Challenges for Weed Management during a Dry Year

JOHN RONCORONI

UCCE WEED SCIENCE FARM ADVISOR, EMERITUS

SAN JOAQUIN VALLEY
WINEGROWERS ASSOCIATION
MARCH 8,2023

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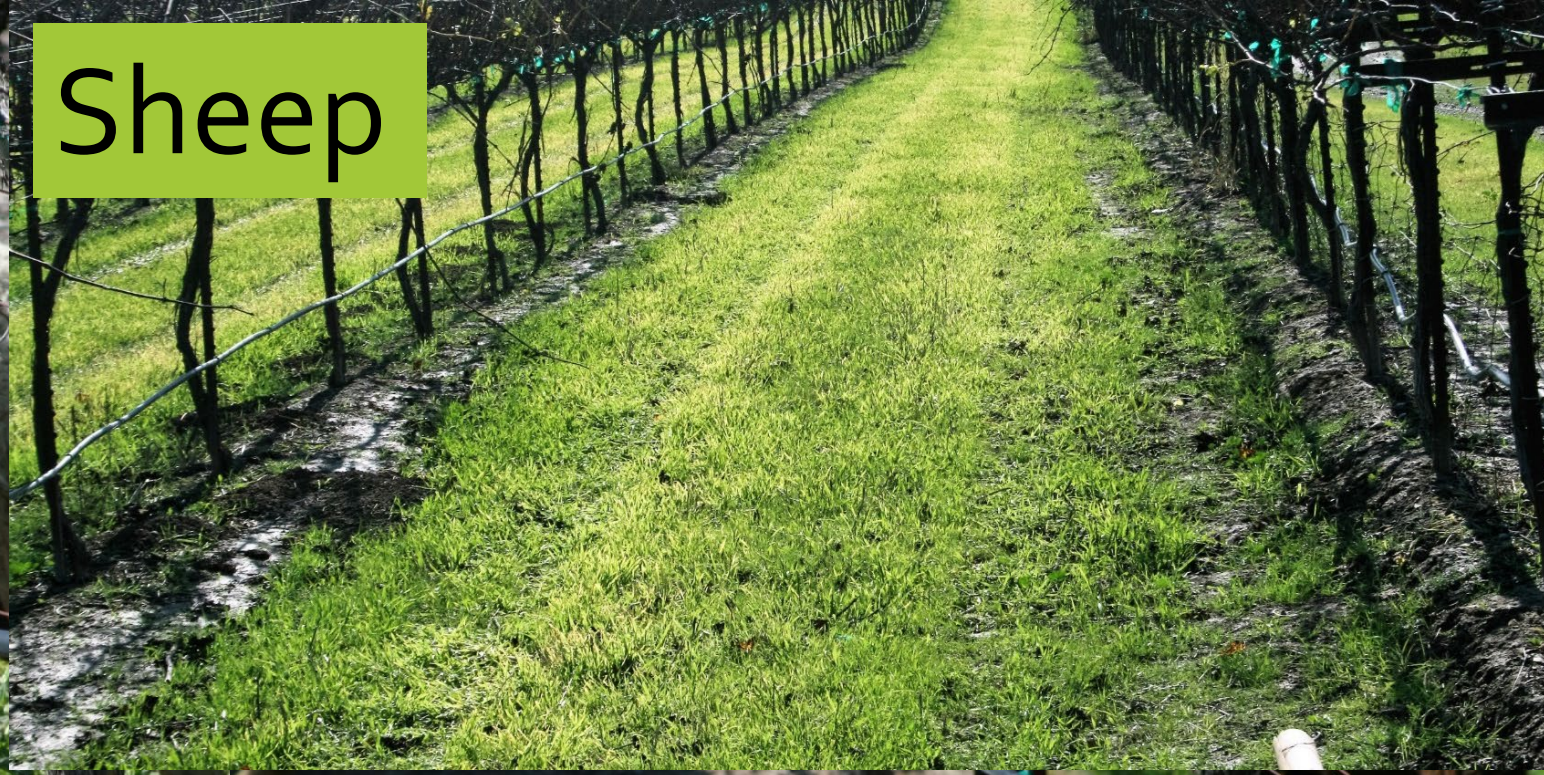
Weed Control Methods

Sheep



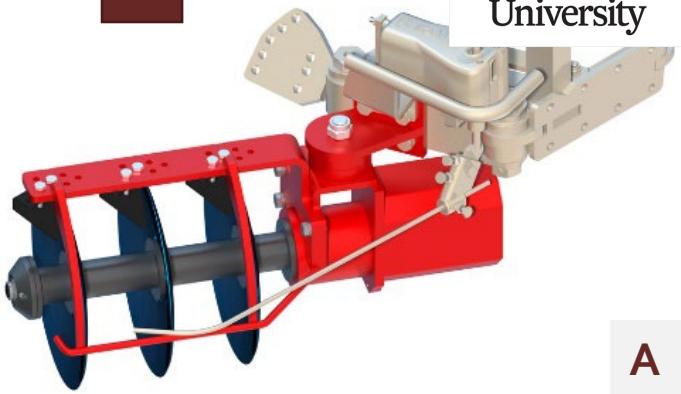
Sheep

- Availability
- Vineyard adaptation
- Timing
- Compaction
- Cost
- Market

Mechanical Cultivation

A

B



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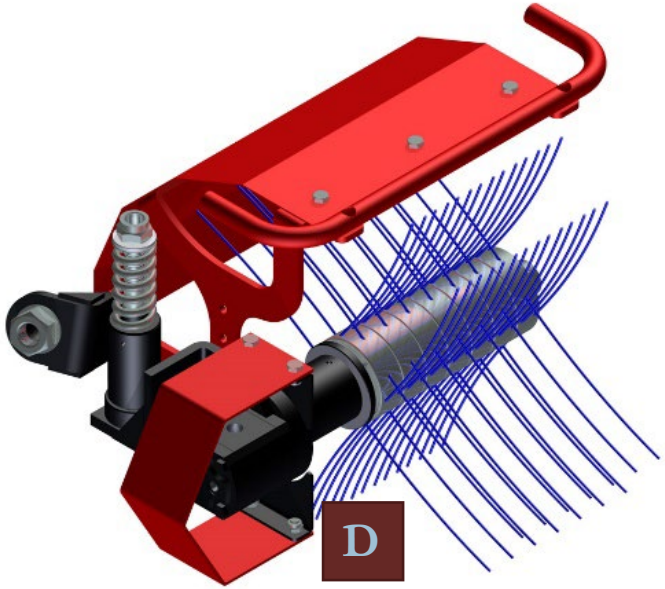

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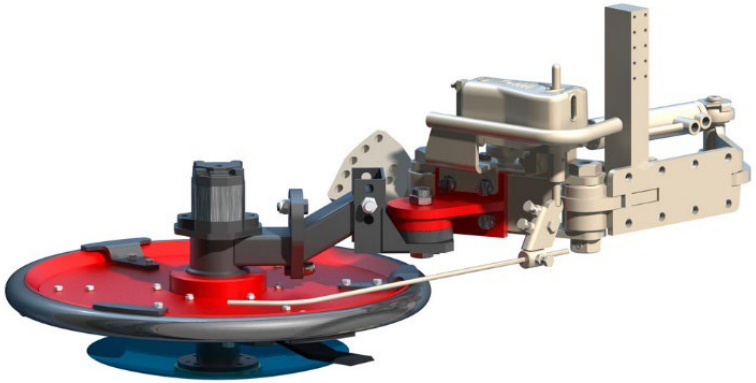

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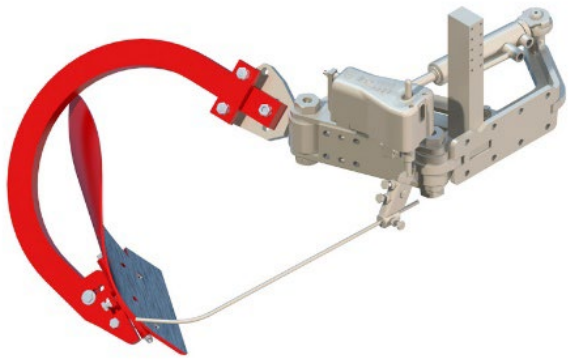


F

A	Rotary hoe
B	blade hoe
C	Cleaner blade
D	Rotary brush
E	Mower
F	French plow

Is your vineyard suitable for cultivation?

Alternative weed management in vineyards.

Flamer

Flamer

- Favors grass
- Timing
  - Small weeds
  - Green weeds
- Fuel

Do you own a mower?
Are vertebrate pests a problem?

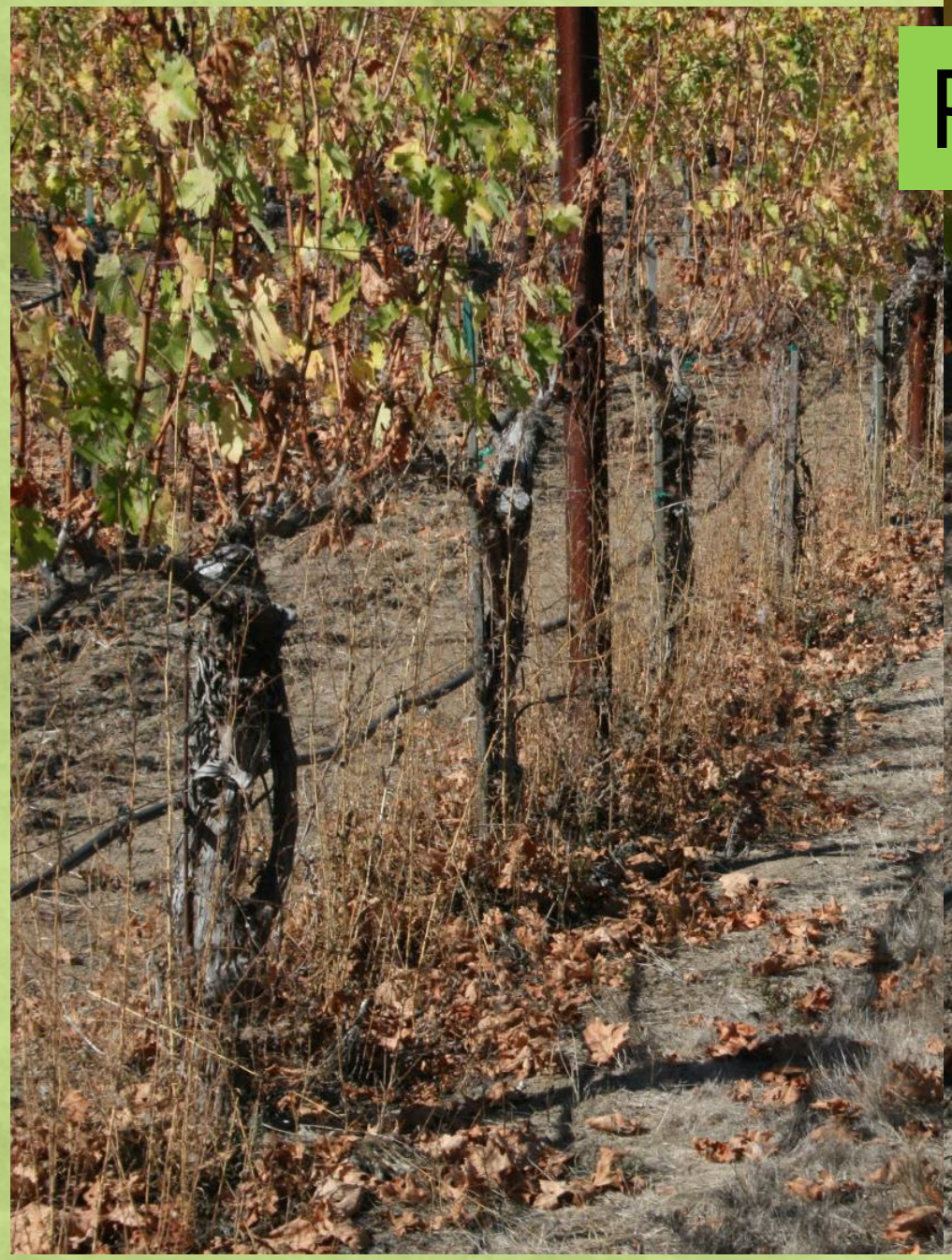
Organic Herbicides

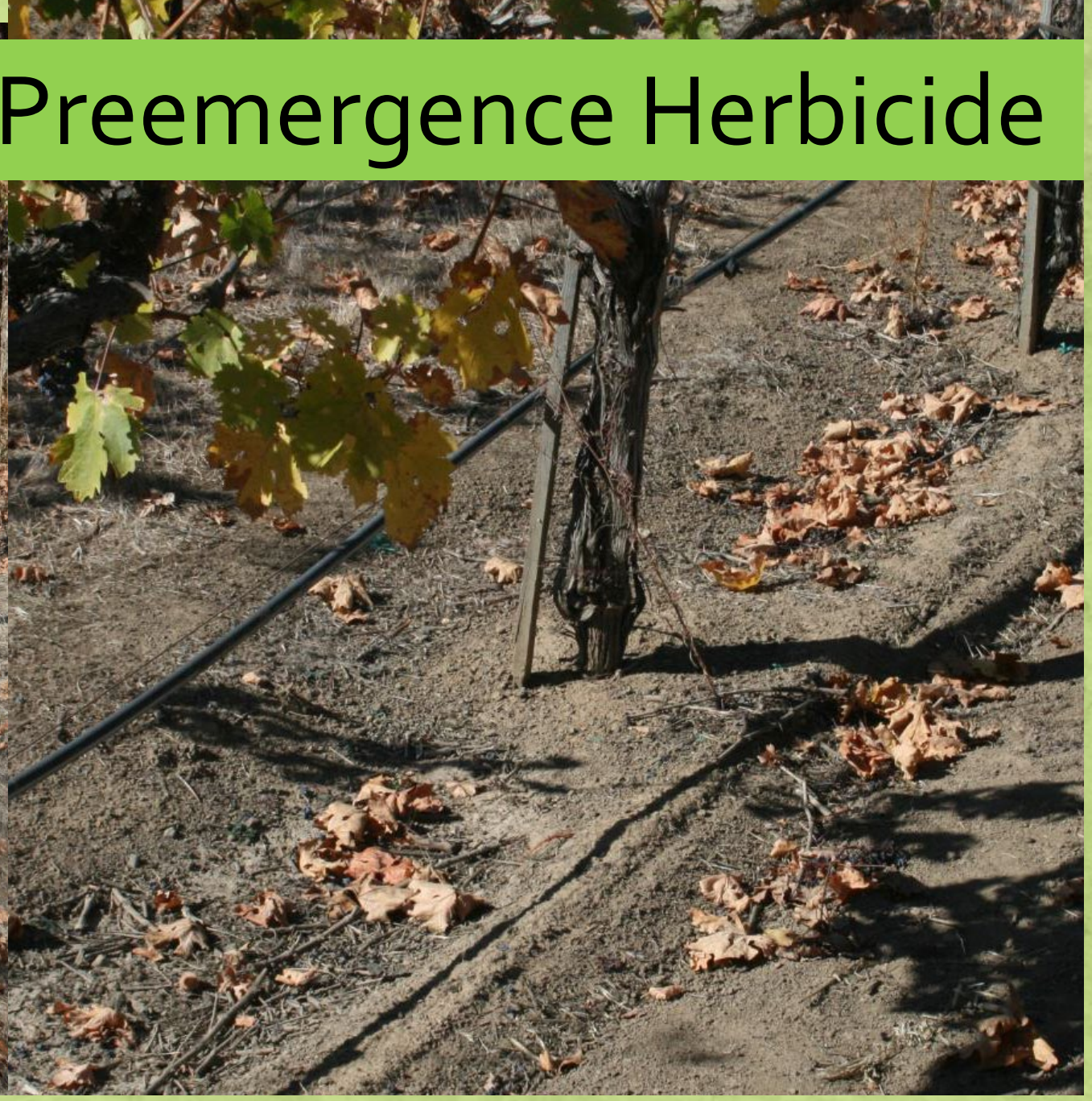
9% 50 GPA

12 days later

2 months

Preemergence Herbicide





Weeds that could be a bigger problem

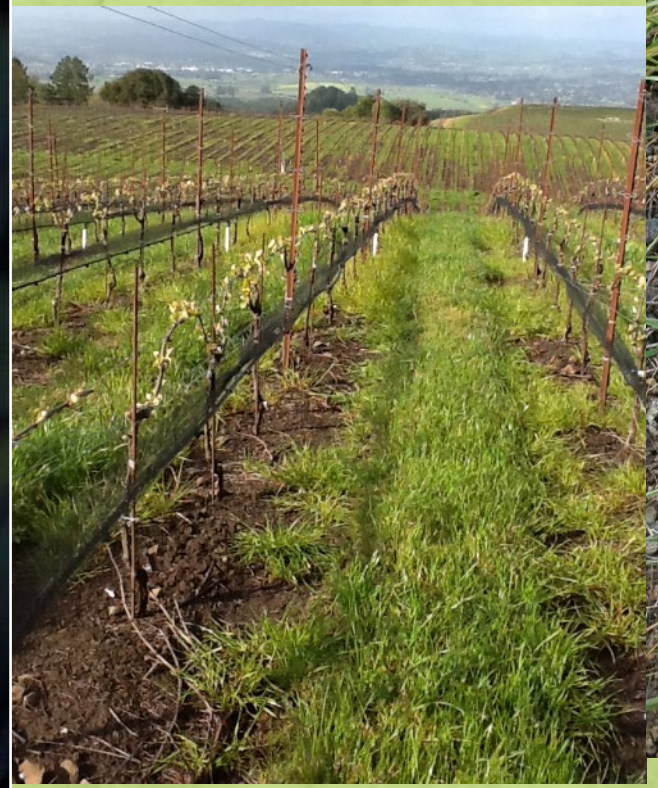
Cheeseweed,Malva-Mallow

C155-15

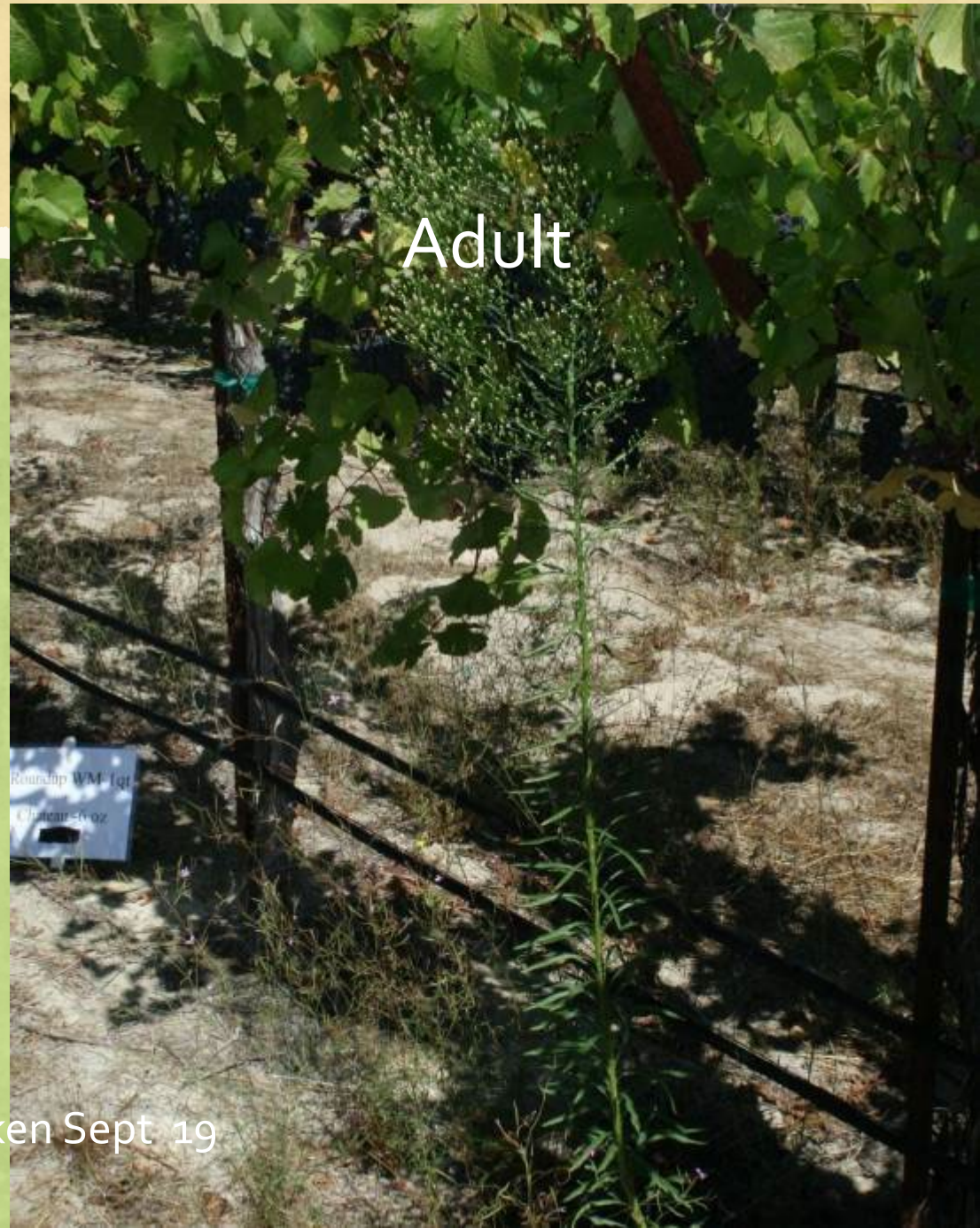
- Several Malva species- all annual to short lived perennial
- Heart-shaped cotylendons
- If conditions are right cultivated pieces can re-root
- Large plants difficult to control with postemegent herbicide applications

Ryegrass

- Species Lolium perenne L. – perennial ryegrass
  - Subspecies - multiflorum (Lam.) Husnot – Italian ryegrass
  - Subspecies - perenne – perennial ryegrass
- Species Lolium rigidum Gaudin – Wimmera ryegrass

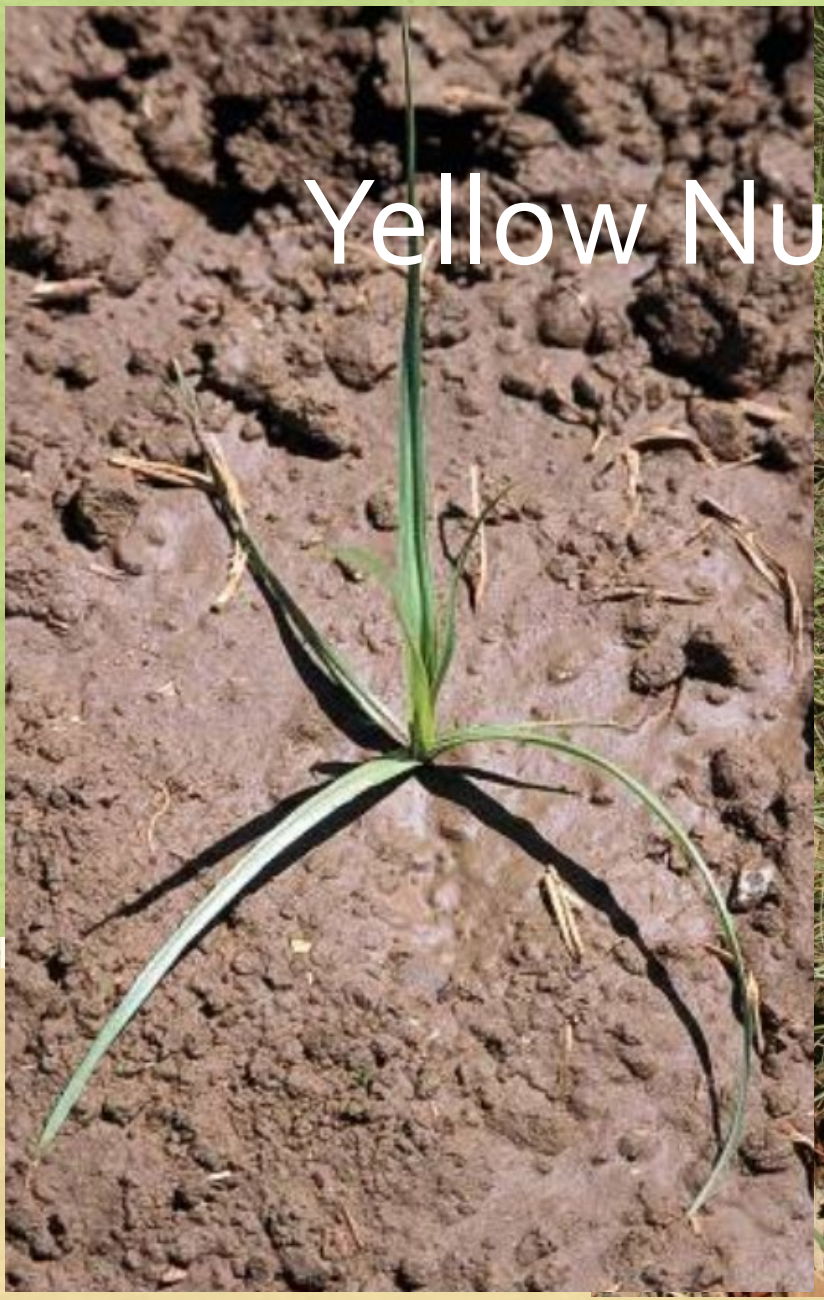


Horseweed (Mare's tail)



Pictures taken Sept 19

Yellow Nutsedge



California Vineyard Weed Control Calendar

- September
- October
- November
- December
- January
- February
- March
- April
- May
- June
- July
- August

Harvest

Frost-leaf drop

Bud Break

Bloom

Verasion

Dependable (?)
Precipitation
for incorporation

Drip irrigation

Preemergence Herbicides

Postemergence Herbicides

Horseweed
Ryegrass
Filaree
Malva
Fluvellin

"Summer" annuals

Horseweed
Summer grasses
Fluvellin

Herbicide Basics

Herbicide Basics

Disclaimer:

Just because I mention an herbicide doesn't necessarily mean you can use it…

ALWAYS CHECK THE LABEL!

Herbicide Basics

Preemergence vs Postemergence

Herbicides are one or the other…

Herbicide Basics

Preemergence vs Postemergence

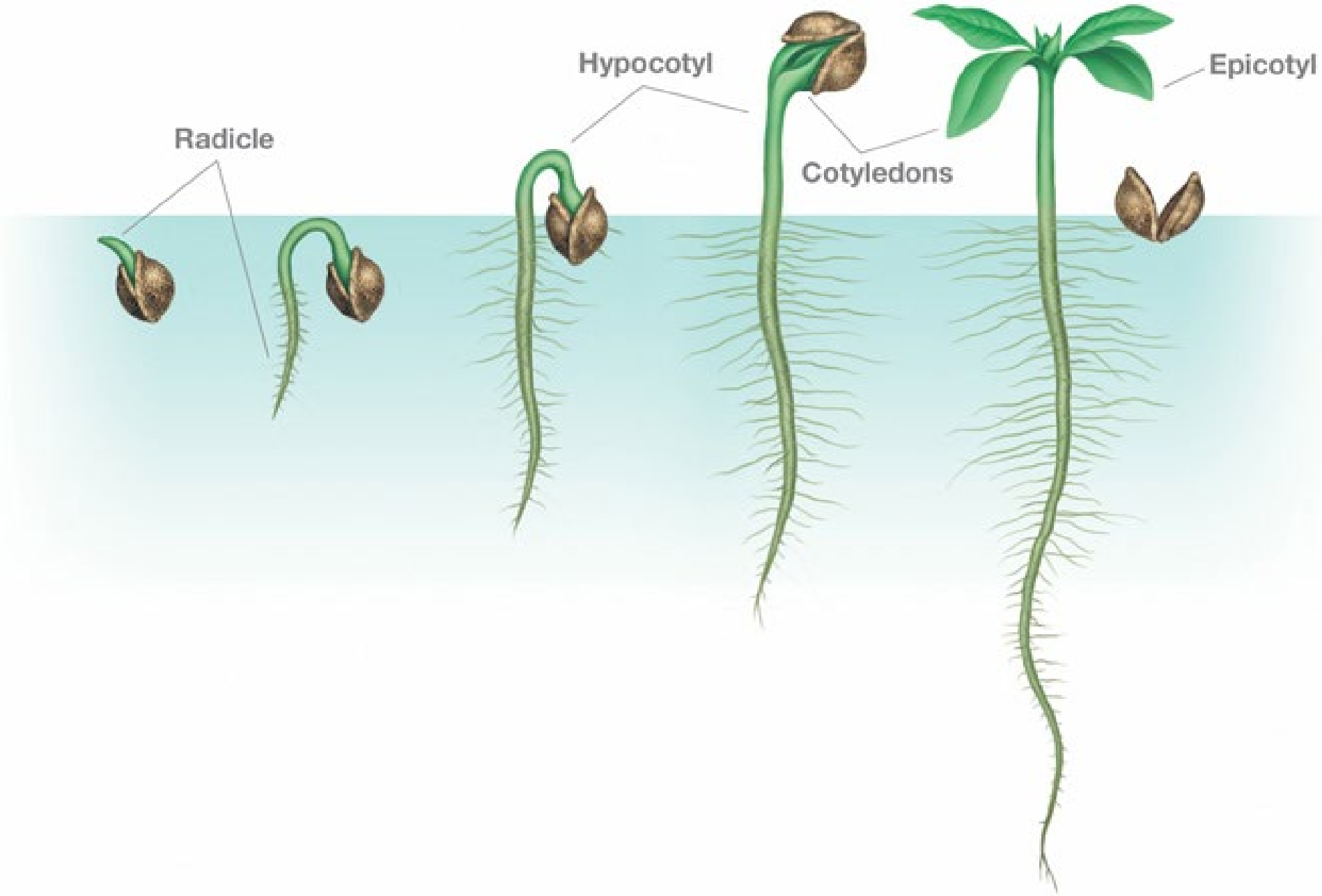
Herbicides are one or the other…

and sometimes a little of both.

Herbicide Basics

Preemergence

Some preemergence herbicides will not control any weed that have germinated:
Alion (indaziflam) and Trellis (isoxaben)
Some herbicides can kill small weeds- root inhibiting herbicides:
Prowl (Pendimethalin)
Some herbicides have preemergence activity and postemergence activity
Chateau(Flumioxazin), Matrix(Rimsulfuron), Mission(flazasulfuron),
Goal (oxyfluorfen)
Some herbicides you can disturb the soil after application
Prowl
Some you can't
Goal
The rest- try and disturb as little as possible


Radicle
Hypocotyl
Cotyledons
Epicotyl

Herbicide Basics

Postemergence -Contact vs Systemic

Some postemergence herbicides are Contact herbicides and kill only what they touch

Some are non selective-Gramoxone, organic herbicides

Some work on broadleaf weeds- Shark(carfentrazone), Venue(pyraflufen-ethyl)

Organic herbicides work better on broadleaves than grasses- but are NOT selective

Some Postemergence herbicides are systemic and move to kill more of the plant and take longer to work(and are better on perennials)

Some(one in particular) is non-selective-Roundup(glyphosate).

Some work on grasses- Poast(sethoxydim), Fusilade(fluazifop-P-butyl), clethodim.

Some work on broadleaves- 2,4-D

One herbicide that is used like a contact herbicide, but is actually a 'limited mobility herbicide" is Rely, or Lifeline, or Cheetah (glufosinate) takes 7-10 days to work.

Herbicide Basics

Postemergence -
And some **preemergence** herbicides have postemergence activity- especially effective to augment activity of postemergence herbicide- Chateau, Matrix, Mission.
In trees and vines a preemergence herbicide, Goal herbicide, was once thought of as a 'Preemergence herbicide with postemergence activity" now it is more often used as a 'Postemergence herbicide with some preemergence activity" and the application rate is usually lower.

Know your herbicides

- Alion
- Chateau
- Goal-GoalTender
- Matrix,Mission, Craze
- Prowl
- Trellis
- Glyphosate
- Rely, Lifeline, Cheetah
- Shark
- Venue
- Gramoxone
- 2,4-D
- Suppress*

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Horseweed
Ryegrass
Filaree
Malva
Fluvellin

"Summer" annuals

Horseweed
Summer grasses
Fluvellin

The Challenge…

Challenges for Weed Management during a Wet Year

- Today is March 8th
- Bud break? Here or very, very close.
- Rain? Still coming.
- What herbicides can I not use due to restrictions
- What herbicides may still be effective?

Know your herbicides

- Alion
- Chateau
- Goal-GoalTender
- Matrix,Mission, Craze
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- Shark
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Chateau, Tuscany (Flumioxazin)

If applied during the period after bud break through final harvest, use shielded application equipment and applicator can ensure spray drift will not come in contact with crop fruit or foliage.

Goal,GoalTender (Oxyfluorfen)

Check label restriction- Do not apply after Feb 15-

Co-distillation

- Co-distillation is when a herbicide evaporates or changes from a liquid to a vapor with water. This can occur from soil, water or plant surfaces and can be responsible for substantial loss of some herbicides. When co-distillation occurs with Oxyfluorfen (GoalTender, Goal 2XL and others), the concern is not herbicide loss but crop injury. Codistillation can occur with several herbicides. It is affected by many factors including temperature, moisture, organic matter, soil pH and other variables.

2,4-D- Dryclean

No-

ONLY USE DURING VERY DORMANT SEASON

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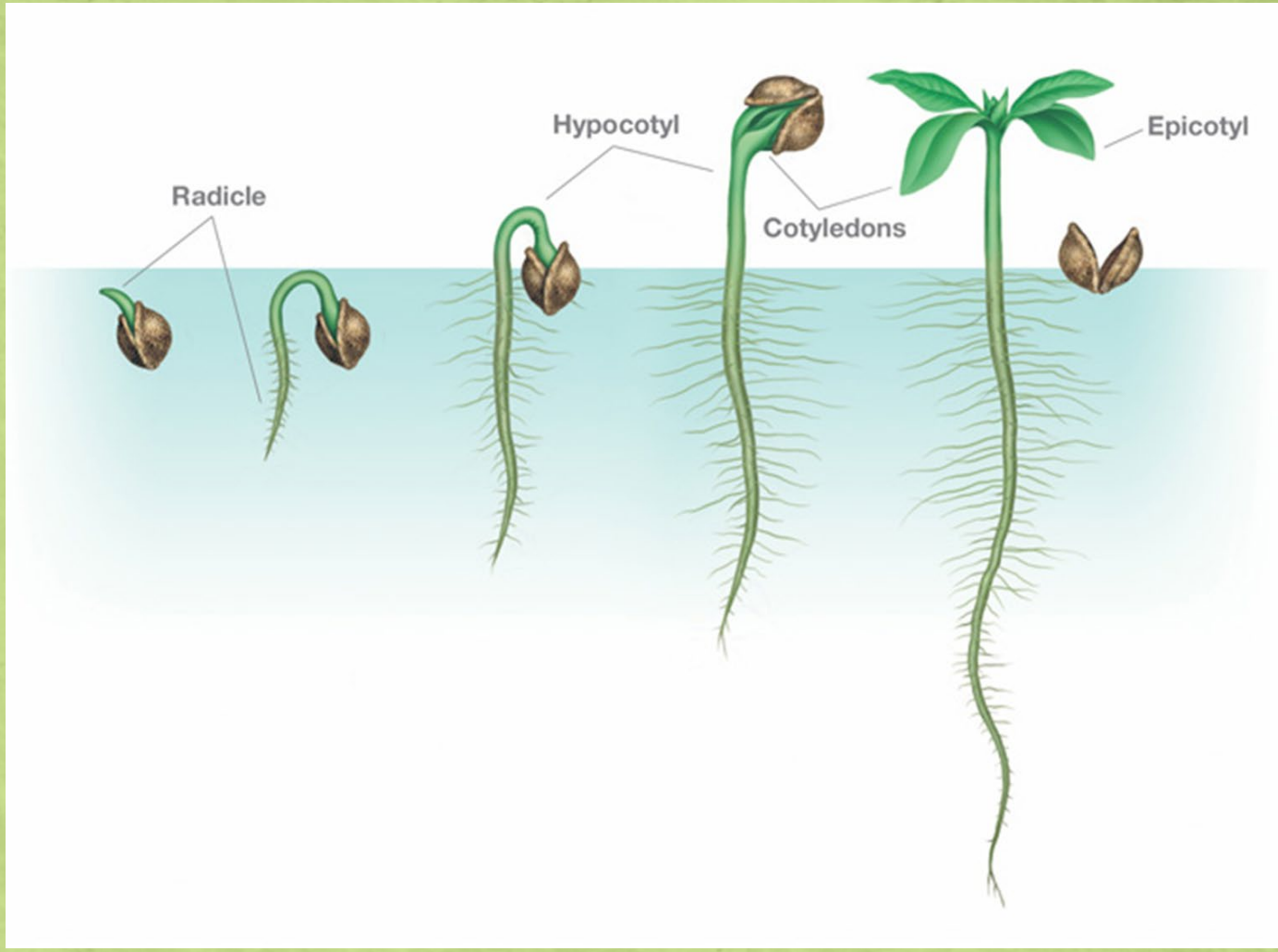
Alion, Trellis and Prowl

- Alion and Trellis work in the same way and will not control weeds that have germinated, even if they have not emerged from the soil
- Prowl is a root inhibitor and can control small weeds by limiting root growth.



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- Trellis

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- Shark
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- 2,4-D
- Suppress*

Glyphosate (Roundup and many others)

- Use Glyphosate very carefully, especially this time of year..

TYPES OF APPLICATION: Those listed in Section 9.0, plus Spot Treatment (dry beans, peas, lentils and chickpeas only); Preharvest (dry beans, peas, lentils and chickpeas only)

Spot Treatment (Dry Beans, Peas, Lentils and Chickpeas Only)

USE INSTRUCTIONS: This product may be applied as a spot treatment to control troublesome weeds such as Canada thistle, quackgrass, mayweed (dog fenneD and milkweed in dry beans, peas, lentils and chickpeas. Apply up to 22 fluid ounces of this product per acre in dry beans, or up to 64 fluid ounces per acre in dry peas, lentils and chickpeas, in 10 to 20 gallons of water using ground application equipment, or use a 2-percent solution in a handheld sprayer. For best results, apply at or beyond the bud stage of growth.

RESTRICTIONS: Allow a minimum of 7 days between application and harvest. Only one spot treatment application may be made per year. Do not combine spot treatment with a preharvest broadcast application on the same crop area. Allow a minimum of 30 days between application and the planting of any crop not listed on this label. Do not feed vines and hay from the application area to livestock. Do not apply this product in cowpeas or field (feed) peas, since this crop is considered to be grown only as livestock feed.

Preharvest (Dry Beans, Peas, Lentils and Chickpeas Only)

USE INSTRUCTIONS: This product may be applied over the top of dry beans, peas, lentils and chickpeas prior to harvest. Apply up to 22 fluid ounces of this product per acre in dry beans, or up to 64 fluid ounces per acre in dry peas, lentils and chickpeas, in 3 to 20 gallons of water per acre at the hard dough stage of the legume seed (30 percent grain moisture or less).

RESTRICTIONS: Allow a minimum of 7 days between application and harvest. Only one preharvest application may be made per year. Do not combine a preharvest application with a spot treatment application on the same crop area. Allow a minimum of 30 days between application and the planting of any crop not listed on this label. Do not feed vines and hay from the application area to livestock. Do not make a preharvest application of this product in cowpeas or field (feed) peas, since this crop is considered to be grown only as livestock feed.

9.10.7 Root and Tuber Vegetables

LABELED CROPS: Arracacha; Arrowroot; Chinese artichoke; Jerusalem artichoke; Beet (garden); Burdock; Canna; Carrot; Cassava (bitter and sweet); Celeriac; Chayote (root); Chervil (turnip-rooted); Chicory; Chufa; Dasheen (taro); Galangal; Ginger; Ginseng; Horseradish; Leren; Kava (turnip-rooted); Parsley (turnip rooted); Parsnip; Potato; Radish; Oriental radish; Rutabaga; Salsify; Black salsify; Spanish salsify; Skirret; Sweet potato; Tanier; Turmeric; Turnip; Wasabi; Yacon; Yam bean; True yam

Directed Application (Non-Bearing Ginseng Only)

USE INSTRUCTIONS: This product may be applied for weed control in established non-bearing ginseng using a boom sprayer, CDA, shielded sprayer, wiper applicator, handheld or backpack wand, lance, or orchard gun. Control the application so as not to allow any contact of this product with the ginseng plant. See additional use instructions in the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label.

RESTRICTIONS: Application must be made a minimum of one year prior to harvest.

Wiper Applicator (Rutabaga Only)

USE INSTRUCTIONS: A wiper applicator may be used over the top of rutabaga for the control of tall weeds. See additional use instructions for wiper applicators in the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label.

RESTRICTIONS: Allow a minimum of 14 days between application and harvest of rutabaga.

9.11 Miscellaneous Crops

LABELED CROPS: Aloe vera; Asparagus; Bamboo shoots; Globe artichoke; Okra; Peanut (ground nut); Pineapple; Strawberry; Sugarbeet

TYPES OF APPLICATION: Those listed in Section 9.0, plus Spot Weed Control; Site Preparation; Spot Treatment (asparagus); Post-Harvest (asparagus)

For directions for use with Roundup Ready sugarbeet, see the "ROUNDUP READY CROPS" section of this label.

PRECAUTIONS: Preemergence application must be made before crop emergence to avoid severe crop injury. Apply before seed germination in coarse sandy soils to further minimize the risk of crop injury. In crops with vines, apply this product in row middles using a hooded sprayer, shielded sprayer or wiper applicator prior to vine development, otherwise severe crop injury or destruction could result.

Spot Weed Control, Site Preparation

USE INSTRUCTIONS: This product may be applied for spot weed control and site preparation prior to planting or transplanting crops listed in this section.

PRECAUTIONS: This product could cause crop injury when applied prior to transplanting or direct-seeding crops into plastic mulch. Remove residues of this product from the plastic with a single 0.5-inch application of water, either by natural rainfall or irrigation, prior to planting. Ensure that the wash water flushes off the plastic mulch and does not enter transplant holes.

RESTRICTIONS: Allow a minimum of 21 days between residue removal and transplanting. Do not apply this product within 7 days prior to emergence of the first asparagus spears. Do not feed or graze pineapple forage from within the application area.

Spot Treatment (Asparagus)

USE INSTRUCTIONS: This product may be applied immediately after cutting asparagus, but prior to the emergence of new spears.

RESTRICTIONS: Do not apply this product to more than 10 percent of the total field area to be harvested. Do not harvest asparagus within 5 days of a spot treatment application.

Post-Harvest (Asparagus)

USE INSTRUCTIONS: This product may be applied for weed control after the last harvest of asparagus and all spears have been removed. If spears are allowed to re-grow, delay application until ferns have developed and make the application as a directed or shielded spray in order to avoid contact of this product with ferns, stems or spears. See additional use instructions in the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label.

PRECAUTIONS: Direct contact of this product with asparagus could result in serious crop injury.

10.0 TREE, VINE AND SHRUB CROPS

THIS SECTION PROVIDES DIRECTIONS FOR USE THAT APPLY TO ALL TREE, VINE, AND SHRUB CROPS LISTED IN THE FOLLOWING SECTIONS. SEE THE INDIVIDUAL CROP SECTIONS FOR SPECIFIC DIRECTIONS FOR USE, PREHARVEST INTERVALS, PRECAUTIONS AND RESTRICTIONS.

TYPES OF APPLICATION: Preplant (site preparation); Broadcast Spray; Site Weed Control; Middles (in between rows of trees, vines or bushes); Strips (within rows of trees, vines or bushes); Selective Equipment (shielded sprayer, wiper applicator); Directed Spray; Spot Treatment; Perennial Grass Suppression; Cut Stump Application

This product may be applied using a boom sprayer, CDA, shielded sprayer, wiper applicator, handheld or backpack wand, lance or orchard gun, unless specifically prohibited in the individual crop sections that follow.

USE INSTRUCTIONS: This product may be applied in middles (in between rows of trees or vines), strips (within rows of trees or vines), and for weed control or perennial grass suppression in established tree fruit and nut groves, orchards, berries and vineyards. It may also be used for site preparation prior to planting or transplanting these crops. Apply 11 fluid ounces to 3.3 quarts of this product per acre as directed in the "ANNUAL WEEDS RATE SECTION" and "PERENNIAL WEEDS RATE SECTION" of this label. Use the higher application rate within the given range when weeds are stressed, growing in dense populations or greater than 12 inches tall. Application may be repeated as needed up to a maximum of 7 quarts of this product per acre per year. See the "PRODUCT INFORMATION" section of this label for more information on Maximum Application Rates.

PRECAUTIONS: Use extreme care to avoid contact of this herbicide solution, spray, drift or mist with foliage or green bark of trunk, branches, suckers, fruit or other parts of trees, canes and vines. Avoid application when recent pruning wounds or other mechanical injury have occurred. Contact of this product with other than matured brown bark could result in serious crop damage or destruction. Only shielded or directed sprayers may be used in crops where potential for crop contact is high, and then only where there is sufficient clearance. For application in strips (within rows of trees), only selective equipment (directed spray, hooded sprayer, shielded sprayer, or wiper applicator) may be used in order to minimize the potential for overspray or drift of this product onto the crop. For berry crops, hooded sprayers must be fully enclosed including top, sides, front and back. Only wiper applicators or shielded sprayers capable of preventing all contact of this product with the crop may be used. See additional use instructions and precautions in the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label.

RESTRICTIONS: Allow a minimum of 3 days between application and transplanting.

Middles (In between rows)

USE INSTRUCTIONS: This product will control or suppress annual and perennial weeds and ground covers growing in between rows of tree and vine crops listed on this label. If weeds are under drought stress, irrigate prior to application. Reduced weed control could result if weeds have been recently mowed at the time of application.

TANK MIXTURES: A tank mixture of this product with Goal 2XL may be applied for annual weed control in between rows (middles) of citrus, tree fruit, tree nut and vine crops when weeds are stressed or growing in dense populations. Application of 11 to 22 fluid ounces of this product, plus 3 to 12 fluid ounces of Goal 2XL, per acre will control annual weeds with a maximum height or length of 6 inches, including crabgrass, common groundsel, jungleríce, common lambsquarters, redroot pigweed, London rocket, common ryegrass, shepherd's-purse, annual sowthistle, filaree (suppression), horseweed/marestail, stinging nettle and common purslane (suppression). This tank mixture will also control common cheeseweed (malva) or hairy fleabane with a maximum height or length of 3 inches.

This product may also be applied to row middles in tank mixtures with the following products. Ensure that the product used is labeled for application within the crop being grown. Read and follow label directions for all products in the tank mixture.

Alion; Chateau; Devrinol 50-DF; Direx 4L; Dri-Clean; Fusilade DX; Goal 2XL; GoalTender; Karmex DF; Karmex II DF; Matrix FNV; Orchard Master CA; pendimethalin; Pindar GT; Poast; Princep Caliber 90; Rely 200; Rely 280; Select Max; Simazine 4L; Simazine 80W; Sim-Trol 4L; Solicam DF; Surflan AS; Surflan 75W; Treevix Powered by Kixor; Venue; Viser 2E

PRECAUTIONS: Use extreme care to avoid contact of this herbicide solution, spray, drift or mist with foliage or green bark of trunk, branches, suckers, fruit or other parts of trees, canes and vines. Avoid application when recent pruning wounds or other mechanical injury have occurred. **Contact of this product with other than matured brown bark could result in serious crop damage or destruction.** Only shielded or directed sprayers may be used in crops where potential for crop contact is high, and then only where there is sufficient clearance. For application in strips (within rows of trees), only selective equipment (directed spray, hooded sprayer, shielded sprayer, or wiper applicator) may be used in order to minimize the potential for overspray or drift of this product onto the crop.

Know your herbicides

- Alion
- Chateau
- Goal-GoalTender
- Matrix,Mission, Craze
- Prowl
- Trellis
- Glyphosate
- Rely, Lifeline, Cheetah
- Shark
- Venue
- Gramoxone
- 2,4-D
- Suppress*

Matrix, Mission, Craze

- These herbicides are all similar and in the chemical family Sulfonylurea- SU's.
- They have postemergence activity and relatively short preemergence activity, but are effective on many hard to control weeds, especially when used in a tank mix.

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- Goal-GoalTender
- Matrix,Mission, Craze
- Prowl
- Trellis
- Glyphosate
- Rely, Lifeline, Cheetah
- Shark
- Venue
- Gramoxone
- 2,4-D
- Suppress*

Glufosinate(Rely, Lifeline, Cheetah)

- Glufosinate acts as a contact herbicide – will damage any green tissue.

Gramoxone (Paraquat)

- Contact Herbicide-Many use restrictions-(If you've been using Gramoxone- you know what they are.)

Shark and Venue

- Broadleaf only contact herbicide

Suppress and other Organic herbicides

- ALL organic herbicides are postemergence contact herbicides
- Effective on small weeds, especially broadleaf weeds.

Grass Herbicides…

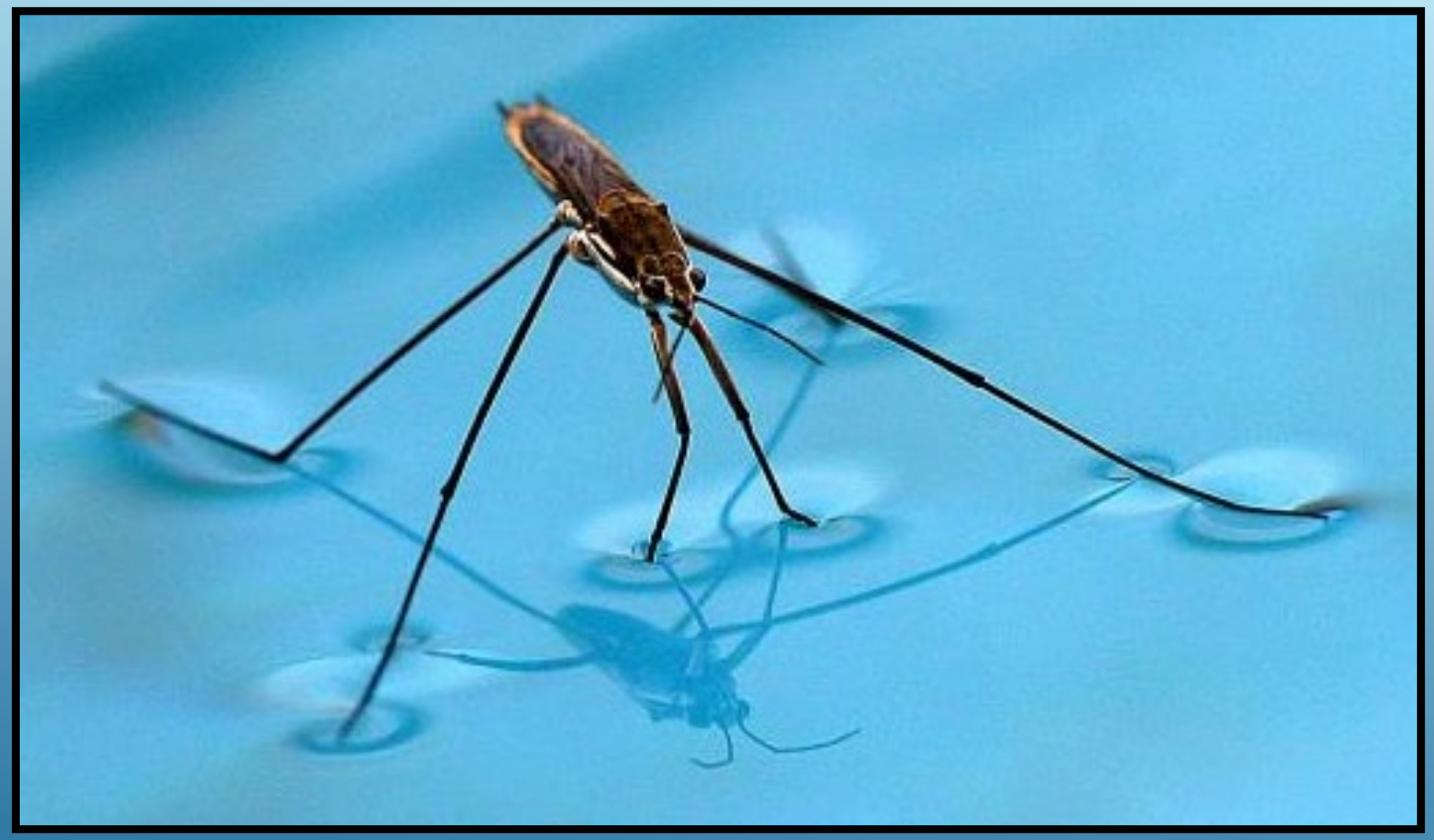
- Poast, Fusilade and Clethodim
- Systemic herbicides that are effective on most grasses- ONLY-
- Check label closely for use restriction (PHI, non-bearing/bearing)

Other things that may help

SURFACTANTS

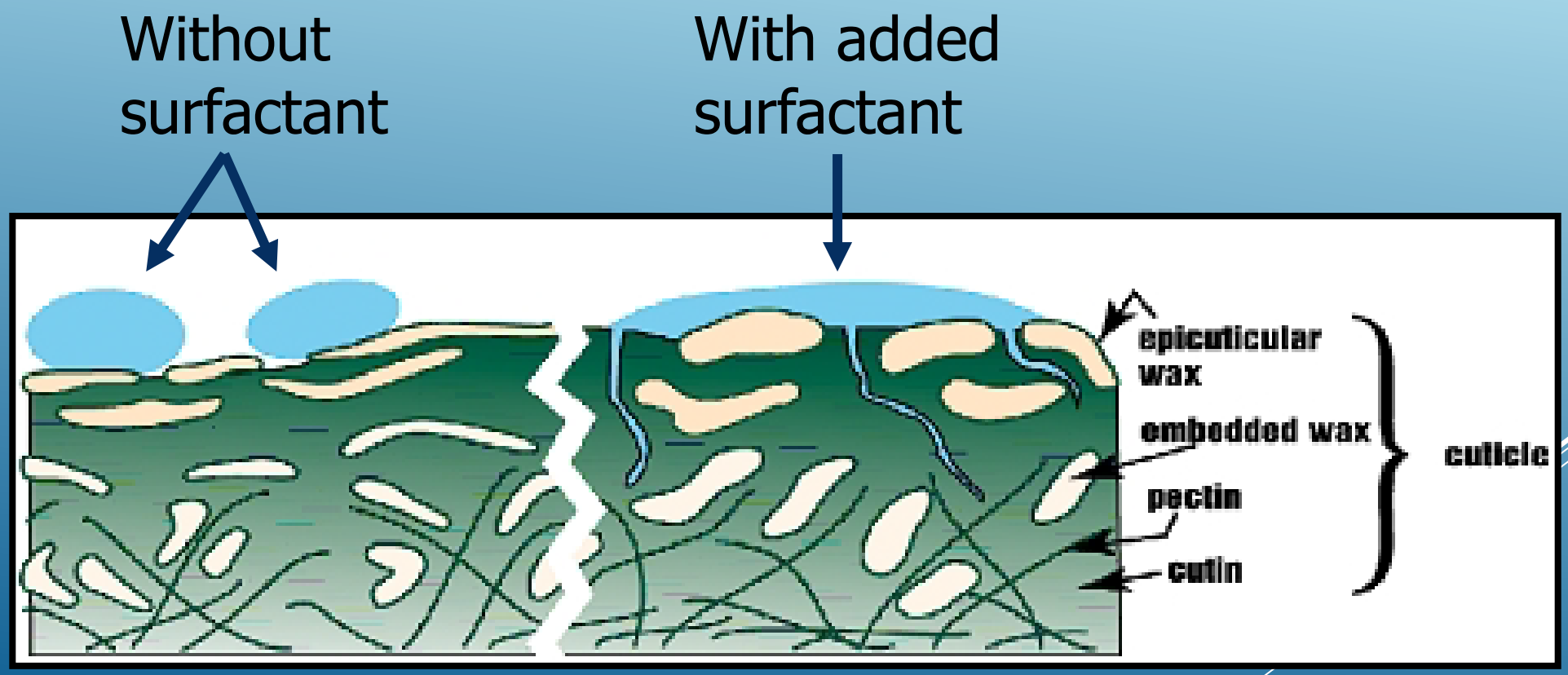
- Surfactants are products that enhance the ability of a herbicide to enter into a leaf or to stay in an aqueous solution
  - Surface Active Agents
- Normally used at 0.25 to 1%, v/v (2 to 8 pt/100 gal)
- Most are nonionic surfactants, although silicon surfactants are also available
- All act on the surface tension of water

SURFACE TENSION OF WATER



Caused by hydrogen bonding between water molecules

Adding surfactant to the mix can increase herbicide droplet contact with foliage



FERTILIZERS AND WATER CONDITIONERS

- Fertilizers and water conditioners can decrease antagonism of herbicides in hard water and enhance the ability of a herbicide to be translocated within a plant
- Ammonium Sulfate (AMS) or Ammonium Nitrate (AN)
  - Normally used at 2%, wt/v (17 lbs/100 gals)
- Urea + Ammonium Nitrate (URAN)
  - Liquid formulations containing 28 or 32% N
  - Used at up to 4% v/v (4 gal/100 gal)

THINGS TO WATCH OUT FOR

- The threshold level for “hard” water antagonism ranges from 150 ppm for calcium to 300 ppm for sodium
- Compatibility problems from addition of liquid fertilizers
- If dry AMS is used, be sure to filter out non-soluble materials to prevent clogging of nozzles

http://www.culligansw.com

GLYPHOSATE AND HARD WATER

- Glyphosate salts are antagonized by other salts in hard water such as calcium, sodium, magnesium, and iron
  - These elements form cations (positively charged ions) that react with negatively charged glyphosate salts
- Both ammonium (NH_3^{1+}) and sulfate (SO_4^{2-}) active
  - Glyphosate is more readily absorbed into foliage when combined with ammonium than when combined with Ca^{2+}, Na^{1+}, Mg^{2+}, or Fe^{2+} ions
  - Free sulfate binds with Ca^{2+}, Na^{1+}, Mg^{2+}, or Fe^{2+} ions

WHEAT FRESH WEIGHT *% REDUCTION* FROM ROUNDUP (0.2 LBS/A) AT 14 DAT

0.2 lbs/A = approx. ½ pint/A

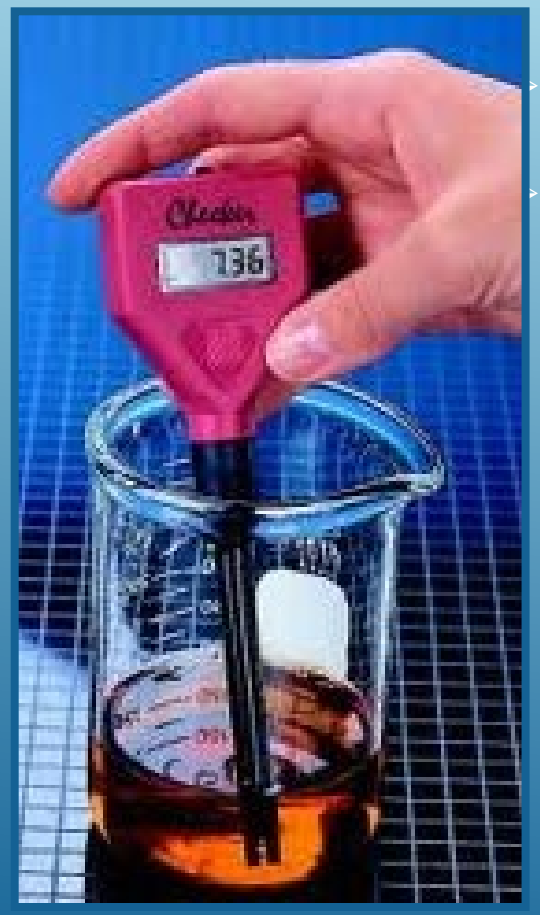
Ammonium Sulfate added	**Distilled water**	**Well water #1**	**Well water #2**
None	79	0	0
2%	84	85	83

Nalewaja and Matysiak 1993

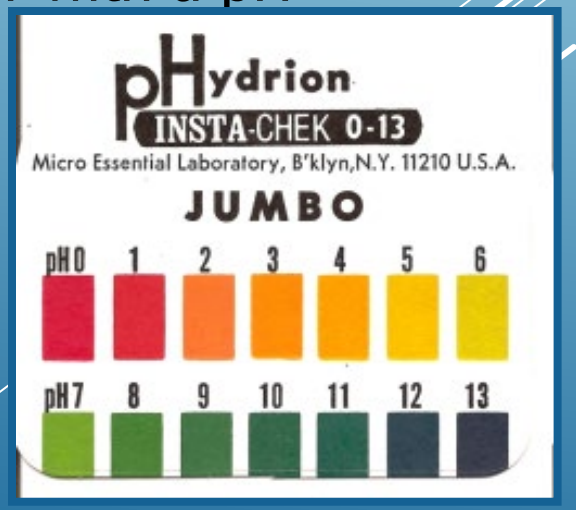
WATER CONDITIONERS AND GPA

- The rate of herbicide you are using is 2 quarts/acre in a 100-gallon sprayer
  - If you are at 40 GPA (spray 2.5 acres) the mix is 5 quarts herbicide and 98.75 gallons water
  - If you are at 20 GPA (spray 5 acres) the mix is 10 quarts herbicide and 97.5 gallons water-much more concentrated.
  - It would be best to add a conditioner to both, but MORE important at the higher GPA.

BUFFERING AGENTS AND GLYPHOSATE



- Buffers modify the pH of a solution
- At low pH, more glyphosate exists as a salt than as the free acid
  - Slightly acidic spray solution applied to leaves results in better glyphosate uptake
  - So when spraying glyphosate, its best to use water with a pH from 4 to 6
  - If water exceeds pH 7, consider using a buffer



Challenges for Weed Management during a ~~Dry~~ *Wet* Year

QUESTIONS?

SAN JOAQUIN VALLEY
WINEGROWERS ASSOCIATION
MARCH 8,2023