinate.

Pre-plant Incorporated Applications: Apply OPPORTUNE and incorporate into the upper (1 inch to 2 inches) soil surface prior to planting. Use an implement capable of giving uniform incorporation.

Surface Incorporated Applications: Uniformly apply OPPORTUNE as a broadcast or banded treatment to soil surface underneath established trees and/or in ground areas between tree rows. Incorporate into upper soil surface using either rainfall, sprinkler irrigation, or shallow mechanical incorporation using an implement capable of giving uniform incorporation.

Pre-emergence Surface Applications: Broadcast OPPORTUNE uniformly to the soil surface at planting. Rainfall, sprinkler irrigation, or shallow mechanical incorporation after application is required to move this product into the upper soil surface where weed seeds germinate. If adequate rainfall does not occur and irrigation is not available, use of shallow cultivation or rotary hoeing is required.

Pre-harvest Interval (PHI) = 0 days

Pre-Emergent Crops	Application Method	Product Use per Application	Application Instructions
Artichoke	Ground	8 - 12 quarts per acre	Apply in 10 - 40 gallons of water per acre.
Asparagus			
Bulb Vegetables (garlic, onion and shallots- transplanted sets only)			
Cereal Grains (barley, millet, oats, rice, rye, sorghum, triticale and wheat)			
Citrus (bearing and nonbearing)			
Cole Crops- Brassicas (broccoli, brussel sprouts, cabbage, cauliflower and collards- transplanted sets only)			
Cotton			
Cucurbits (cantaloupe, cucumber, melon, muskmelon, pumpkin, squash, watermelon and zucchini- transplanted sets only)			
Fruiting Vegetables (eggplant, ground cherry, okra, peppers, tomatillo and tomato- transplanted sets only)			
Grapes			
Hops			
Legumes (beans, chick peas, dry beans, garbanzo beans, green beans, lentils, lima beans, peanuts, peas, shell beans, snap beans, soybeans and split peas)			
Olives			
Pome Fruit (apple, crabapple, mayhaw, pear and quince)			

(continued)

- Root, Tuber (potato)
- Stone Fruits
- Strawberries
- Tree Nut Cro filbert, macar
- Tropical Fruit plantain and
- Annual ryegrass
- Barnyardgrass
- Bluegrass, ar
- Brome (Brom)
- Canarygrass
- Crabgrass (C)
- Crowfootgrass
- Dallisgrass, s
- Foxtail, giant
- Foxtail, greer
- Foxtail, yellow
- Goosegrass
- Hairy chess (C)
- Itchgrass (Rc)
- Italian ryegrass
- Amaranth, P
- Bittercress (C)
- Burweed, lav
- Carpetweed
- Chickweed, c
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- Cudweed (G)
- Filaree (Erod)
- Geranium, G
- Henbit (Lami)
- Knotweed, p
- Kochia (Koc)
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Pre-Emergent Crops	Application Method	Product Use per Application	Application Instructions
Root, Tuber and Corm Crops (ginger, ginseng, potato and sweet potato)	Ground	8 - 12 quarts per acre	Apply in 10 - 40 gallons of water per acre.
Stone Fruits (apricot, cherry, nectarine, peach, plum and prune)			
Strawberries (transplanted sets only)			
Tree Nut Crops (almond, beechnut, butternut, cashew, chestnut, filbert, macadamia, pecan, pistachio and walnut)			
Tropical Fruits (avocado, banana, kiwi, mango, papaya, pineapple, plantain and pomegranate)			
Pre-Emergent Target Pests			
Grasses			
Annual ryegrass (<i>Lolium rigidum</i>)	Japanese brome (<i>Bromus japonicas</i>)		
Barnyardgrass (<i>Echinochloa crus-galli</i>)	Johnsongrass- from seed (<i>Sorghum halepense</i>)		
Bluegrass, annual (<i>Poa annua</i>)	Jointed goatgrass (<i>Aegilops cylindrical</i>)		
Brome (<i>Bromus</i> spp.)	Junglerice (<i>Echinochloa colona</i>)		
Canarygrass (<i>Phalaris arundinaca</i>)	Lovegrass- from seed (<i>Eragrostis</i> spp.)		
Crabgrass (<i>Digitaria</i> spp.)	Panicum, browntop (<i>Panicum fasciculatum</i>)		
Crowfootgrass (<i>Dactyloctenium aegyptium</i>)	Panicum, fall (<i>Panicum dichotomiflorum</i>)		
Dallisgrass, seedling (<i>Paspalum dilatatum</i>)	Panicum, Texas (<i>Panicum texanum</i>)		
Foxtail, giant (<i>Setaria faberia</i>)	Sandbur, field (<i>Cenchrus incertus</i>)		
Foxtail, green (<i>Setaria viridis</i>)	Signalgrass (<i>Brachiaria platyphylla</i>)		
Foxtail, yellow (<i>Setaria glauca</i>)	Sprangletop, Mexican (<i>Leptochloa uninervia</i>)		
Goosegrass (<i>Eleusine indica</i>)	Sprangletop, red (<i>Leptochloa filiformis</i>)		
Hairy chess (<i>Bromus commutatus</i>)	Witchgrass (<i>Panicum capillare</i>)		
Itchgrass (<i>Rottboellia exalta</i>)	Woolly cupgrass (<i>Eriochloa villosa</i>)		
Italian ryegrass (<i>Lolium perenne</i>)			
Broadleaf Weeds			
Amaranth, Palmer (<i>Amaranthus palmeri</i>)	Oxalis, buttercup (<i>Oxalis pes-caprae</i>)		
Bittercress (<i>Cardamine</i> spp.)	Pigweed (<i>Amaranthus</i> spp.)		
Burweed, lawn (<i>Scirva pterosperma</i>)	Purslane, common (<i>Portulaca oleracea</i>)		
Carpetweed (<i>Mollugo verticillata</i>)	Purslane, Florida (<i>Richardia scabra</i>)		
Chickweed, common (<i>Stellaria media</i>)	Ragweed, common (<i>Ambrosia artemisiifolia</i>)		
Chickweed, mouseear (<i>Cerastium vulgatum</i>)	Ragweed, giant (<i>Ambrosia trifida</i>)		
Cudweed (<i>Gnaphalium</i> spp.)	Rocket, London (<i>Sisymbrium irio</i>)		
Filaree (<i>Erodium</i> spp.)	Shepardspurse (<i>Capsella bursa-pastoris</i>)		
Geranium, Carolina (<i>Geranium carolinianum</i>)	Speedwell, corn (<i>Veronica arvensis</i>)		
Henbit (<i>Lamium amplexicaule</i>)	Smartweed, Pennsylvania (<i>Polygonum pensylvanicum</i>)		
Knotweed, prostrate (<i>Polygonum aviculare</i>)	Spurge, annual (<i>Euphorbia</i> spp.)		
Kochia (<i>Kochia scoparia</i>)	Spurge, garden (<i>Euphorbia hirta</i>)		
Lambsquarters (<i>Chenopodium album</i>)	Spurge, prostrate (<i>Chamaesyce humistrata</i>)		
Lespedeza, common (<i>Lespedeza striata</i>)	Woodsorrel, creeping (<i>Oxalis corniculata</i>)		
Mustard (<i>Brassica</i> spp.)	Woodsorrel, yellow (<i>Oxalis stricta</i>)		

FOR USE AS A POST-EMERGENT HERBICIDE ON THE FOLLOWING CROPS FOR CONTROL OF SPECIFIED WEEDS:

Pre-harvest Interval (PHI) = 0 days

Post-Emergent Crops	Application Method	Product Use per Application	Application Instructions
Cereal Grains- excluding rice* (barley, corn, corn grown for seed, field corn, milo, oats, pearl millet, popcorn, proso millet, rye, sorghum, sweet corn, triticale and wheat)	Ground	8 - 12 quarts per acre	Apply in 20 - 40 gallons of water per acre. Applications of OPPORTUNE as a post-emergent herbicide must be targeted against weeds that are 2 inches in height or less. Thorough coverage of weed foliage is necessary for effective control. OPPORTUNE does not have systemic activity. A spreader/sticker or adjuvant which has been approved for growing crops can be added for hard to wet weed species.
* See specific instructions in the following section for rice.			
Sod farms and grass grown for seed			

Post-Emergent Target Pests

Broadleaf Weeds (dicotyledons):

Amaranth, Powell (<i>Amaranthus powelli</i>)	Nightshade, hairy (<i>Solanum sarrachoides</i>)
Bedstraw, catchweed (<i>Galium aparine</i>)	Pickereelweed, heartshape, false (<i>Monochoria vaginalis</i>)
Beggarweed, Florida (<i>Desmodium tortuosum</i>)	Pigweed, redroot (<i>Amaranthus retroflexus</i>)
Buckwheat, wild (<i>Polygonum convolvulus</i>)	Pigweed, smooth (<i>Amaranthus hybridus</i>)
Buffalo bur (<i>Solanum rostratum</i>)	Puncturevine (<i>Tribulus terrestris</i>)
Burhead (<i>Echinodorus cordifolius</i>)	Purslane, common (<i>Portulaca oleracea</i>)
Carpetweed (<i>Mollugo verticillata</i>)	Pusley, Florida (<i>Richardia scabra</i>)
Cocklebur, common (<i>Xanthium strumarium</i>)	Radish, wild (<i>Raphanus raphanistrum</i>)
Deadnettle, purple (<i>Lamium purpurium</i>)	Ragweed, common (<i>Ambrosia artemisiifolia</i>)
Devil's claw (<i>Proboscidea louisianica</i>)	Ragweed, giant (<i>Ambrosia trifida</i>)
Galinsoga (<i>Galinsoga parviflora</i>)	Sesbania, hemp (<i>Sesbania exaltata</i>)
Henbit (<i>Lamium amplexicaule</i>)	Shepard's-purse (<i>Capsella bursa-pastoris</i>)
Horseweed- marestail (<i>Coryza Canadensis</i>)	Sicklepod (<i>Senna obtusifolia</i>)
Jimsonweed (<i>Datura stramonium</i>)	Sida, prickly (<i>Sida spinosa</i>)
Kochia (<i>Kochia scoparia</i>)	Smartweed, ladythumb (<i>Polygonum persicaria</i>)
Lambsquarter, common (<i>Chenopodium album</i>)	Smartweed, Pennsylvania (<i>Polygonum pennsylvanicum</i>)
Mallow, Venice (<i>Hibiscus trionum</i>)	Sunflower, common (<i>Helianthus annuus</i>)
Mustard, wild (<i>Brassica kaberu</i>)	Velvetleaf (<i>Abutilon theophrasti</i>)
Nightshade, black (<i>Solanum nigrum</i>)	Waterclover, (European <i>Marsilea quadrifolia</i>)
Nightshade, eastern black (<i>Solanum ptycanthum</i>)	

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**MARRONE BIO INNOVATIONS
WARRANTY**

To the extent consistent with applicable law, the seller makes no warranty, expressed or implied, of merchantability, fitness or otherwise concerning use of this product. The user assumes all risks of use, storage or handling that are not in strict accordance with the accompanying directions.

Label date:
US Patents No.- (Patent pending in the US)
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For control of burndown of a broad spectrum of weeds on contact

ACTIVE INGREDIENTS:	% By Wt.
Pelargonic Acid*	57.0%
Related Fatty Acids	3.0%
OTHER INGREDIENTS**	40.0%
	TOTAL 100.0%

*Contains 4.2 pounds of pelargonic acid per U.S. gallon

**Contains petroleum distillates

**KEEP OUT OF REACH OF CHILDREN
WARNING – AVISO**

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

FIRST AID	
If in eyes	<ul style="list-style-type: none"> • Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	<ul style="list-style-type: none"> • Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If inhaled	<ul style="list-style-type: none"> • Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. • Call a poison control center or doctor for further treatment advice.
If swallowed	<ul style="list-style-type: none"> • Call a poison control center or doctor immediately for treatment advice. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.
HOT LINE 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 1-888-478-0798 for emergency medical treatment information. Note to Physician: Contains petroleum distillates. Vomiting may cause aspiration pneumonia.	

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

Causes substantial but temporary eye injury. Causes skin irritation. Harmful if inhaled. Harmful if absorbed through the skin. Do not get in eyes, on skin or on clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash clothing before reuse.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Worker Protection Standard (WPS) Uses: Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category E on an EPA chemical resistance category selection chart. Applicators and other handlers who handle this pesticide for any use covered by the Worker Protection Standard (40 CFR Part 170) - in general, agricultural uses are covered - must wear:

- Coveralls worn over short-sleeved shirt and short pants
- Chemical resistant-gloves such as barrier laminate, nitrile rubber, or neoprene rubber
- Chemical-resistant footwear plus socks
- Protective eyewear (goggles, face shield or safety glasses)

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining personal protective equipment (PPE). If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

NET CONTENTS _____ GALLONS

EPA Reg. No. 10163-325
EPA Est. No.



Produced For:
Gowan Company
P. O. Box 5569
Yuma, AZ 85366-5569

Non-WPS Uses: Applicators and other handlers who handle this pesticide for any use NOT covered by the Worker Protection Standard (40 CFR Part 170) - in general, only agricultural uses are covered - must wear:

- Long-sleeved shirt and long pants
- Chemical resistant-gloves such as barrier laminate, nitrile rubber, or neoprene rubber
- Protective eyewear (goggles, face shield or safety glasses)

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

Environmental Hazards

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

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Read all Directions for Use carefully before applying.

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 state or tribal agency responsible for pesticide regulations.

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 the statements on this label about personal protection 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 12 hours.

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

- Coveralls worn over short-sleeved shirt and short pants
- Chemical resistant-gloves such as barrier laminate, nitrile rubber, or neoprene rubber
- Chemical-resistant footwear plus socks
- Protective eyewear (goggles, face shield or safety glasses)

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. Keep unprotected persons out of the treated areas until the sprayed area is dry.

PRODUCT INFORMATION

Scythe® Herbicide is a contact non-selective, broad spectrum, foliar-applied herbicide. This product will only control actively growing emerged green vegetation. It provides burndown of both annual and perennial broadleaf and grass weeds, as well as most mosses and other cryptogams. The degree of burndown and the longevity of control is less when the plants are inactive, mature, or biennial/perennial types.

This product is not translocated. It will burn only those plant parts that are coated with spray solution.

This product is a non-volatile, emulsifiable concentrate. It can be applied through most standard or field type sprayers after dilution and mixing with water in accordance with label instructions. For best results, uniform and complete coverage of target plants is required.

Visible effects on most weeds occur within hours. This product does not damage mature, non-green, woody parts of plants. Cool weather following treatment slows the activity of this product and delays or reduces visual effects.

This product provides no residual weed control. Repeat treatments will be necessary for new plants emerging from seed or regrowth of treated vegetation. Should residual control be desired, use a product labeled for the use situation.

Mixing and Application Instructions

Apply spray solutions in properly maintained and calibrated equipment capable of delivering desired volumes. Avoid spraying or allowing drift to desirable plants. Always clean tank, pump, and line thoroughly with water after use.

Do not apply this product through any type of irrigation system.

Do not apply this product aerially.

Adjust spray droplet size to minimize drift and allow application to the intended exposure area only.

Mixing

This product mixes readily with water. To prepare the spray mixture, fill the mix or spray tank with three-fourths the required amount of water then add the proper amount of this product. Complete filling the mix or spray tank with the balance of water needed. Remove hose from tank immediately after filling to avoid siphoning back into the carrier source. Mix well.

During mixing and application, foaming of the spray solution can occur. A defoaming agent can be added to prevent excessive foaming. If application is intended in or around crops, the defoaming agent must be approved for such use.

Always determine compatibility of companion herbicides and tank additives prior to addition to the spray tank. Determine compatibility by performing a jar test using appropriate quantities of each material and water (see Tank Mixes).

For best results with backpack or other small tank applicators ensure thorough mixing of herbicidal solution at filling and during the spray operation. For sprayers without agitation, mix or shake regularly to maintain suspension. Without agitation, this product separates quickly out of the spray solution.

Boom Equipment

For best control or burndown of annual, biennial or perennial weeds using conventional boom equipment, use the indicated rate of this product in 75 to 200 gallons of spray solution per acre as a broadcast spray. Use lower delivery rates of 10 to 75 gallons per acre of spray solution when this product is used as a tank mix synergist with other foliar products (see Tank Mixes). As the density of weeds increase, increase spray gallonage within the indicated range.

Hand-Held and High-Volume Equipment

Use spray-to-wet applications of this product with knapsack and backpack sprayers, pump-up pressure sprayers, handguns, handwands, and other hand-held spray equipment and vehicle mounted high volume spray equipment. Apply spray solutions of this product to foliage of vegetation to be controlled. For most efficient use of spray mixture, spray all leaf surfaces uniformly and completely to wetness, but not to the point of runoff.

Selective Placement Equipment

Direct the herbicide solution onto weeds using a shielded applicator which employs a physical barrier to shield desirable vegetation from herbicide sprays. When applying this product through a shielded or directed applicator, follow spray volume instructions of the equipment or nozzle manufacturer.

Application Rates

Mix this product in the indicated proportions as listed below and deliver the spray solution through boom, high volume, or hand-held equipment.

Stand Alone Use

Use the following percentage solutions (volume/volume) to deliver 75 to 200 gallons of the spray solution per acre through boom, hand-held equipment, or high volume equipment.

- Use a 3-5% solution for control of annual weeds, mosses and cryptogams. Use the lower rate in the rate range for young, succulent and actively growing weeds and the higher rate for weeds greater than six inches in height or in the flowering stage. Use higher rate for control of mosses, lichens, and other cryptogams on structures and surfaces.
- Use a 5-7% solution for burndown of perennial herbaceous plant, weeds in a later stage of growth and control of sucker growth. Use the highest rate for perennial weeds at or beyond the flower stage or when the plants have "hardened".
- Use a 7-10% solution when maximum vegetative burndown, edging, or foliar trimming is desired.

Repeat application as required to maintain desirable level of weed control and to control plants emerging from seed and underground parts.

Tank Mixes

Tank mixing this product with other pesticides must be governed by the most restrictive label limitations and precautions. Do not exceed any label dosage rates. This product must not be mixed with any product containing a label prohibition against such mixing.

Always predetermine the compatibility of labeled tank mixtures of this product with other products in advance of application by mixing proportional quantities of all products and water in a container and watching for adverse reactions. When tank mixing, add formulations in the following sequence: (1) wettable powders; (2) flowable liquids; (3) emulsifiable liquids; (4) Scythe Herbicide; (5) water soluble liquids; and (6) adjuvants.

This product is synergistic with certain postemergence herbicides. A mixture of this product and glyphosate have shown enhanced speed of top kill and improved control of numerous weed species.

See "Mixing and Application Instructions" section of this label for spray volume, equipment and procedures for tank mixtures.

Scythe plus Glyphosate Herbicides: To enhance the activity of glyphosate-containing herbicides such as Roundup, Rodeo®, Touchdown, Glyphomax® or Glypro® herbicides, and accelerate burndown of target weeds, use the necessary amount of this product to reach a final concentration of 1-3% spray solution plus the labeled rate of the registered glyphosate product (see Rate Table). Lower rates in the rate range will provide less visible burndown effect. When this product is used as an additive and foliar burndown is not expected, mix the necessary amount to reach a final concentration of 0.25-1% spray solution plus the labeled rate of the glyphosate formulation. Adjust rates of both products according to label rates for desired level of control, weeds to be controlled, and conditions at application.

Scythe plus Other Foliar Herbicides: This product can enhance the activity of postemergence herbicides such as Touchdown herbicide and all formulations consisting of cyclohexanedione, sulfonyleurea and imidazolinone herbicides when used as a tank mix additive. Use the necessary amount of this product to reach a final concentration of 1-3% spray solution plus the label rate of the companion product (see Rate Table). Lower rates in the rate range will provide less visible burndown effect. When this product is used as an enhancement additive and foliar burndown is not expected, mix the necessary amount to reach a final concentration of 0.25-1% spray solution plus the companion product. Adjust rates of products according to label rates for desired level of control, weeds to be controlled and conditions at application.

Scythe Plus Residual Herbicides: For burndown of vegetation followed by residual control of weeds emerging from seed or underground parts, mix this product with a labeled soil-active herbicide such as all formulations consisting of sulfonyleurea, imidazolinone, triazine, dinitroaniline and acylurea herbicides. Follow the use instructions and application rates of the residual companion product plus: (See "Stand Alone" rates)

- 3-5% for annual weeds and vegetation
- 5-7% for perennial herbaceous and late stage annuals
- 7-10% for maximum vegetation burndown

Rate Table

Desired Volume Of Spray Solution (gallons)	Amount of Scythe for Following Percent Solution (Volume/Volume)				
	1%	3%	5%	7%	10%
1	1 1/3 fl oz	4 fl oz	6 2/3 fl oz	9 1/3 fl oz	13 fl oz
2.5	3 1/4 fl oz	9 2/3 fl oz	1 pt	1 3/8 pt	2 pt
5	6 2/3 fl oz	1 1/4 pt	2 pt	1 1/2 qt	2 qt
7.5	9 2/3 fl oz	1 3/4 pt	1 1/2 qt	2 1/4 qt	3 qt
10	13 fl oz	2 1/2 pt	2 qt	2 3/4 qt	1 gal

Use Methods

See the "Use Sites" section of this label to match the method of use with the crop or use situation.

1. **Vegetative Burndown:** General control of weeds for seedbed or site preparation, non-crop and around aquatic sites. Spot treatments may be used in crop and pasture situations.
2. **Directed and Shielded Sprays:** Applications may be made in and around desirable plants when contact of foliage and green bark is avoided.
3. **Prior to Emergence of Plants from Seed, Perennial Rootstocks, Corms and Bulbs:** Ensure applications are made before new growth or crop emerges from soil or damage will occur.
4. **Dormant or Post Harvest Spray:** For control of weeds growing in dormant turf or fields after this commodity has been harvested. Partially green growth will be killed or stunted.
5. **Sucker Control, Pruning and Trimming:** To burn back unwanted basal sucker growth on woody trees and foliage growth on vines, and excessive cane growth in brambles. Apply only to unwanted vegetative parts. Apply before suckers become woody.
6. **Harvest Aid and Desiccation:** To remove leaves of plants prior to harvest and/or burndown of weeds to facilitate harvest. Harvest aid and desiccation uses include applications to root and tuber vegetables, bulb vegetables and cotton only. Applications must be made no later than twenty-four hours prior to harvest (pre-harvest interval = 24 hours).
7. **Structural and Building Applications:** Apply to unwanted vegetation in and around buildings and structures. Application to walks, benches, walls, floors, roofs, or cooling pads for the control of moss and certain algae. A temporary residue or precipitate can result when used on some types of concrete, masonry, brick or stone.

Use Sites

Care must be exercised to avoid contact of spray with foliage of desirable turfgrasses, trees, shrubs, or other desirable vegetation since damage can result. Best results are obtained when applications are made to young succulent weeds and when spray solutions cover all leaf surfaces. Mature, woody weeds are less susceptible. Repeat applications as needed to give desirable levels of weed control.

Select nozzles/pressure combinations that deliver large coarse droplets such as solid cones or flat fans at low pressures, and avoid nozzle/pressure combinations that generate fine particles or mist. If spraying areas adjacent to desirable plants, use a shield to help prevent spray from contacting foliage of desirable plants. Reseeding or transplanting can occur in treated areas as soon as desirable levels of weed control are obtained.

Crop Uses and Use Methods

Use Methods: See the corresponding numbers in the "Use Methods" section under "General Information" for use descriptions and precautions.

Crop Group	Crops	Use Methods
Root Tuber and Perennial Vegetables	Asparagus, artichoke, beet, carrot, ginger, ginseng, horseradish, parsnip, potato, radish, rutabaga, sweet potato, turnip and yam † Harvest Aid and Desiccation uses are approved only for root and tuber vegetables in this crop group.	1,2,3,4,6 †
Bulb Vegetables	Garlic, leek, onion, and shallot	1,2,3,6
Leafy Vegetables	Celery, cilantro, cress, endive, fennel, lettuce, parsley, rhubarb, spinach, Swiss chard	1,2
Cole or Brassica Crops	Broccoli, brussels sprouts, cabbage, cauliflower, collards, kale, kohlrabi, greens (mustard and turnip)	1,2,3
Legume Vegetable	Beans (<i>Phaseolus</i> spp. such as: field green, kidney, lima, mung, navy, pinto, snap, and wax beans) (<i>Vigna</i> spp. such as: black-eyed, Chinese longbean, cowpea, and southern pea) peas (<i>Pisum</i> spp. such as: garden, green, sugar, and snow peas), lentil, and soybean	1,2,3
Fruiting Vegetables	Eggplant, okra, pepper (bell, chili, sweet), pimento, and tomato	1,2,3
Cucurbits and Melons	Cucumber, gourd, muskmelon, cantaloupe, pumpkin, squash, and watermelon	1,2,3
Citrus	Grapefruit, kumquat, lemon, lime, orange, tangerine, and tangelo	1,2
Pome Fruit	Apple, crabapple, pear, and quince	1,2,5
Stone Fruit	Apricot, cherry, nectarine, peach, plum and prune	1,2,5
Small Fruit, Berries, and Grapes	Blackberry, blueberry, boysenberry, cranberry, currant, dewberry, grape (all types), loganberry, olallieberry, raspberry, and strawberry	1,2,3,5
Nuts	Almond, brazil nut, chestnut, filbert, macadamia, pecan, pistachio, and walnut	1,2,5
Tropical and Other Fruit	Avocado, banana, coconut, date, fig, guava, kiwi, mango, olive, persimmon, papaya and pineapple	1,2,5
Field Crops and Cereal Grains	Barley, buckwheat, canola, corn (field, popcorn, and sweet corn), cotton, cowpea, millet, oat, peanut, rice, rye, safflower, sorghum, sugarcane, sunflower, and wheat † Harvest Aid and Desiccation uses are approved only for cotton within this crop group.	1,2,3,6 †
Forages and Pasture Grasses (Forage or Seed)	Alfalfa, clovers, trefoil, vetch, bromegrass, fescue, bluegrass, lespedeza, ryegrass, sudangrass, timothy, range grasses, and crops grown for livestock feed	1,3,4
Herbs & Spices	Anise, basil, caraway, chive, cumin, curry, dill, fennel, oregano, mints, rosemary, sage, savory, sweet bay, tarragon, thyme and wintergreen	1,2,3,4
Beverage and Specialty Crops	Cocoa, coffee, hops, tea, tobacco, and jojoba	1,2,5

Non-Crop Use Sites and Use Methods

Use Methods: See the corresponding numbers in the "Use Methods" section under "General Information" for use descriptions and precautions.

Non-Crop Group	Non-Crop Use Sites	Use Methods
Turf, Flowers, Bedding and Landscape Plants	Turfgrass (maintenance, sod or seed production), bedding plant, flowers, and ornamentals	1,2,3,4,5,6
Trees and Shrubs	Christmas trees, forest and commercial trees, landscape trees, nursery trees or shrubs, and fiber farms	1,2,5
Greenhouse and Indoor Use	All crops, plants, and structures	1,2,3,7
Non-Crop, Industrial, and Public Areas	Farmstead, homestead, fallow land, storage areas, schools, paved areas, rights-of-way (e.g., road, railroad, utilities), parking lots, recreation areas (e.g., athletic fields, campgrounds, golf courses, playgrounds), walks, industrial sites (e.g., lumberyard, tank farms, buildings).	1,2,7
Structures, Buildings, and Walkways	Bench, deck, equipment, floor, roof, wall, walks, and evaporative cooling pads.	7
Dry Aquatic Sites, Dry Drainage Systems and Around Aquatic Sites	Applications must be made 72 hours prior to reflooding of dry aquatic sites. Dry ditches, dry canals, ditch banks, and for use above the water line or after drawdown of agricultural irrigation water and ditch systems, industrial ponds and disposal systems, and impounded water areas.	1,7

Storage and Disposal

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

Pesticide Storage: Keep container tightly sealed when not in use. Store only in original container in a dry place inaccessible to children and pets.

Pesticide Disposal: Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

Container Reuse: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available.

Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

FOR 24-HOUR EMERGENCY ASSISTANCE (SPILL, LEAK, OR FIRE), CALL CHEMTREC® (800) 424-9300.
For other product information, contact Gowan Company, LLC or see Material Safety Data Sheet.

NOTICE ON CONDITIONS OF SALE

Important: Read the entire Directions for Use and Notice of Conditions of Sale and Warranty and Liability Limitations before using this product. If terms are not acceptable return the unopened container for a full refund.

Our directions for use of this product are based on tests believed to be reliable. However, it is impossible to eliminate all risk associated with the use of this product. Crop injury, inadequate performance, or other unintended consequences may result due to soil or weather conditions, off target movement, presence of other materials, method of use or application, and other factors, all of which are beyond the control of Gowan Company. To the extent consistent with applicable law, all such risks are assumed by the Buyer and User.

Gowan Company warrants that this product conforms to the specifications on the label when used in strict conformance with Direction for Use, subject to the above stated risk limitations. GOWAN COMPANY MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, GOWAN COMPANY'S EXCLUSIVE LIABILITY FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT WHETHER IN CONTRACT, WARRANTY, TORT, NEGLIGENCE, OR ANY OTHER LEGAL THEORY IS STRICTLY LIMITED TO THE PURCHASE PRICE PAID OR REPLACEMENT OF PRODUCT, AT GOWAN COMPANY'S SOLE DISCRETION.

This product is sold only for uses stated on its label. No express or implied license is granted to use or sell this product under any patent in any country except as specified. Country: United States of America.

Scythe® is a registered trademark of Gowan Company LLC

Chemtrek® is a registered trademark of American Chemistry Council, Inc.

1 Identification

· Product identifier

· Trade name: **SCYTHE® HERBICIDE**

EPA Registration No.: 10163-325

· CAS Number: Active Ingredient: Pelargonic acid (57.0%), CAS: 112-05-0

· Relevant identified uses of the substance or mixture and uses advised against

· Sector of Use Agriculture

· Application of the substance / the mixture Agricultural herbicide

· Details of the supplier of the safety data sheet

· Manufacturer/Supplier:

Gowan Company

P.O. Box 5569

Yuma, Arizona 85366-5569

(928) 783-8844

· Information department: sds@gowanco.com

· Emergency telephone number:

Chemtrec® Emergency Telephone 24-Hours: (Spills, leak or fire) Inside U.S. & Canada: (800) 424-9300

Outside the U.S. & Canada: +011 (703) 527-3887

For medical emergency (Prostar®): (888) 478-0798

2 Hazard(s) identification

· Classification of the substance or mixture



GHS07

Acute Tox. 4 H332 Harmful if inhaled.

Skin Irrit. 2 H315 Causes skin irritation.

· Label elements

· GHS label elements

The product is classified and labeled according to the Globally Harmonized System (GHS).

· Hazard pictograms



GHS07

· Signal word: Warning

· Hazard-determining components of labeling:

Pelargonic Acid

· Hazard statements

Harmful if inhaled.

Causes skin irritation.

· Precautionary statements

Avoid breathing dust/fume/gas/mist/vapors/spray

Wear protective gloves.

Specific treatment (see on this label).

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Call a poison center/doctor if you feel unwell.

If skin irritation occurs: Get medical advice/attention.

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· **Classification system:**

· **NFPA ratings (scale 0 - 4)**



HAZARD INDEX:

- 4 Severe Hazard
- 3 Serious Hazard
- 2 Moderate
- 1 Slight Hazard
- 0 Minimal Hazard

· **HMIS-ratings (scale 0 - 4)**



HAZARD INDEX:

- 4 Severe Hazard
- 3 Serious Hazard
- 2 Moderate
- 1 Slight Hazard
- 0 Minimal Hazard

· **Other hazards**

- **Results of PBT and vPvB assessment**
 - PBT: Not applicable in US.
 - vPvB: Not applicable in US.

3 Composition/information on ingredients

· **Chemical characterization: Mixtures**

· **Description:** Mixture of the substances listed below with nonhazardous additions.

· **Dangerous components:**

112-05-0	Pelargonic Acid ⚠ Skin Corr. 1B, H314	57.0%
64742-65-0	Distillates (petroleum), solvent-dewaxed heavy paraffinic ⚠ Carc. 1B, H350	<29.7%
64741-88-4	Distillates (petroleum), solvent-refined heavy paraffinic ⚠ Carc. 1B, H350	<10.5%

4 First-aid measures

· **Description of first aid measures**

· **General information:**

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

You may also contact 1-888-478-0798 for emergency medical treatment information.

· **After inhalation:**

- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-

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- mouth if possible.
- Call poison control center or doctor for further treatment advice.
- **After skin contact:**
 - Take off contaminated clothing.
 - Rinse skin immediately with plenty of water for 15-20 minutes.
 - Call a poison control center or doctor for treatment advice.
- **After eye contact:**
 - Hold eye open and rinse slowly and gently with water for 15-20 minutes.
 - Remove contact lenses, if present, after first 5 minutes, then continue rinsing eyes.
 - Call a poison control center or doctor for treatment advice.
- **After swallowing:**
 - Call a poison control center or doctor immediately for treatment advice.
 - Do not induce vomiting unless told to do so by the poison control center or doctor.
 - Do not give anything by mouth to an unconscious person.
- **Information for doctor:**
 - **Most important symptoms and effects, both acute and delayed** Unknown
 - **Indication of any immediate medical attention and special treatment needed**
 Contains petroleum distillates. Vomiting may cause aspiration pneumonia.

5 Fire-fighting measures

- **Extinguishing media**
 - **Suitable extinguishing agents:**
 CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
- **Special hazards arising from the substance or mixture**
 - Carbon monoxide (CO)
 - Carbon dioxide (CO₂)
- **Advice for firefighters**
 - **Protective equipment:** Wear self-contained respiratory protective device.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**
 Wear protective equipment. Keep unprotected persons away.
- **Environmental precautions:**
 Do not apply directly to water, areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters or rinsate.
- **Methods and material for containment and cleaning up:**
 - Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
 - Use neutralizing agent.
 - Dispose contaminated material as waste according to item 13.
 - Ensure adequate ventilation.
- **Reference to other sections**
 - See Section 7 for information on safe handling.
 - See Section 8 for information on personal protection equipment.
 - See Section 13 for disposal information.

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7 Handling and storage

· Handling:

· Precautions for safe handling

Causes substantial but temporary eye injury. Causes skin irritation. Harmful if inhaled. Harmful if absorbed through the skin. Do not get in eyes, on skin or on clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash clothing before reuse.

· **Information about protection against explosions and fires:** *Keep ignition sources away - Do not smoke.*

· Conditions for safe storage, including any incompatibilities

· Storage:

· Requirements to be met by storerooms and receptacles:

Keep container tightly sealed when not in use. Store only in original container in a dry place inaccessible to children and pets.

· **Information about storage in one common storage facility:** *Store away from foodstuffs.*

· **Further information about storage conditions:** *Store in dry conditions.*

· **Specific end use(s)** *No further relevant information available.*

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** *No further data; see item 7.*

· Control parameters

· Components with limit values that require monitoring at the workplace:

The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.

· **Additional information:** *The lists that were valid during the creation were used as basis.*

· Exposure controls

· Personal protective equipment:

· General protective and hygienic measures:

- *Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.*
- *Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.*
- *Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.*

· Protection of hands:



Protective gloves

· **Material of gloves** *Chemical-resistant gloves.*

· Penetration time of glove material

The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.

· Eye protection:



Tightly sealed goggles

· Body protection:

- *Coveralls worn over short-sleeved shirt and short pants*
- *Chemical resistant-gloves such as barrier laminate, nitrile rubber, or neoprene rubber*
- *Chemical-resistant footwear plus socks*

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- Protective eyewear (goggles, face shield or safety glasses)

9 Physical and chemical properties

· Information on basic physical and chemical properties

· General Information

· Appearance:

- Form: Liquid
- Color: Colorless to yellow
- Odor: Waxy
- Odour threshold: Not determined.

· pH-value at 20 °C (68 °F): 3.8

· Change in condition

- Melting point/Melting range: Undetermined.
- Boiling point/Boiling range: < 237 °C (< 459 °F)

· Flash point: > 94 °C (> 201 °F)

· Flammability (solid, gaseous): Not applicable.

· Ignition temperature: 405 °C (761 °F)

- Decomposition temperature: Not determined.

· Auto igniting: Product is not self-igniting.

· Danger of explosion: Product does not present an explosion hazard.

· Explosion limits:

- Lower: 1.2 Vol %
- Upper: Not determined.

· Vapor pressure: Not determined.

· Density: Not determined.

- Relative density: Not determined.
- Vapour density: Not determined.
- Evaporation rate: Not determined.

· Solubility in / Miscibility with

- Water: Dispersible.

· Partition coefficient (n-octanol/water): Not determined.

· Viscosity:

- Dynamic: Not determined.
- Kinematic: Not determined.

· Other information: No further relevant information available.

10 Stability and reactivity

· Reactivity

- Chemical stability: Stable under normal conditions
 - Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications.
- Possibility of hazardous reactions: No dangerous reactions known.

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- **Conditions to avoid** Excessive heat.
- **Incompatible materials:** No further relevant information available.
- **Hazardous decomposition products:** No dangerous decomposition products known.

11 Toxicological information

- **Information on toxicological effects**
- **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**

Scythe Herbicide

Oral	LD50	>5000 mg/kg (rat)
Dermal	LD50	>2000 mg/kg (rabbit)
Inhalative	LC50/4 h	>5.29 mg/l (rat)

· **Primary irritant effect:**

- **on the skin:** Irritating effect
- **on the eye:** Substantial but temporary eye injury.

· **Sensitization:** No sensitizing effects known.

· **Additional toxicological information:**

The product shows the following dangers according to internally approved calculation methods for preparations:

Corrosive

Swallowing will lead to a strong caustic effect on mouth and throat and to the danger of perforation of esophagus and stomach.

Carcinogenic.

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

None of the ingredients are listed.

· **NTP (National Toxicology Program)**

None of the ingredients are listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**

None of the ingredients are listed.

12 Ecological information

· **Toxicity**

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

· **Aquatic toxicity:** No further relevant information available.

· **Persistence and degradability** No further relevant information available.

· **Behavior in environmental systems:**

· **Bioaccumulative potential** No further relevant information available.

· **Mobility in soil** No further relevant information available.

· **Results of PBT and vPvB assessment**

· **PBT:** Not applicable.

· **vPvB:** Not applicable.

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· Other adverse effects No further relevant information available.

13 Disposal considerations

· Waste treatment methods

· Recommendation:

Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

· Uncleaned packagings:

· Recommendation:

Disposal must be made according to official regulations.

Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available.

Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

· Recommended cleansing agent: Water, if necessary with cleansing agents.

14 Transport information

· UN-Number

· DOT

· ADR, IMDG, IATA

Not regulated

UN1760

· UN proper shipping name

· ADR

· IMDG, IATA

1760 Corrosive liquids, n.o.s. (Pelargonic Acid)
CORROSIVE LIQUID, N.O.S. (Pelargonic Acid)

· Transport hazard class(es)

· ADR, IMDG, IATA



· Class

8 Corrosive substances

· Label

8

· Packing group

· ADR, IMDG, IATA

II

· Environmental hazards:

· Marine pollutant:

No

· Special precautions for user

Warning: Corrosive substances

· Danger code (Kemler):

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· EMS Number:	F-A,S-B
· Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable
· Transport/Additional information:	
· ADR	
· Excepted quantities (EQ)	Code: E2 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 500 ml
· IMDG	
· Limited quantities (LQ)	IL
· Excepted quantities (EQ)	Code: E2 Maximum net quantity per inner packaging: 30 ml Maximum net quantity per outer packaging: 500 ml
· UN "Model Regulation":	US DOT: Non Bulk: Not regulated All Others: UN1760, Corrosive liquids, n.o.s. (Pelargonic Acid), 8, II

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**

EPA /FIFRA Information:

This chemical is a pesticide product registered by the Environmental Protection Agency and is subject to certain labeling requirements under federal pesticide law. These requirements differ from the classification criteria and hazard information required for safety data sheets, and for workplace labels of non-pesticide chemicals.

· SARA Title III

· **Section 355 (extremely hazardous substances):**

None of the ingredients are listed.

· **Section 313 (Specific toxic chemical listings):**

None of the ingredients are listed.

· **TSCA (Toxic Substances Control Act):**

All ingredients are listed.

· **Proposition 65**

· **Chemicals known to cause cancer:**

None of the ingredients are listed.

· **Chemicals known to cause reproductive toxicity for females:**

None of the ingredients are listed.

· **Chemicals known to cause reproductive toxicity for males:**

None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity:**

None of the ingredients are listed.

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· **Carcinogenicity categories**· **EPA (Environmental Protection Agency)**

None of the ingredients are listed.

· **TLV (Threshold Limit Value established by ACGIH)**

None of the ingredients are listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**

None of the ingredients are listed.

· **GHS label elements**

The product is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**

Not applicable

· **Signal word:**

(USA EPA) WARNING

· **Hazard-determining components of labeling:**

Pelargonic Acid

· **Hazard statements**

Causes substantial but temporary eye injury.

Causes skin irritation.

Harmful if inhaled

Harmful if absorbed through skin.

Do not get in eyes or on clothing.

Avoid breathing spray mist.

Wash thoroughly with soap and water after handling.

Remove contaminated clothing and wash before reuse.

Harmful if inhaled.

Causes skin irritation.

· **Precautionary statements**

Avoid breathing dust/fume/gas/mist/vapors/spray

Wear protective gloves.

Specific treatment (see on this label).

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

Call a poison center/doctor if you feel unwell.

If skin irritation occurs: Get medical advice/attention.

· **National regulations:**· **Information about limitation of use:**

Workers are not allowed to be exposed to the hazardous carcinogenic materials contained in this preparation. Exceptions can be made by the authorities in certain cases.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

—US—

(Contd. on page 10)

Safety Data Sheet

acc. to OSHA

Printing date 07/01/2015

Reviewed on 07/01/2015

Trade name: SCYTHE® HERBICIDE
EPA Registration No.: 10163-325

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16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing SDS:** Supply Chain

· **Contact:** sds@gowanco.com

· **Date of preparation / last revision** 07/01/2015 / 2

· **Abbreviations and acronyms:**

ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)

IMDG: International Maritime Code for Dangerous Goods

DOT: US Department of Transportation

IATA: International Air Transport Association

ACGIH: American Conference of Governmental Industrial Hygienists

EINECS: European Inventory of Existing Commercial Chemical Substances

ELINCS: European List of Notified Chemical Substances

CAS: Chemical Abstracts Service (division of the American Chemical Society)

NFPA: National Fire Protection Association (USA)

HMIS: Hazardous Materials Identification System (USA)

LC50: Lethal concentration, 50 percent

LD50: Lethal dose, 50 percent

Acute Tox. 4: Acute toxicity, Hazard Category 4

Skin Corr. 1B: Skin corrosion/irritation, Hazard Category 1B

Skin Irrit. 2: Skin corrosion/irritation, Hazard Category 2

Carc. 1B: Carcinogenicity, Hazard Category 1B

· **Sources** Scythe® is a registered trademark of Gowan Company, L.L.C.

· * **Data compared to the previous version altered.**

US

PART A



controls grass and weeds...naturally
NON-SELECTIVE HERBICIDE

GUARANTEED ANALYSIS:

Active Ingredients:

Eugenol 6%

Inert Ingredients:

Water and Molasses : 94%

PRODUCT INFORMATION

WEED SLAYER is a unique broad spectrum natural herbicide made from a blend of Part A (Eugenol an essential oil of Clove and molasses) and Part B (a strong natural and proprietary bio surfactant)

WEED SLAYER can be applied to control grass and weeds. Results are normally seen in less than a week but can take up to 10 to 14 days. Residuality can be expected to last for several weeks but should not affect new crops.

DIRECTIONS FOR USE:

Mix 32 ounces of **PART A** per acre and 32 ounces of **PART B** per acre into 25 gallons and up to 50 gallons of water per acre. **Make sure to agitate** and empty every jug thoroughly. When applying, make sure to protect all desirable crop or plants from overspray as **WEED SLAYER** will affect them. **SHAKE BEFORE USE.**

WEED SLAYER is exempted from EPA registration under FIFRA 25 (b).

CAUTION: KEEP OUT OF REACH OF CHILDREN

NET VOLUME / NET WEIGHT:

2.5 US Gal 12.56 kg/27.63 lb

LOT: MMDDAAXX-#

EXP: MM AA

PRECAUTIONS:

Avoid getting in eyes or on skin or clothing. The use of side-shield safety glasses and gloves is recommended. Harmful if swallowed. If skin contact occurs, remove contaminated clothing and wash with large amounts of soap and water. If in eyes, rinse repeatedly with clean water for 15 minutes. Obtain medical attention for any persistent irritation.

CONTAINER DISPOSAL:

Dispose of waste material in accordance with federal, state and local environmental laws and regulations.

STORAGE:

Keep container sealed tightly when not in use. Keep product in a cool location away from direct sunlight. Store in temperatures between 5° C (41° F) and 25° C (77° F).

CONDITIONS OF SALE:

Seller warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on the label when used in accordance with directions under normal use and conditions. Crop injury, inefficacy, or other unintended consequences may result from factors, such as weather conditions, presence of other materials, or the manner of use or application, which are beyond the control of seller. In no case shall seller or its affiliates be liable for consequential, special or indirect damages resulting from the use, handling, or shipping of this product. No warranty is expressed or implied, including warranty of merchantability or fitness for a particular purpose.

FOR COMMERCIAL USE ONLY

Manufactured in the USA



From the farm to the table... naturally



MANUFACTURED BY:

Agro Research International LLC
29203 State Road 46
Sorrento, FL 32776
(407) 302 6116

www.agroresearchinternational.com

PART B

weed slayer™

controls grass and weeds...naturally

NON-SELECTIVE HERBICIDE

GUARANTEED ANALYSIS:

Active Ingredients:
Bio Surfactant 35%
Inert Ingredients:
Water 65%

PRODUCT INFORMATION

WEED SLAYER is a unique broad spectrum natural herbicide made from a blend of Part A (Eugenol an essential oil of Clove and molasses) and Part B (a strong natural and proprietary bio surfactant)

WEED SLAYER can be applied to control grass and weeds. Results are normally seen in less than a week but can take up to 10 to 14 days. Residuality can be expected to last for several weeks but should not affect new crops.

DIRECTIONS FOR USE:

Mix 32 ounces of **PART A** per acre and 32 ounces of **PART B** per acre into 25 gallons and up to 50 gallons of water per acre. **Make sure to agitate** and empty every jug thoroughly. When applying, make sure to protect all desirable crop or plants from overspray as **WEED SLAYER** will affect them. **SHAKE BEFORE USE.**

WEED SLAYER is exempted from EPA registration under FIFRA 25 (b).

CAUTION: KEEP OUT OF REACH OF CHILDREN

NET VOLUME / NET WEIGHT:

9.45 kL/20.85Lb.

FOR COMMERCIAL USE ONLY

Manufactured in the USA



From the farm to the table... naturally

LOT: MMDDAAXX-#
EXP: MM AA

PRECAUTIONS:

Avoid getting in eyes or on skin or clothing. The use of side-shield safety glasses and gloves is recommended. Harmful if swallowed. If skin contact occurs, remove contaminated clothing and wash with large amounts of soap and water. If in eyes, rinse repeatedly with clean water for 15 minutes. Obtain medical attention for any persistent irritation.

CONTAINER DISPOSAL:

Dispose of waste material in accordance with federal, state and local environmental laws and regulations.

STORAGE:

Keep container sealed tightly when not in use. Keep product in a cool location away from direct sunlight. Store in temperatures between 5° C (41° F) and 25° C (77° F).

CONDITIONS OF SALE:

Seller warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on the label when used in accordance with directions under normal use and conditions. Crop injury, inefficacy, or other unintended consequences may result from factors, such as weather conditions, presence of other materials, or the manner of use or application, which are beyond the control of seller. In no case shall seller or its affiliates be liable for consequential, special or indirect damages resulting from the use, handling, or shipping of this product. No warranty is expressed or implied, including warranty of merchantability or fitness for a particular purpose.



MANUFACTURED BY:

Agro Research International LLC
29203 State Road 46
Sorrento, FL 32776
(407) 302 6116

www.agroresearchinternational.com

SAFETY DATA SHEET



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WEED SLAYER

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name: Weed Slayer.

Product Use: Broad spectrum, nonselective herbicide.

Supplier: AGRO RESEARCH INTERNATIONAL LLC

Address: 29203 State Road 46.

Sorrento, FL 32776

Telephone: 1 407 302 6116

Emergency phone: 1 407 435 9105

E-Mail: marc@agroresearchinternational.com

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENTS	%	CAS #
Eugenol	0 - 6	97-53-0

SECTION 3: HAZARDS IDENTIFICATION

Toxicological risk classification according to WHO: U product unlikely to present acute hazard.

Physical state: dark brown liquid with a characteristic odor of cloves, noncorrosive and chemically stable in its form liquid.

This material is not a "health hazard" or a "physical hazard" as determined when reviewed according to the requirements of the Occupational Safety and Health Administration Hazard Communication Standard, 20 CFR 1910.1200.

Health hazards:

Eyes: Causes eye irritation, ardeny, and redness.

Skin: brief contact with the skin is not toxic. Repeated or prolonged contact will dehydrate skin.

Ingestion: Can cause upper GI tract disturbance.

Inhalation: Can cause sneezing and coughing.

SECTION 4: FIRST AID MEASURES

Eye contact: if you wear contact lenses remove them immediately. Rinse with plenty of water for at least 15 minutes, keeping eyelids open. Seek medical attention if irritation persists.

SAFETY DATA SHEET



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WEED SLAYER

Skin contact: Immediately wash with water. Remove contaminated clothing and wash before use. Seek medical attention if irritation develops.

Inhalation: if it inhaled, bring the person immediately to take fresh air. Seek medical attention if discomfort persists.

Ingestion: Give plenty of water, never induce vomiting. Seek medical attention if consumed in large quantities.

SECTION 5: FIRE-FIGHTING MEASURES

Flammability of the product: Non-combustible. **Flash Point:** 0

Fire Extinguishing: Non-combustible, use water.

General Information: In the case of a fire, wear breathing apparatus. Avoid direct contact with the product, product mists, and thermal decomposition products, which may produce oxides of carbon, nitrogen oxides and other organic substances.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Use personal protective equipment recommended. Stop the spill immediately. Pump the product into drums for disposal. Wash the affected area with plenty of water. Never return spills in original containers for re-use. For waste disposal, see section 13 of the this MSDS. Do not dump into rivers or lakes, keeping away from drains, surface, and groundwater.

SECTION 7: HANDLING AND STORAGE

Handling: Avoid direct eye contact. Wash thoroughly exposed parts after handling and complies with the recommendations issued by good industrial hygiene practices.

Storage: Store in a clean and dry place. Store in original sealed containers, in a place where the temperature is below 90°F (32°C). Do not store with incompatible materials such as strong oxidizing agents, strong acids, and alkalis. It must be protected against physical damage and properly labeled.

SAFETY DATA SHEET



PAG 3 of 5

WEED SLAYER

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Engineering:

Provide adequate ventilation. Install emergency showers and eye showers close to storage and handling areas.

Personal Protection:

Eye Protection: Use safety glasses with side shields or goggles when handling large quantities.

Skin Protection: Wear clothing and gloves PVC, latex or nitrile gloves during work. Gloves and protective clothing should be worn when working with a prolonged contact in your pure form.

Respiratory Protection: Ventilation should be adequate. In case of insufficient ventilation, wear suitable respiratory equipment.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Liquid
Colour:	Dark brown
Odor:	Characteristic of cloves
Viscosity:	> 5000 cps at 70°F (21°C)
Boiling point (°C)	219°F (104.4°C)
Specific gravity (Water = 1)	≤ 1.46 at 60°F (15.6°C)
Vapor pressure (mm Hg)	Data not available
% Volatile (WT%)	Data not available
Density (Water = 1)	1.4 at 70°F (21°C)
Solubility in water, fats, and organic solvents	Complete
pH	≤6

SECTION 10: STABILITY AND REACTIVITY

Chemical stability: This product is stable under recommended storage and handling conditions. Stable at normal temperatures and pressure.

Hazardous decomposition products: Excessive heat decomposition can produce carbon and sulfur oxides and other organic substances.

SAFETY DATA SHEET



PAG 4 of 5

WEED SLAYER

Avoiding conditions: High temperatures or excessive heat above 120°F (49°C).

Incompatibilities: Reactive with strong oxidizing agents, alkalis, and strong acids.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on likely routes of exposure:

Oral effects: Data not available

Skin contact: Data not available

Inhalation effects: Data not available

Eye contact: Data not available

Chronic/Carcinogenicity: Not evidence available

Mutagenicity: Not evidence available

Synergistic Materials: Solvents and soaps.

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity: Data not available

Persistence and degradability: Data not available

Bioaccumulative potential: this product is not bioaccumulative

SECTION 13: DISPOSAL CONSIDERATIONS

Dispose of waste in accordance with local regulations. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds.

Empty containers may retain some product residues. This material and its container must be disposed of in a safe manner.

Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14: TRANSPORT INFORMATION

During charging, transfer, transport, unloading, dissolving, mixing and sampling, it is not dangerous if precautions are taken use disclosed herein.

The transportation of dangerous good act classification for this product is: Not regulated. DOT classification: non-toxic, non-corrosive, chemical NOI, non-hazardous.

SAFETY DATA SHEET



WEED SLAYER

PAG 5 of 5

SECTION 15: REGULATORY INFORMATION

FIFRA Requirements:

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) allows for federal control of pesticide distribution, sale and use.

Exemptions for pesticides of a character not requiring FIFRA regulation. The pesticides or classes of pesticides listed in this section have been determined to be of a character not requiring regulation under FIFRA, and are therefore exempt from all provisions of FIFRA when intended for use, and used, only in the manner specified. Eugenol is included on this list.

SECTION 16: ADICIONAL INFORMATION

Date of Issue: October 10th, 2017

Prepared by Agro Research International LLC.

References:

The information contained in this safety data sheet material was obtained from sources believed to be accurate and reliable from a technical point of view. Despite that they have been deployed all efforts to ensure full disclosure of product hazards, in some cases, no data are available, which is declared. Whereas the conditions under which the product is used in practice are beyond the control of the supplier, it is assumed that users of this material have been fully trained according to the standards of industrial safety of each user. No express or implied warranties are given, and the provider is not liable for losses, injuries or consequential damages that may result from using or reliance on information contained herein.

Abbreviations:

WHO: World Health Organization

CFR: Code of Federal Regulations

NOI: Notice of intent - Chemical safety protocol - notice of intent (NOI)

DOT: Department of transportation.

FIFRA: Federal Insecticide, Fungicide and Rodenticide Act.

