

ORGANIC HERBICIDES

John Roncoroni,
UCCE Weed Science Advisor,
Napa

'Organic' Weed Control Options

- Sanitation
- Cover cropping
- Animals
- Tillage
- Mowing
- Mulching
- Flaming or steaming
- Solarization
- Organic Herbicides

Organic Herbicides

All are contact herbicides- problem- grasses and perennials

Good spray coverage is essential -

Work best on clear sunny days

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

Organic surfactants improve weed control

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
24. Rosemary * and Rosemary Oil*
25. Sesame* (includes ground Sesame plant stalks) 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)

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. **Lemongrass 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
24. Rosemary * and Rosemary Oil*
25. Sesame* (includes ground Sesame plant stalks) 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)

Types of Organic Herbicides

Acidic Acid

'Natural' Acids



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
Copyright © JH Biotech, Inc.
All rights reserved.

Matratec 10%- 2DAT

Without Adjuvant



With 1% Adjuvant



Herbicidal soaps



SPECIMEN LABEL

For contact spray control or burndown of weeds and grasses for food crops, field crops, pastures, ornamentals, turf, landscapes, interiorscapes, greenhouses, non-crop areas on farmsteads and around buildings and industrial sites.

ACTIVE INGREDIENT:

Ammonium Nonanoate:.....40.00%

OTHER INGREDIENTS:.....60.00%

TOTAL:.....100.00%

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 this label, find someone to explain it to you in detail.)

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 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.

HOTLINE NUMBER:

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-424-9300 for emergency medical advice.

Produced for: BioSafe Systems LLC
22 Meadow Street East Hartford, CT 06108
EPA Registration No. 70299-23
EPA Establishment No. 064784-OK-001

PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS AND DOMESTIC ANIMALS

Warning: Causes substantial, but temporary eye irritation. Do not get in eyes or on clothing. Wear goggles. Harmful if inhaled. Avoid breathing spray mist. Causes moderate skin irritation.

Avoid contact with skin or on clothing. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum or using tobacco. Remove and wash contaminated clothing before reuse.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Applicators and other handlers must wear:

- Coveralls worn over short-sleeve shirt and short pants
- Socks and chemical resistant footwear
- Chemical resistant gloves
- Protective eyewear
- When mixing and loading wear a chemical resistant apron

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

USER SAFETY RECOMMENDATIONS

Users should:

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

ENVIRONMENTAL HAZARDS

For terrestrial uses: This pesticide is toxic to fish and aquatic invertebrates. Use care when applying in areas adjacent to any body of water. Do not apply directly to water, 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. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas.

This product is toxic to bees exposed to direct treatment or residues on blooming crops or weeds. Do not apply this product if bees are visiting the treatment area.

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 State/Tribal 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 exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 24 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 worn over short-sleeve shirt and short pants
- Socks and chemical resistant footwear
- Chemical resistant gloves
- 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 unprotected persons out of treated areas until sprays have dried.

METHODS OF USE AND GENERAL APPLICATION INSTRUCTIONS

General Instructions:

AXXE Broad Spectrum Herbicide is a contact non-selective herbicide for spray application only to undesirable plant growth. Do not allow spray to contact any green plant parts of desirable plants. AXXE Broad Spectrum Herbicide provides control and burndown suppression of annual and perennial broadleaf and grass



Modified Natural Acids

SUPPRESS[®]

HERBICIDE EC

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

Active Ingredients:
Caprylic Acid..... 47%
Capric Acid..... 32%
Other Ingredients:..... 21%
Total..... **100%**

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.)

See inside booklet for First Aid and Precautionary Statements

SHAKE WELL BEFORE USING • APPLY WITH CONTINUOUS AGITATION

Manufactured by:
 **Westbridge**
Agricultural Products
1260 Avenida Chelsea
Vista, CA 92081 USA
(800) 876-2767

EPA Reg. No. 51517-9
EPA Est. No. 51517-CA-1



DoMyOwn.com



Avenger



Matran

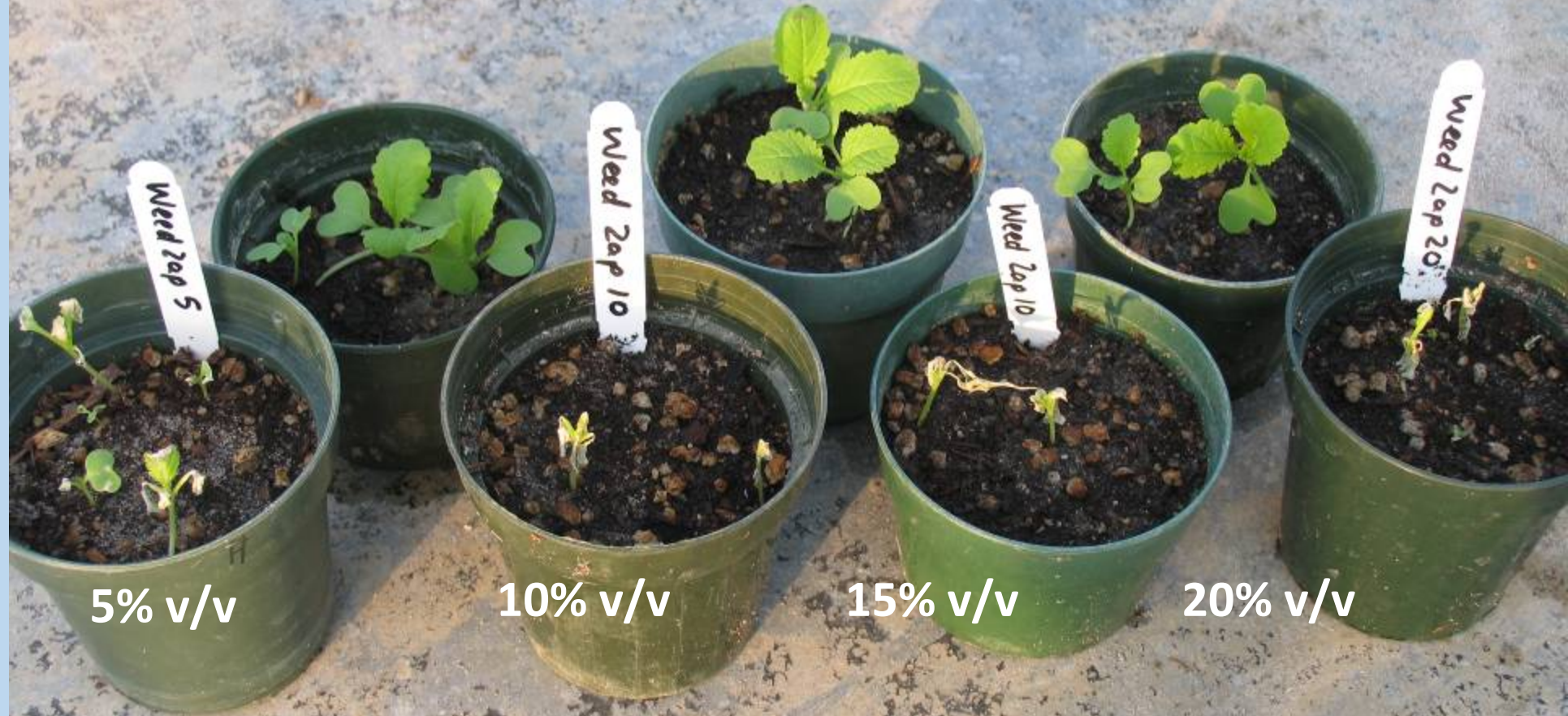


Weed Zap





Brassica sp.



5% v/v

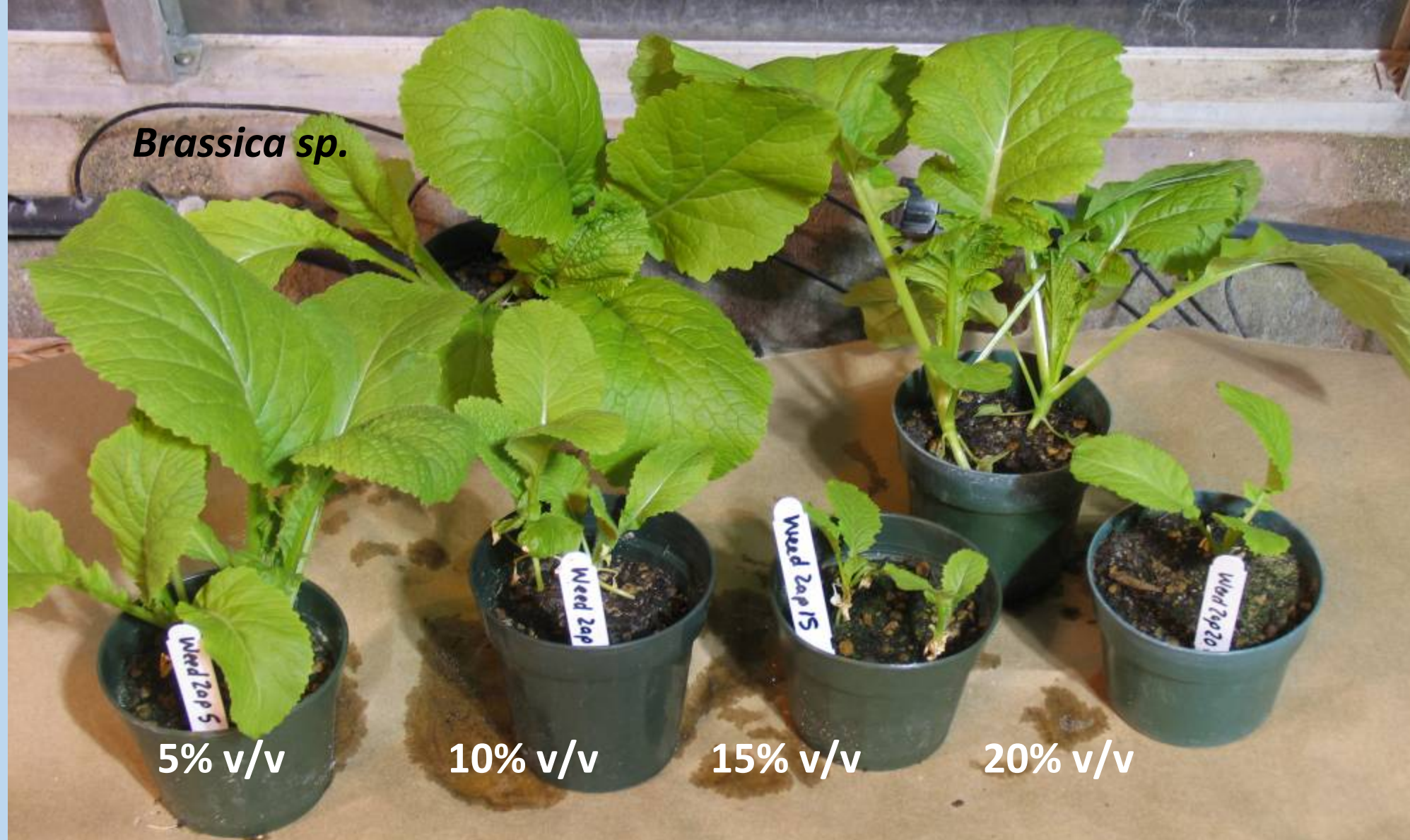
10% v/v

15% v/v

20% v/v

35 gal/ Ac spray volume
Weed Zap

Brassica sp.



5% v/v

10% v/v

15% v/v

20% v/v

16 Days after treatment

Echinochloa colona



**organic herbicides tested
provided only temporary
suppression of grasses**

GreenMatch EX



35 Gal/Ac spray volume

GreenMatch EX



70 Gal/ Ac spray volume

Greenhouse Conclusions

- Higher concentrations and spray volumes increased weed control across all products
- Spray volume had a greater impact on weed control than concentration
- Grasses are much harder to control than broadleaf weeds

Organic Adjuvants



Field Studies

The image shows a field study setup. A series of parallel black pipes are laid out across a field, supported by vertical wooden stakes. The pipes are connected by black couplings. The field is covered with green grass, with some areas showing dry, yellowish grass. The text "Field Studies" is overlaid in white at the top center of the image.

Pre-treatment March 30



April 4th - 5 Days after treatment- Acetic Acid



April 4th Untreated







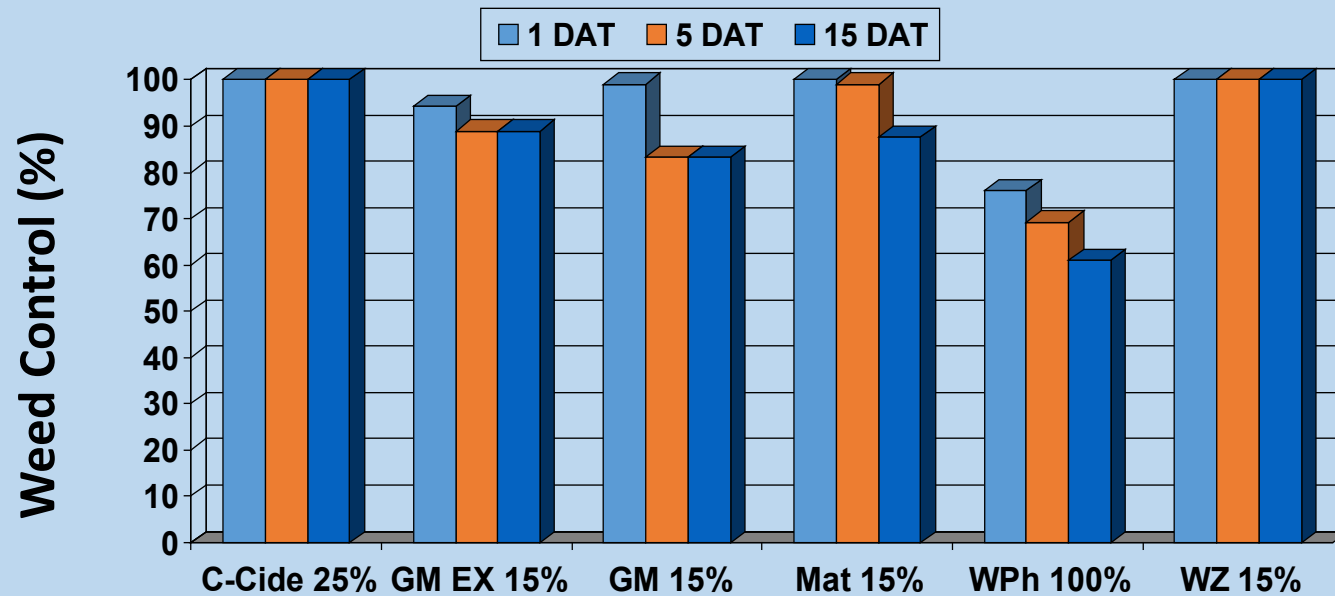
Methods for Weed Size study

- Entire trial area cultivated to remove existing weeds
- Study site irrigated to germinate weed seeds
- Study site divided into three segments, with each section treated at a different time
- Treatments applied at 14, 21 or 28 days after the initial irrigation
- All treatments applied at 650 l/ha and 1% v/v 'Natural Wet' adjuvant added to each treatment

Concentrations used in 'Weed Age' field study

- C-Cide – 25%v/v (1.25% citric acid)
- GreenMatch –15% v/v (8.25% d-limonene)
- GreenMatch EX 15% v/v (7.5% lemongrass oil)
- Matratec 15% v/v (7.5% clove oil)
- Weed Pharm – 100% v/v (20% acetic acid)
- Weed Zap – 15% v/v (13.5% clove + cinnamon oil)

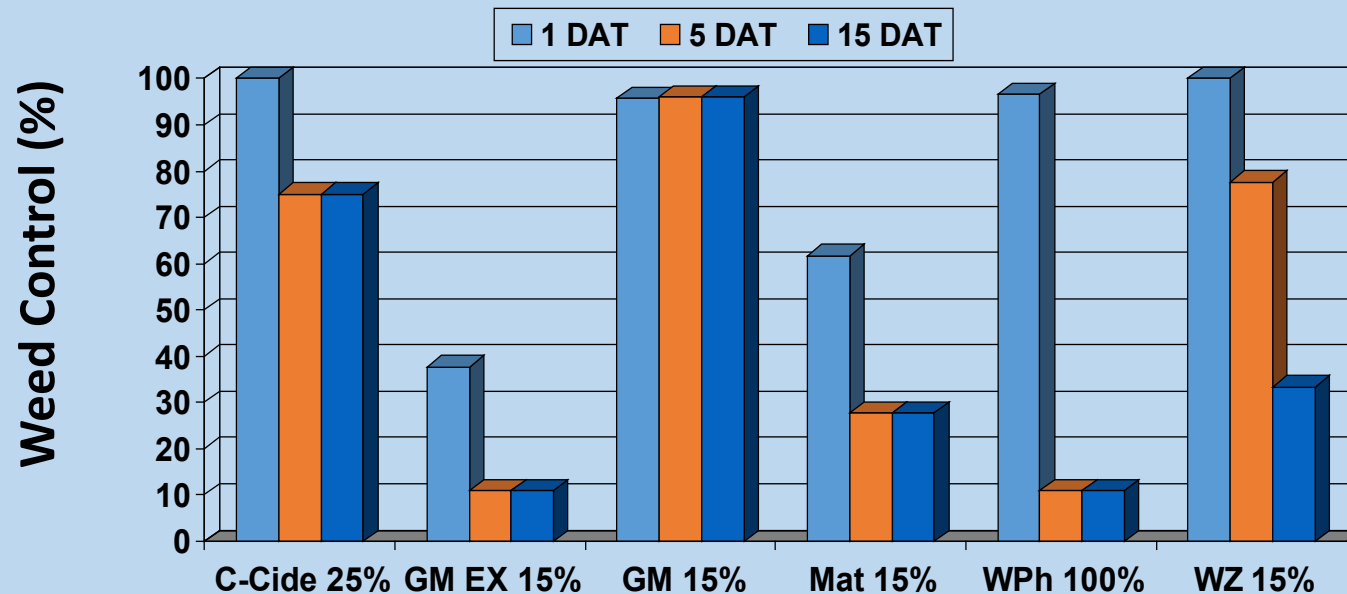
Broadleaf Weed Control (%) at 1, 5 and 15 days after application 14 days AI



Broadleaf weeds = *Portulaca oleracea*, *Amaranthus retroflexus*, and *Solanum nigrum*

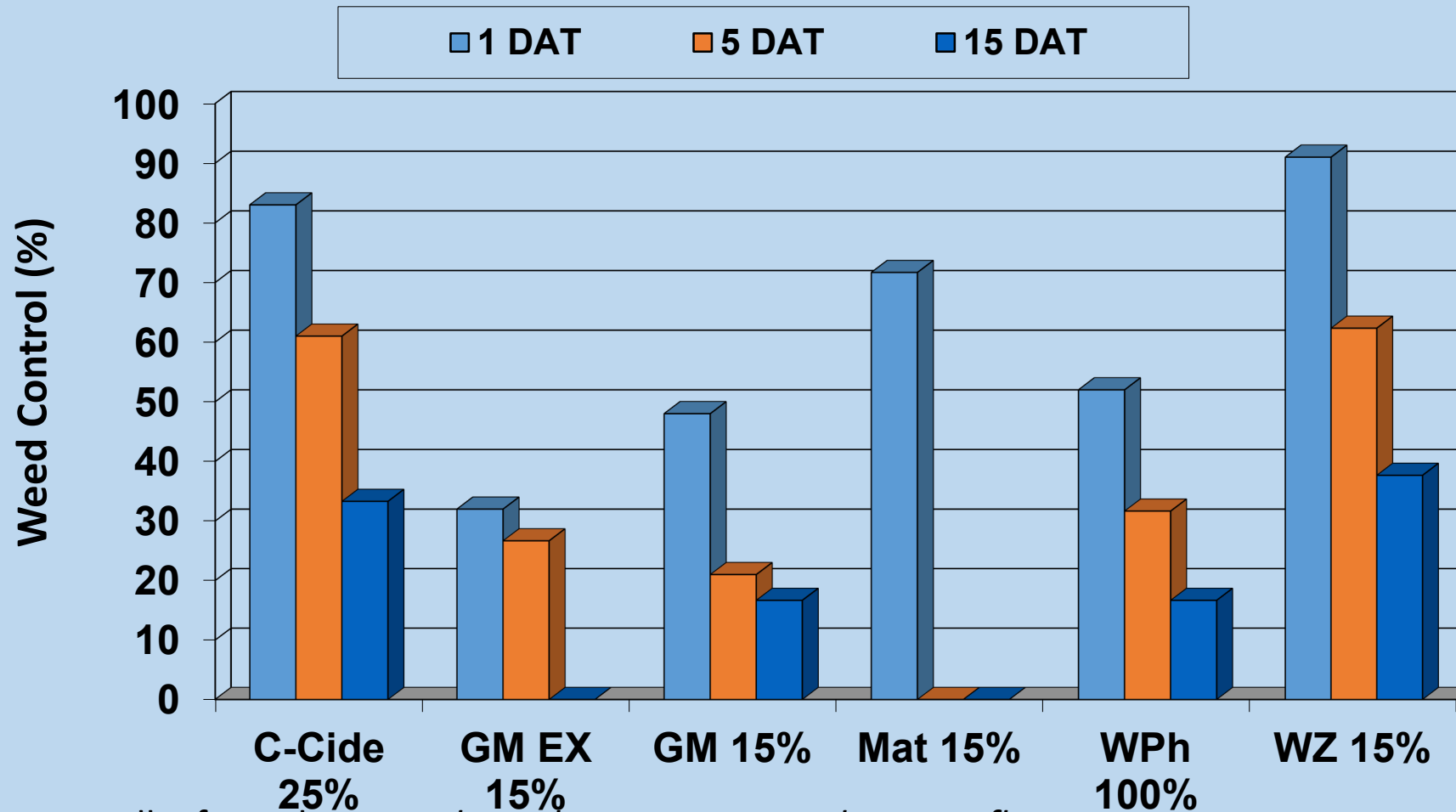
Applic. – June 15, 2009

Broadleaf Weed Control (%) at 1, 5 and 15 days after application 21 days AI



Broadleaf weeds = *Portulaca oleracea*, *Amaranthus retroflexus*, and *Solanum nigrum*

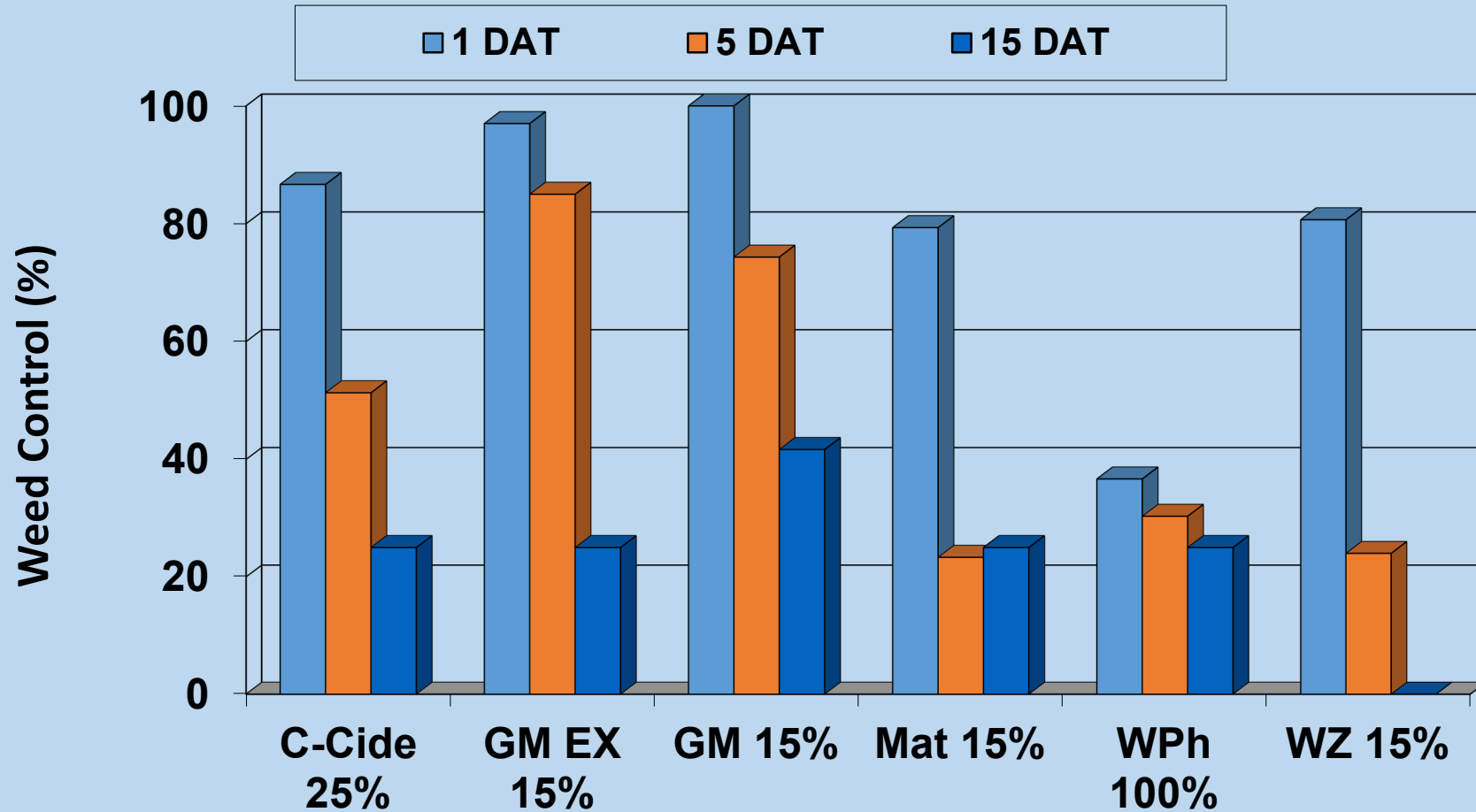
Broadleaf Weed Control (%) at 1, 5 and 15 days after application 28 days AI



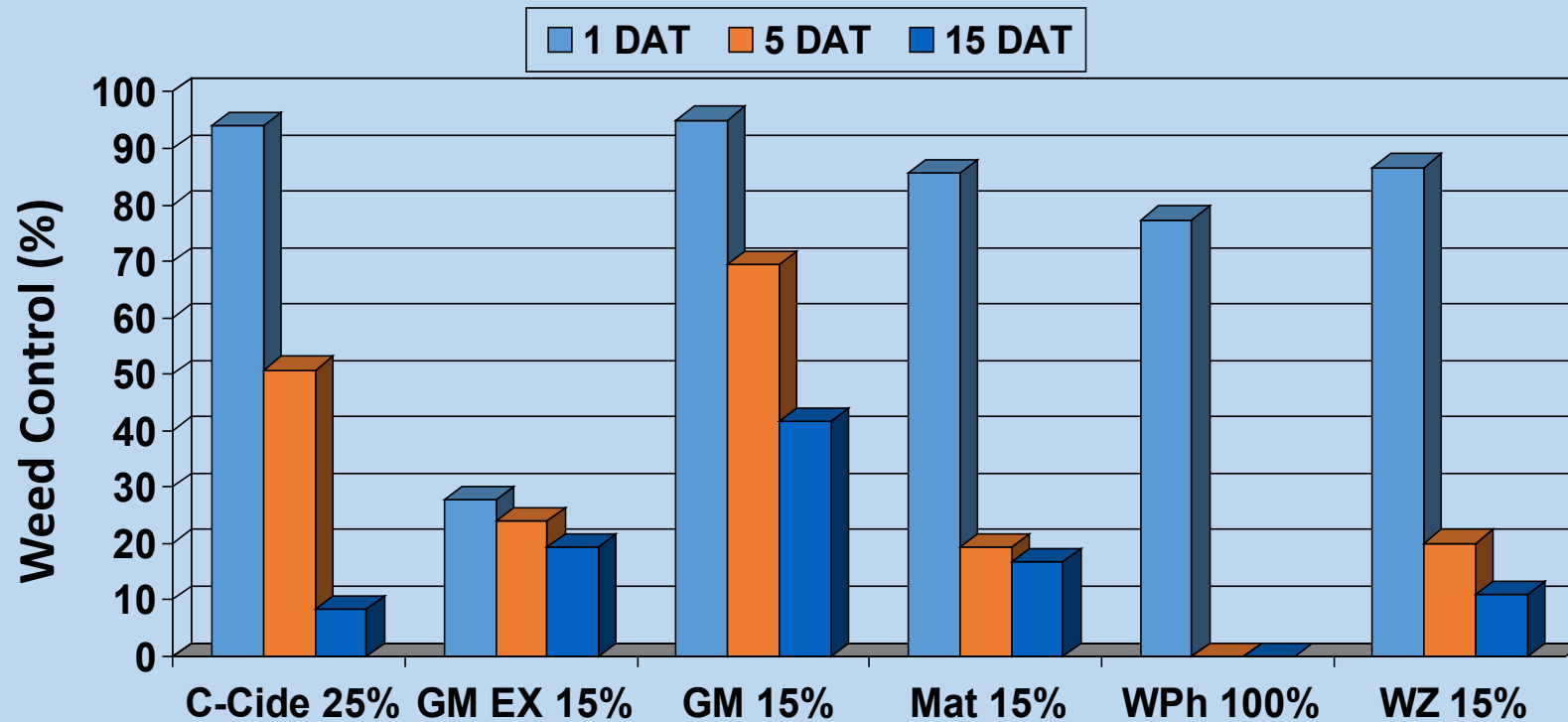
Broadleaf weeds = *Portulaca oleracea*, *Amaranthus retroflexus*, and *Solanum nigrum*

Applic. – June 29, 2009

Grass Weed Control (%) at 1, 5 and 15 days after application 14 days AI



Grass Weed Control (%) at 1, 5 and 15 days after application 21 days AI



Influence of Seasonal Timing/ Temperature on weed control

- Two trials established in the same area
 - First trial started on Jan 6, 2011
 - average high/low temp. = 55 F / 41F
 - Second trial started on May 23, 2011
 - average high/low temp. = 75 F / 50 F
- All treatments applied at 70 gal/A and 1% v/v 'Natural Wet' adjuvant added to each treatment

Biolink 3 % v/v – 3 DAT – May

Biolink 3 % v/v – 9 DAT – January



Biolink 6 % v/v – 3 DAT - May



Biolink 6 % v/v – 9 DAT - January





Untreated - January

GreenMatch 7.5% v/v – 9 DAT - January

GreenMatch 15% v/v – 9 DAT - January





Matratec 15% v/v - 9 DAT - January

Matratec 7.5 % v/v - 9 DAT - January

Matratec 15% v/v 3DAT - May

WeedZap 7.5 % v/v – 9 DAT - January

WeedZap 15 % v/v – 9 DAT - January





Untreated - May



WeedPharm 100% v/v 3DAT - May



WeedPharm 50% v/v 3DAT - May



Final-San-O 10% - 3 DAT - May



Final-San-O 20% v/v – 3 DAT - May

'Organic' Weed Control Options

- Sanitation
- Cover cropping
- Animals
- Tillage
- Mowing
- Mulching
- Flaming or steaming
- Solarization
- Organic Herbicides