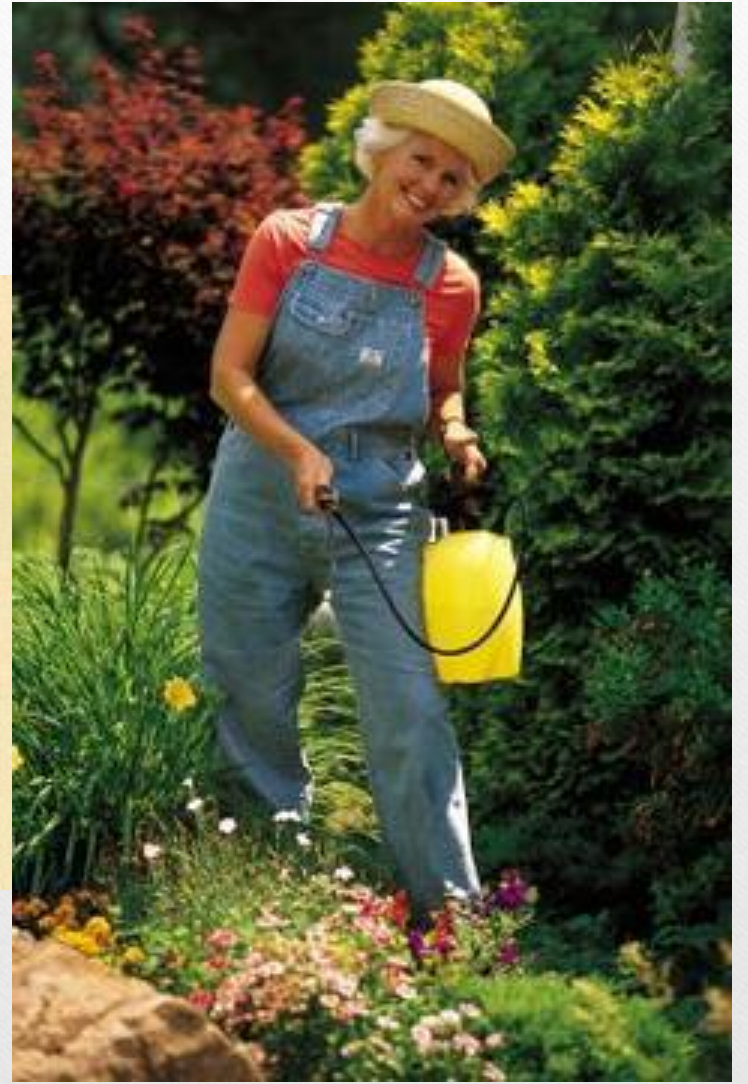




Herbicides



Pesticides and Human Health (from NPIC)

Pesticides have a specific purpose in society.

Pesticides are intended to:

- Kill organisms that cause disease and threaten public health

- Control insects, fungus, and weeds that damage crops

- Control pests that damage homes and structures vital to public safety

Because people use pesticides to kill, prevent, repel, or in some way adversely affect some living organism (the pest), pesticides by their nature are toxic to some degree.

Even the least-toxic products, and those that are natural or organic, can cause health problems if someone is exposed to enough of it.

People come into contact with pesticides in many ways, including:

When pesticides are used in and around our homes and gardens

When pesticides are used on our pets

When we work with pesticides

When pesticides are used in our communities or in our environment

When pesticides are used on the food we eat

The risk of health problems depends not only on how toxic the ingredients are (Pesticide Ingredients), but also on the amount of exposure to the product.

In addition, certain people like children, pregnant women and sick or aging populations may be more sensitive to the effects of pesticides than others. To reduce the risk of health problems from pesticides there are several things you can do:

Identify the least-toxic way to control your pest;
learn about Integrated Pest Management (IPM).

Always read the pesticide label first!

Select the appropriate product for your site, method and goals.

Read all precautions and warnings on the label prior to use.

These are intended to help you prevent harmful exposures.

Take steps to minimize your exposure, even when using low toxicity pesticides

References

- UCIPM website- pest notes and PMG's
- National Pesticide Information Center
<http://npic.orst.edu>

Do you need herbicides?

Herbicides are pesticides that control weeds

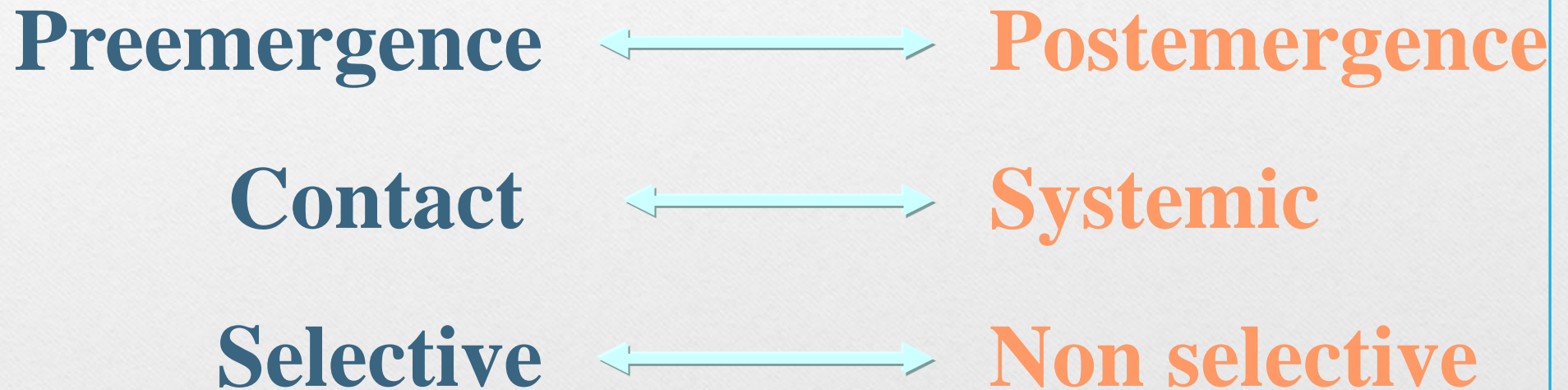
- Hand-weeding and mulching usually provide adequate control
- Use for special situations
- Figure out the underlying cause
- Use preventive methods
- Choose one labeled for the weed and safe around desirable plants



Selecting the Best Herbicide

- **Identify the weed species to be controlled and life cycle**
- **What is the crop or desired plant?**
- **Determine the soil characteristics**
- **Environmental conditions**
- **Herbicide application equipment available**
- **Duration of weed control desired**
- **Is a pre- or postemergence herbicide best?**

Herbicides



Herbicides

Preemergence

Applied before weeds emerge

- Weed and Feed
- Weed Stopper[®] (surflan, oryzalin)
- Preen[®]
- Barricade[®] (prodiamine)
- Garden Weed Preventer[®] (dacthal)
- Roundup **Extended Control[®]**

Postemergence

Applied after weeds emerge

- Weed and Feed
- Grassgetter[®] (fluazifop)
- Roundup[®] (glyphosate)
- Trimec[®], Turflon[®],
- All organic herbicides

Herbicides

Contact

Causes localized plant injury where in contact with plant

- *All organic herbicides*
- *Weed & Grass Killer[®] (diquat)*
- *Blackberry & brush block[®] (citric acid + acetic acid)*

Systemic

Moves within plant, causes injury throughout

- *Roundup[®] (glyphosate)*
- *Trimec[®] (2, 4-D, dicamba, MCPP)*
- *Weed B Gone*
- *Grass Getter*
- *Grass B Gone*
- *Roundup For Lawns[®]*

Herbicides

Selective

Toxic only to certain plants

- **Weed-B-Gon[®] (2,4-D)**
kills broadleaves, not grasses
- **Grass-B-Gon[®] (fluazifop)**
kills grasses, not broadleaves
- **Weed Stopper[®] (oryzalin)**
kills grasses and some broadleaves but does not injure established grasses and broadleaf plants

Non Selective

Generally toxic to all plants

- **Finale[®]**
- **Roundup[®] (glyphosate)**
- **Grass Weed & Vegetation Killer[®]**

Herbicides can injure garden plants

Preemergent

- Before seedlings emerge

Postemergent

- After weeds emerge

Selective

- Kills specific types of weeds

Nonselective

- Kills most vegetation

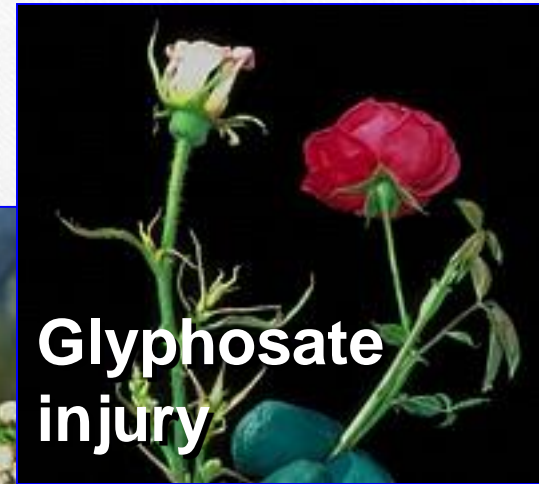


Herbicides can injure garden plants

- When labels are not followed
- When drift occurs
- When roots are buried beneath treated areas



**Triclopyr
injury**



**Glyphosate
injury**



**2,4-D
injury**

Special problem herbicides

Glyphosate	Triclopyr	2,4-D
Roundup	Brush-b-gon	Weed-b-gon

Follow the label



Wear proper clothing

- Follow all directions
- Use only the amount needed
- Don't overirrigate

Make sure the product is labeled for your weed and is registered for the area where it will be used



Applying glyphosate

- Most common herbicide
- Kills most weeds, but can damage desirable plants
- Pre-mixed solutions may be too weak to control perennials

Mix up your own solution

- Use hand-held applicator or low-pressure pump sprayer
- Measure product and water
- Rinse the measuring container
- If necessary, add surfactant



Place a funnel over the spray nozzle to avoid drift

- Treat when weeds are actively growing
- Small areas: dig up propagules, irrigate, treat
- Large areas: treat, irrigate, treat again

STATE OF CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY OFFICE OF ENVIRONMENTAL HEALTH
 HAZARD ASSESSMENT SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 CHEMICALS
 KNOWN TO THE STATE TO CAUSE CANCER OR REPRODUCTIVE TOXICITY July 7, 2017

The Safe Drinking Water and Toxic Enforcement Act of 1986 requires that the Governor revise and republish at least once per year the list of chemicals known to the State to cause cancer or reproductive toxicity. The identification number indicated in the following list is the Chemical Abstracts Service (CAS) Registry Number. No CAS number is given when several substances are presented as a single listing. The date refers to the initial appearance of the chemical on the list. For easy reference, chemicals which are shown underlined are newly added. Chemicals or endpoints shown in ~~strikeout~~ were placed on the Proposition 65 list on the date noted, and have subsequently been removed.

CHEMICAL	TYPE OF TOXICITY	CAS No.	Date Listed
Wood dust	cancer		December 18, 2009
Bracken fern	cancer		January 1, 1990
Diesel engine exhaust	cancer		October 1, 1990
Carbaryl	cancer	63-25-2	February 5, 2010
Leather dust	cancer		April 29, 2011
Glyphosate	cancer	1071-83-6	July 7, 2017
Salted fish, Chinese-style	cancer		April 29, 2011
Saccharin	cancer	81-07-2	October 1, 1989 Delisted April 6, 2001

Organic and Alternative Herbicides

Organic Herbicides

Good spray coverage is essential

70 GPA?- suppress lower 40?

Work best on clear sunny days.

Some work better in warm weather (80°F+)

Organic surfactants improve weed control

Treat when weeds are small

Repeat applications are needed for larger weeds

Active Ingredients Which May Be in Minimum Risk Pesticide Products Exempted under section 25(b) of FIFRA

1. Castor Oil (U.S.P. or equivalent)
2. Cedar Oil
3. Cinnamon* and Cinnamon Oil *
4. Citric Acid*
5. Citronella and Citronella Oil
6. Cloves* and Clove Oil*
7. Corn Gluten Meal*
8. Corn Oil*
9. Cottonseed Oil*
10. Dried Blood'
11. Eugenol
12. Garlic* and Garlic Oil*
13. Geianiol
14. Geranium Oil
15. Lamyl Sulfate
16. Lemon grass Oil*
17. Linseed Oil
18. Malic Acid*
19. Mint* and Mint Oil*
20. Peppermint* and Peppermint Oil*
21. 2-PhenethylPropionate (2-phenylethyl propionate)
22. Potassium Sorbate
23. Putrescent Whole Egg Solids (See 180.1071)
24. Rosemary * and Rosemary Oil*
25. Sesame* (includes ground Sesame plant stalks) (See 180.1087) and Sesame Oil*
26. Sodium Chloride (common salt)*
27. Sodium Lauryl Sulfate
28. Soybean Oil
29. Thyme* and Thyme Oil*
30. White Pepper*
31. Zinc Metal Strips (consisting solely of zinc metal and impurities)

August 2016 Cost/1000Ft²

Product	Signal word	Active ingredient		Cost	Unit	
Roundup Pro	Caution	48.7% glyphosate		\$69.99	2.5 gal	\$0.87
Suppress	Warning	32% capric acid	47% caprylic acid	\$150	2.5 gal	\$7.49
Finale	Warning	11.33% glufosinate-ammonium		\$175	2.5 gal	\$2.17
WeedPharm	Danger	20% acetic acid		\$29.95	gal	\$7.80
AvengerAG	Caution	55% limonene		\$157.26	2.5 gal	\$18.53
AXXE	Warning	40% ammonium nonanoate		\$195.02	2.5 gal	\$4.84
WeedZap	25 (b)	45% clove oil	45% cinnamon oil	\$124.35	gal	\$12.84
Burnout II	Danger 25 (b)	8% clove oil	24% citric acid	\$135.00	2.5 gal	\$27.91
Scythe	Warning	3% nonanoic acid, other related	57% nonanoic acid	\$178.98	2.5 gal	\$7.39
Fiesta	Caution	26.52% iron hedta		\$250.95	2.5 gal	\$8.15
FinalSan*	Warning	22% free fatty acids and/or amine salts		\$94	2.5 gal	\$12.94

*w/surfactant is much better



WEED ZAP™



A NON-SELECTIVE HERBICIDE FOR ANNUAL GRASSES AND WEEDS

General Information

WEED ZAP is a contact, non-selective, broad spectrum, foliar-applied herbicide. This product will only control actively growing emerged green vegetation. It controls both annual and perennial broadleaf and grassy weeds. This product does not translocate. It will affect only those plants that are coated with the spray solution.

ACTIVE INGREDIENTS:

Clove Oil	45%
Cinnamon Oil.....	45%
Inert Ingredients:	10%
Lactose and Water.	
TOTAL	100%

This product is exempt from registration with the Federal EPA under section 25 (b) of FIFRA. WEED ZAP has not been registered with the Environmental Protection Agency. JH Biotech, Inc. represents that this product qualifies for exemption from registration under the Federal Insecticide, Fungicide and Rodenticide Act.

International & United States Patents Pending

APPLICATION RATE TABLE

Mix 5 gallons of WEED ZAP concentrate per 100 gallons of spray water. Apply enough WEED ZAP to cover the entire surface of the weed. Spray to the point of run off. The use of a spreader/sticker may increase contact and efficacy of treatment.

FINAL MIX VOLUME	FL. OZ.
1 Gallon	6.4
5 Gallons	32
10 Gallons	64
25 Gallons	160

Repeat application as necessary. Coverage is essential to establish control.

Lot No.:

CAUTION KEEP OUT OF REACH OF CHILDREN

PRECAUTIONARY STATEMENTS

Off target application of WEED ZAP will result in damage to growing plants. Do not apply this product through the irrigation system.

Avoid contact with skin, eyes or clothing. In case of contact, immediately flush eyes or skin with plenty of water. Get medical attention if irritation persists.

STATEMENT OF PRACTICAL TREATMENT

IF SWALLOWED	-Call a Physician or Poison Control Center. -Drink one or two glasses of water. -Do not induce vomiting. -If person is unconscious, do not give anything by mouth or induce vomiting.
IF IN EYES	-Hold eyelids open and flush with a steady, gentle stream of water for 15 minutes. -Get medical attention if irritation persists.
IF ON SKIN	-Wash with plenty of soap and water. -Get medical attention if irritation persists.

LIMITED WARRANTY

Manufacturer or seller makes no warranty, whether expressed or implied, concerning the use of this product other than for the purposes indicated on the label. Neither manufacturer nor seller shall be liable for any injury or damage caused by this product due to misuse, mishandling or any application not specifically described on the label.

Manufactured By: JH Biotech, Inc. P.O. Box 3538 Ventura, CA 93006

NET CONTENTS:

- 1 Pint (0.47 liter)
- 2.5 Gallons (9.45 liters)
- 2 x 2.5 Gallons (18.9 liters)
- 5 Gallons (18.9 liters)
- 55 Gallons (207.9 liters)
- Other: _____ Gallons

Weight per Gallon: 8.4 lbs.

JH Biotech Inc.

0239-D-A-1
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SUPPRESS[®]

HERBICIDE EC  FOR ORGANIC PRODUCTION

**A Contact, Post-Emergent,
Non-Selective Herbicide
for Use in all Agricultural
Food Crops**





Fast Acting

AVENGER

divided weed

WEED KILLER CONCENTRATE

OMRI
Listed
Organic Materials Review Institute

FOR ORGANIC GARDENING

Non-Selective: Controls most weeds, grasses & broadleaves

• Made from Oranges • Contains Citrus Oil • Clean Citrus Scent • Does not stain brick, concrete or pavement • Can Be Used Around Pets, Wildlife After Spray Has Dried

KEEP OUT OF REACH OF CHILDREN
CAUTION See back panel for additional Precautionary Statements and First Aid

ACTIVE INGREDIENT:
d-limonene (citrus oil)..... 70%
INERT INGREDIENTS..... 30%
Total 100%

Net Contents: 32 FL OZ (946 mL)

EPH Reg. No. 42253-04
EPH Est. No. 10252-04-1 Patented Formula

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 protective equipment (PPE), notification to workers, and restricted-entry intervals. The requirements in this box apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry to 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:
• Long sleeved shirt and pants • Shoes plus socks • Protective eyewear

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 children and pets out of the treated area until sprays have dried.

Product Information: Avenger Weed Killer is a broad spectrum weed killer that contains a citrus extract called d-limonene. D-limonene comes from the peel of oranges. It is non-selective and controls most annual weeds, both grasses and broadleaves. Avenger Weed Killer is fast acting with quick visible results. For best performance, complete coverage of target weeds is necessary. Spray until thoroughly wet. For use on non-cropland, borders, driveways, patios, sidewalks, around mature trees and ornamentals, around building, in greenhouses containing non-food crops, flower beds and around flower beds.

Environmental Conditions: Avenger Weed Killer is effective over a wide range of environmental conditions. Cool weather will slow the activity of Avenger Weed Killer, but should not affect its performance.

Allow heavy dew to evaporate prior to Avenger Weed Killer applications. Do not apply if windy conditions exist or a strong threat of rain is expected within 2 hours.

Spray drift management: Do not allow the herbicide solution to contact desirable vegetation as small amounts can cause severe damage to crops and other desirable plants.

Mixing of Avenger Weed Killer: Fill the spray tank 1/2 full with clean water. Add any other dry formulations then liquid formulations to the tank. Add Avenger Weed Killer while agitating. Then fill remainder with water.

Tank Mix Combination: When used in combination with any other products, refer to their respective product labels for rates and methods of application, proper timing, restrictions and precautions. The most restrictive precautions and restrictions must be followed.

Compatibility Testing: If compatibility with another product is not known, a jar test or physical compatibility study should be conducted before tank mixtures are made.

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

CONCENTRATE AVENGER WEED KILLER

PRECAUTIONARY STATEMENTS HAZARDOUS TO HUMANS AND DOMESTIC ANIMALS

CAUTION: Harmful if absorbed through skin. Causes moderate eye irritation. Avoid contact with skin, eyes or clothing.

FIRST AID

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 in Eyes:	<ul style="list-style-type: none"> Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lens, if present, after the first 5 minutes. Then continue rinsing eye. Call a poison control center or doctor for treatment advice.

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

Personal Protective Equipment (PPE): Applicators and other handlers must wear:
• Long sleeved shirt and pants • Shoes plus socks • Protective eyewear
Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations

User should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if product gets inside. Then wash thoroughly and put on clean clothing.

PHYSICAL AND CHEMICAL HAZARDS: Combustible. Do not use or store near heat or open flame.

ENVIRONMENTAL HAZARDS: Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when 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.

Manufactured by: Cutting Edge Formulations, Inc.
2057 Summer Oak Place, Buford, Georgia 30610
(866) 906-WEED www.avengerweedkiller.com



Application Instructions

Mix this product in clean water and apply to the foliage of vegetation to be controlled. Spray weeds until thoroughly wet.

NOTE: All contacted vegetation is allecided. Avoid contacting desirable plants. Over spray or drift will injure or kill contacted vegetation. DO NOT spray on lawns - it will damage or kill treated grass.

Mixing Instructions		
To Control Small Annual Weeds (weeds less than 6 inches tall)	Large Annuals and Most Perennials	Hard to Kill Weeds
Add 1 Quart of Concentrate to 7 quarts of water to make 2 Gallons (8 quarts) of spray solution.	Add 1 Quart of Concentrate to 5 quarts of water to make 1 1/2 Gallons (6 quarts) of spray solution.	Add 1 Quart of Concentrate to 3 quarts of water to make 1 Gallon (4 quarts) of spray solution.

Small annual weeds: for control of annual weeds less than 6 inches tall, a 1:7 ratio of Avenger Weed Killer to water, dilute 1 part of Avenger Weed Killer in 7 parts of water.

Larger annual and most perennial weeds: for annual weeds above 6 inches, use a 1:5 ratio of Avenger Weed Killer to water; dilute 1 part of Avenger Weed Killer in 5 parts of water.

Hard to control weeds: for harder to control weeds (for example, weeds with a thick cuticle such as ivy) and hard to control perennials, use a 1:3 ratio of Avenger Weed Killer to water. Dilute 1 part of Avenger Weed Killer in 3 parts of water.

STORAGE AND DISPOSAL

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

Pesticide Storage: store in a cool, dry place and in such a manner to prevent cross contamination with other pesticides, fertilizers, food and feed. Store in original container and out of the reach of children, preferably in a locked storage area.

Pesticide Disposal: To avoid waste, use all material in this container by application according to label directions. If wastes cannot be avoided, offer remaining product to a waste disposal facility or pesticide disposal program (when such programs are run by state or local governments or by industry).

Container Disposal: Nonrefillable container. Do not reuse or refill this container. Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Offer for recycling, if available, otherwise separate and dispose of in a sanitary landfill or by incineration. Do not burn, unless allowed by state and local ordinances.

Conditions of Sale

The directions for use of this product are the only ones to be followed. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, illness or other unintended consequences may result because of factors such as weather conditions, presence of other materials, or use of the product in a manner inconsistent with its labeling. All of which are beyond the control of Cutting Edge Formulations or the seller. To the extent conditions are applicable law, all such risks are assumed by the buyer.

GLUE ST 1



**PHARM
SOLUTIONS
WEED
PHARM**

www.pharmsolutions.com



**FAST
ACTING
WEED &
GRASS
KILLER**

Ready-to-use

**A FOOD GRADE
ORGANIC ACID**

For Non-Selective
Control of Herbaceous
Broadleaf Weeds and
Weed Grasses on
Residential, Non-Crop,
Right-of-Way, and
Industrial Land Sites

35 Fl. Oz.

**KEEP OUT OF REACH
OF CHILDREN**

DANGER - PELIGRO

Si usted no entiende, 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.)

EPA Registration No. 81936-1-81935
EPA Establishment No. 81936-WA-001

**Pharm Solutions Inc.
2023 E. Sims Way.
Suite #358
Port Townsend, WA 98368**

Active Ingredients by wt.

Acetic Acid	20.0%*
Other Ingredients . . .	80.0%
TOTAL	100.0%

*Equivalent to 200 grain
vinegar by titration

First Aid

If in Eyes

Hold eyelids open and flush
with a steady, gentle stream of
water for 15-20 min. Remove
contact lenses, if present,
after first 5 min., then continue
rinsing eye.

If on Skin or Clothing

Take off contaminated
clothing. Rinse skin
immediately with plenty of
water for 15-20 min. Call
poison control center or
doctor for further treatment

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

Finale



7dat1



10dat2

Scythe



7dat1



10dat2

Weedzap



7dat1



10dat2

Avenger

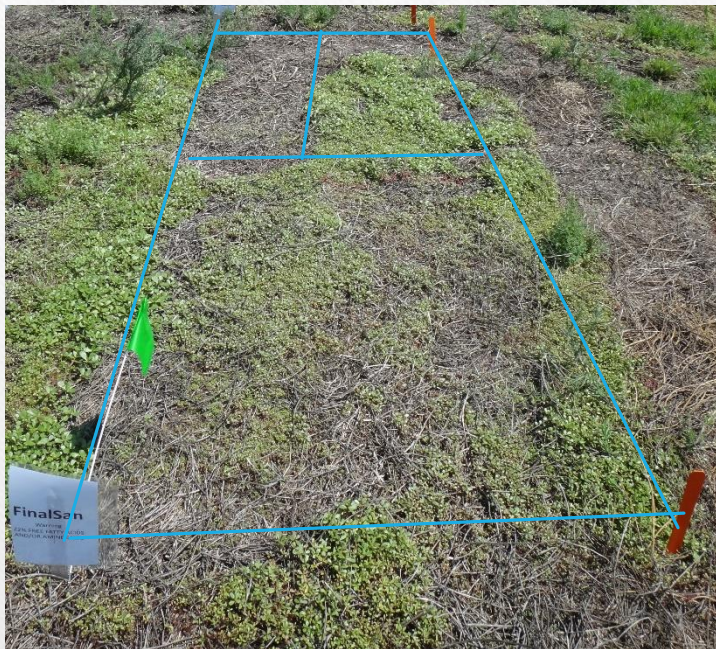


7dat1

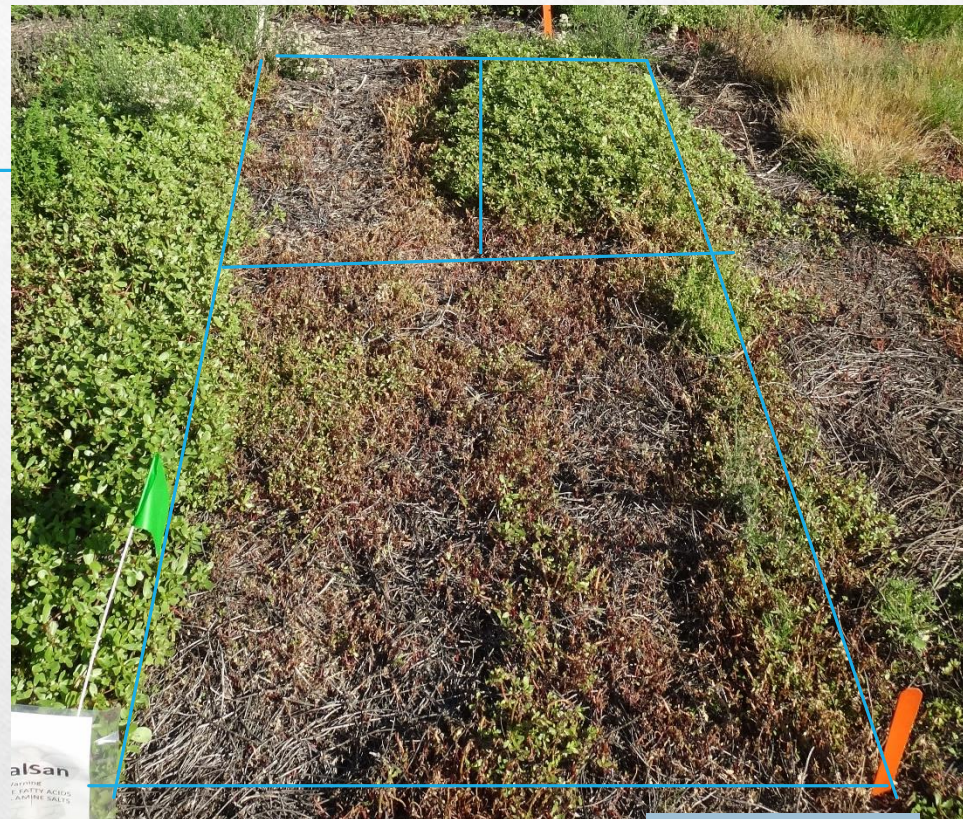


10dat2

Finalsan



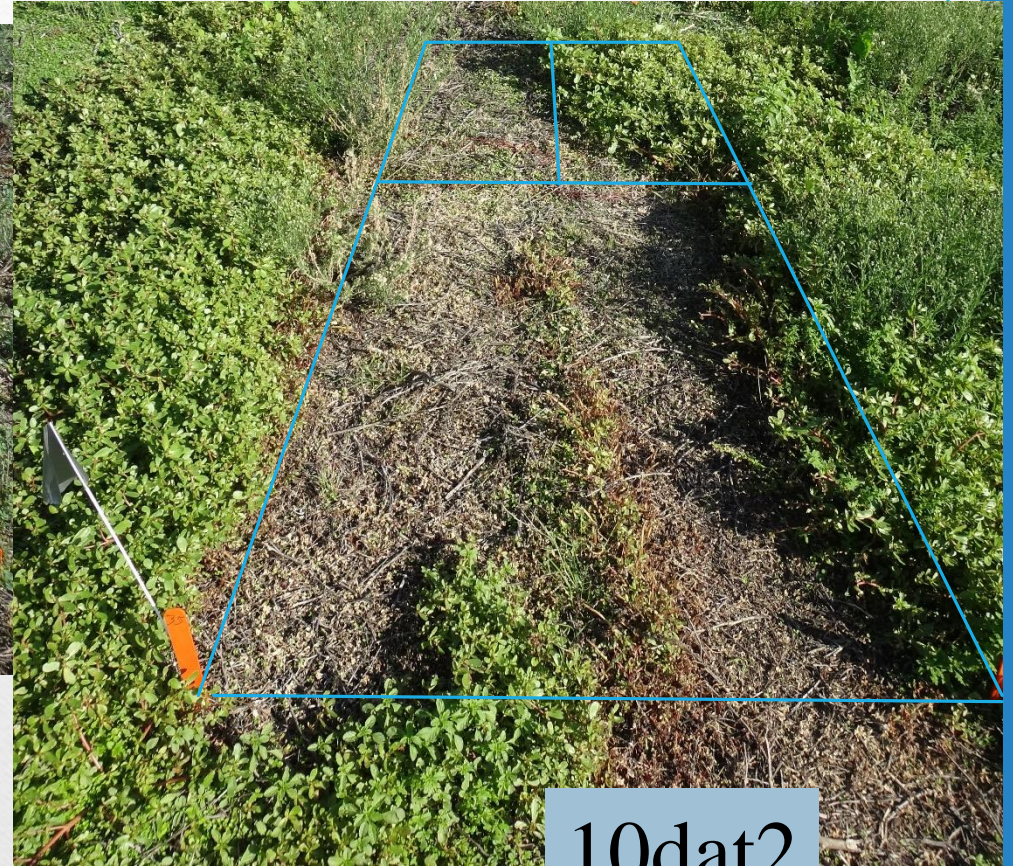
7dat-1



10dat2



7dat1



10dat2

WeedPharm



7dat1



10dat2

Results (% control)

45DAT 1st app, 35DAT 2nd app



UNTREATED

1X 0
2X 0



ROUNDUP

98.5
98.5



ECOEXEMPT

30.0
30.0



MATRAN

13.8
15.0



CIMONEX

1X 6.3
2X 6.3



ALL DOWN

28.8
38.8



BURNOUT II

36.3
51.3



WEEDZAP

5.0
5.0