

IPM for Turf Management and Alternatives to Neonicotinoids

San Mateo County IPM Workshop

March 1st, 2023

Eric Carlson

Target Specialty Products

PCA/QAL/ISA Arborist

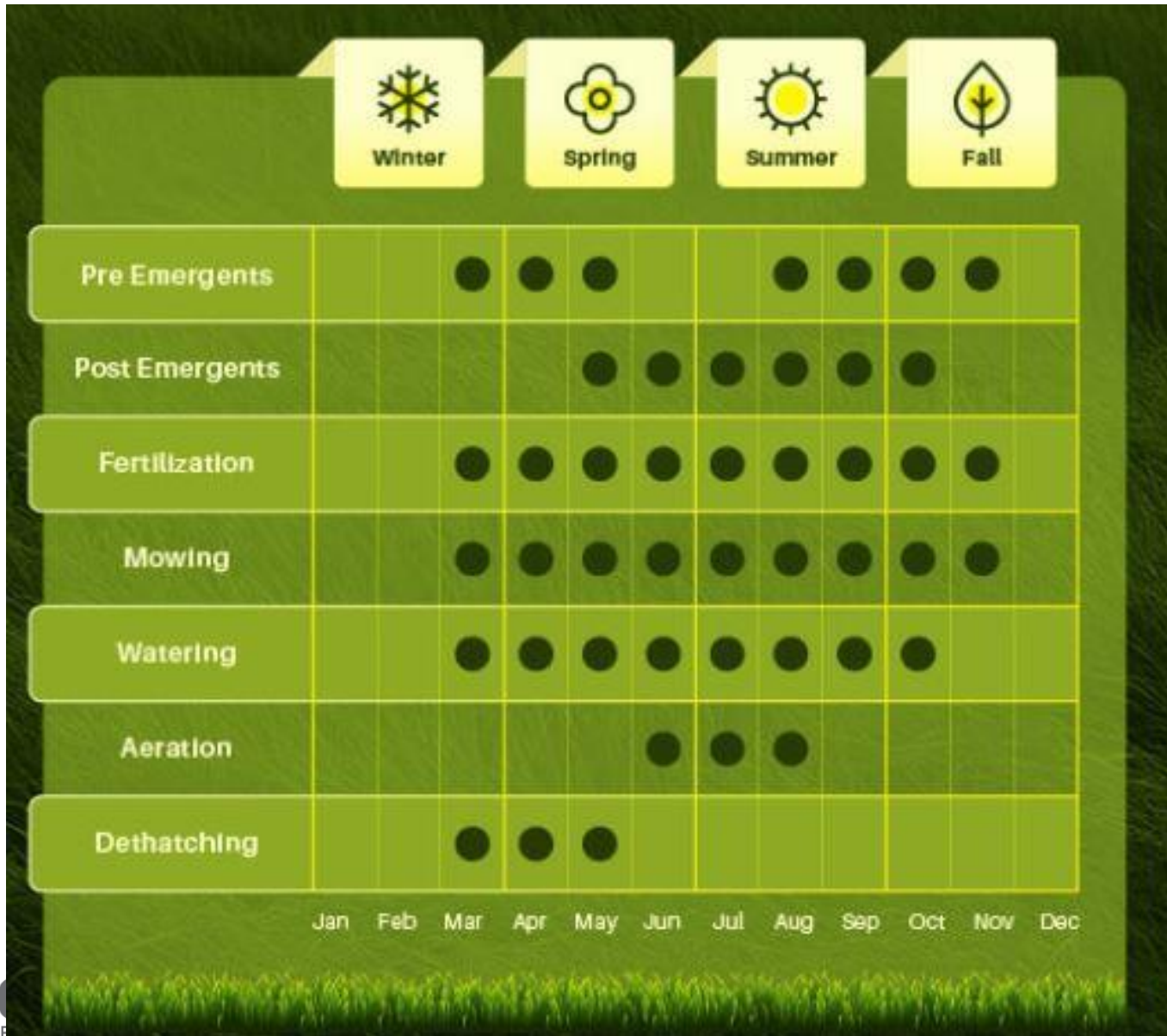


IPM for municipal turf areas

- Spring Soil Testing
- Re-seeding/Aeration
- Sodium management / Salt Remediation
- Monitoring / Spring diseases & grub(insects)
 - Insecticides
 - Fungicides
- Pre & Post Emergent Herbicides
 - Granular & Liquid options
- Fertilization
- Spring/Summer/Fall



Have a plan....



IPM for municipal turf areas (urban parks, right-of-way, etc.)

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- Spring/Summer/Fall



Get a Soil Test

SEND TO: TARGET SPECIALTY PRODUCTS
15415 MARQUARDT AVE
SANTA FE SPRINGS, CA 90670

GROWER:

SUBMITTED BY: ERIC CARLSON

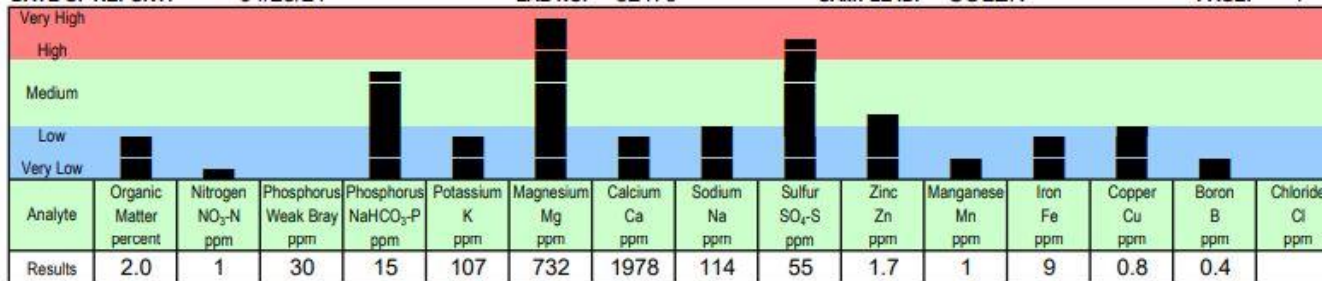
Graphical Soil Analysis Report

DATE OF REPORT: 04/23/21

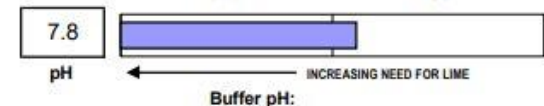
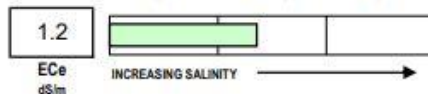
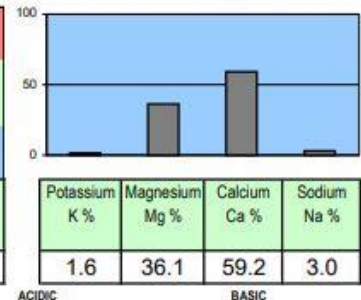
LAB NO: 52479

SAMPLE ID: COLEN

PAGE: 1



Percent Cation Saturation (computed)



Weak Bray P unreliable at M or H excess lime or pH > 7.5

Soil Fertility Guidelines

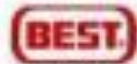
CROP: OAK TREE

RATE: lb/1000 sq ft

NOTES:

Dolomite (70 score)	Lime (70 score)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P ₂ O ₅	Potash K ₂ O	Magnesium Mg	Sulfur SO ₄ -S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B		
		20	*25	1.6	1	4.5				*					

Get a Soil Test



PROFESSIONAL PRODUCTS

18777 HOWLAND ROAD, P.O. BOX 188, LATHROP, CA. 95338 • (209) 858-2511 • FAX (209) 858-2519

REPORT NUMBER: 19-156-167

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15415 MARQUARDT AVE
SANTA FE, CA 90670

GROWER: PRINS CUNNINGHAM

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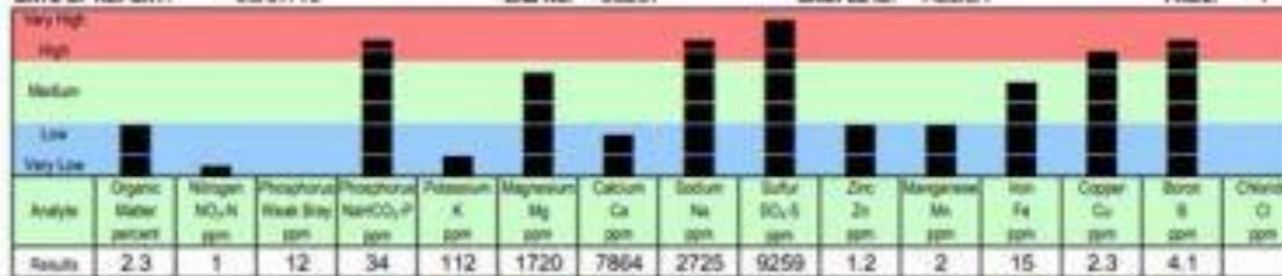
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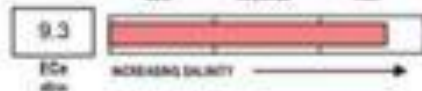
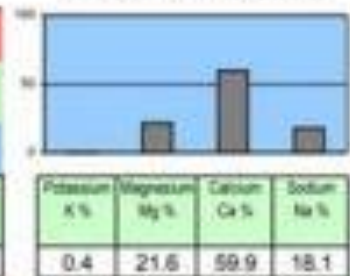
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Percent Cation Saturation (computed)



Weak Bray P unreliable at H or H excess line or pH > 7.5

Soil Fertility Guidelines

CROP: TURF

RATE: lb/1000 sq ft

NOTES:

Dolomite (lb/acre)	Lime (lb/acre)	Gypsum	Elemental Sulfur	Nitrogen N	Phosphate P ₂ O ₅	Potash K ₂ O	Magnesium Mg	Sulfur SO ₄ -S	Zinc Zn	Manganese Mn	Iron Fe	Copper Cu	Boron B	
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ESTABLISHED TURF: Limit sulfur applications to 5 lb/1,000 sq ft every 3-4 weeks during the active

IPM for municipal turf areas (urban parks, right-of-way, etc.)

- Spring Soil Testing
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• Pre & Post Emergent Herbicides

• Granular & Liquid options

- Fertilization
- Spring/Summer/Fall



Poa annua

- Healthier Turf,
- Fewer weeds
 - Increase competition



- Healthier Turf,
- Fewer weeds
 - Improve performance of non-weed turf species



- Blend liquid herbicides with liquid fertilizers & surfactants
 - Use growth regulators to disrupt life cycle
 - Increase mow heights

Poa annua is less competitive at high mowing heights, and will be somewhat crowded out by the shade of the taller ryegrass

- Pre-emergent (Liquid, granular, dry flowable)
- Dimension – 47 grasses & broadleaf weeds controlled
- Gallery – 90 grasses & broadleaf weeds controlled
- Barricade – 30 grasses & broadleaf weeds controlled
- Pendulum – 40 + grass & broadleaf (**can stain**)
- Crew (Dimension Gallery) 110-115 grasses & broadleaf weeds



Granular Pre-Emergents

- St Paul 0-0-0 Weed & Feed w/ .25% Dimension (Dimension 270G)
 - (2.3-3.7lbs/1000 or 13,500 sq ft/bag)
- Ronstar
- Pendulum
- Ronstar (no longer available)

•Crew (Dimension & Gallery) **New**

Combination Products

- 18-0-12 w/ .22% Dimension-slow release (5.4lbs/1000 sq ft)
- 37-0-5 SIFI w/ .125% Dimension (7.7lbs/1000 or 11,350sq ft/bag)
- Turf Supreme 16-6-8 w/ Trimmec (2,4-D – 5.0lbs/1000 sq ft)
- 21-3-5 with Surge herbicide (Post emergent)

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Where do we start

- Identification
- Symptoms
- IPM strategies for control



Conditions that favor soil borne pests

- Standing moisture, Poor drainage, contamination, high traffic areas, climate, topography
- Climate

Strategies to reduce soil pest problems

- Plant selection, proactive soil conditioning, plant density, pesticide applications, root zone protection areas
-



Right in front of us but hard to see

Non-ag environments have a range of permanent soil-borne disease organisms which are usually contained in a balanced environment where organisms, soil conditions, and hosts interact in a complex system.

Garden plants only show symptoms of disease when this balance is disrupted and pathogen organisms become dominant.

Balanced?



Humans (bad or good)?

Gardeners can overcome disease by improving plant conditions, creating a hostile environment for the disease and by stimulating the growth of beneficial soil organisms.

Unbalanced?



Below ground

Soil-borne diseases in the garden include pre and post-emergence damping-off, like

- Fusarium,
- Pythium
- Rhizoctonia species,

Root rot,

- Phytophthora,
- Vascular wilts caused by fungi
- Verticillium
- Nematodes.



Below ground

Soil-borne diseases in the garden include pre and post-emergence damping-off, like

- Fusarium,
- Pythium
- Rhizoctonia species,



Chemical option

GROUP 11 FUNGICIDE

PULL HERE TO OPEN ►



Heritage® G



Fungicide

Broad spectrum fungicide for control of turf diseases in lawns around residential, institutional, public, commercial and industrial buildings; turf areas of parks, recreational areas and athletic fields; and golf course turf

Active Ingredient:
Azoxystrobin: methyl(E)-2-[(2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl)-3-methoxyacrylate*] 0.31 %

Other Ingredients: 99.69 %

Total: 100.00 %

Contains 0.0031 lb. a.i./lb. product

*IUPAC

KEEP OUT OF REACH OF CHILDREN.
CAUTION

See additional precautionary statements and directions for use inside booklet.

EPA Reg. No. 100-1323 EPA Est. 9198-AI-1

IPM for municipal turf areas (urban parks, right-of-way, etc.)

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•Monitoring / Spring diseases & grub(insects)



Insecticides



Fungicides

- Pre & Post Emergent Herbicides
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always thinking ahead.



Nemasys® G

Advanced Biocontrol for White Grubs

GENERAL DESCRIPTION

- No restrictions in use and no re-entry interval.
- No requirements for protective clothing.
- Safe for applicators, users and the environment.
- Proven curative control.
- No concerns for residue runoff.

Nemasys® G contains live nematodes (*Heterorhabditis bacteriophora*) in their vigorously infective juvenile stage. These nematodes attack pest larvae by entering their natural body openings. Once inside, they release symbiotic bacteria that quickly kill the insect larvae. Reproduction inside the larvae releases a new generation of hungry, infective juveniles that disperse in search of further prey.

PACKAGING

Available in trays of 50 million and 250 million nematodes.

PRECAUTIONS

This product contains living organisms that require special handling and application procedures.

- This product will not control the adult or egg stage of targeted insects.

Application requirements:

- 1-3 Billion per acre
- 250 million per tray
- 2 tray minimum
- Drop Ship to your location only
- Must be refrigerated
- Remove all filters from spray equipment to prevent clogging

Nemasys® G

Advanced Biocontrol for White Grubs

Nematode species: *Heterorhabditis bacteriophora*

Activity: 57-86 °F (14-30 °C)

Pests Controlled

- European Chafer Grub (*Rhizotrogus majalis*)
- Japanese Beetle Grub (*Popillia japonica*)
- Oriental Beetle Grub (*Exomala orientalis*)

Reclaimed water

(What does it do to the
soil ?)



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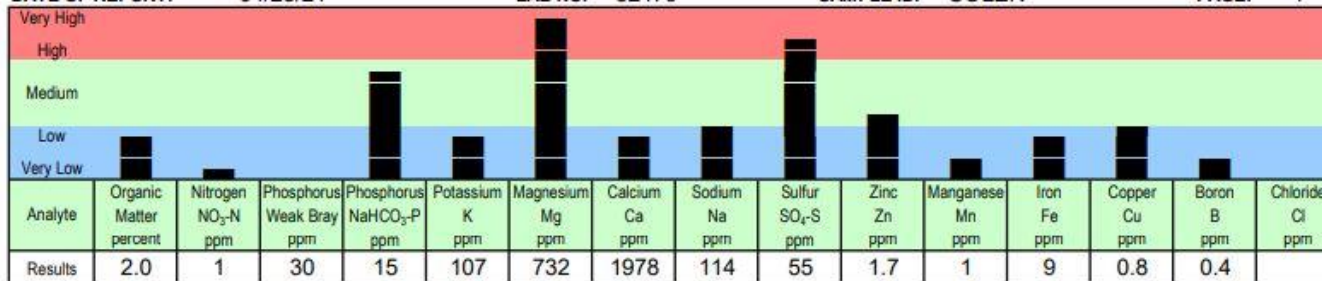
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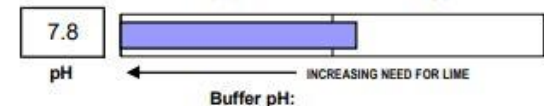
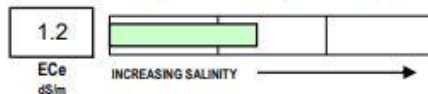
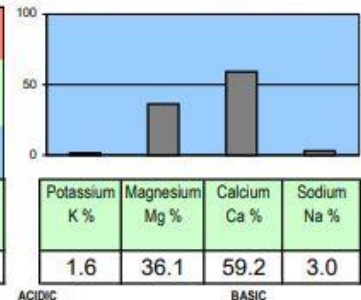
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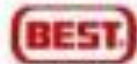
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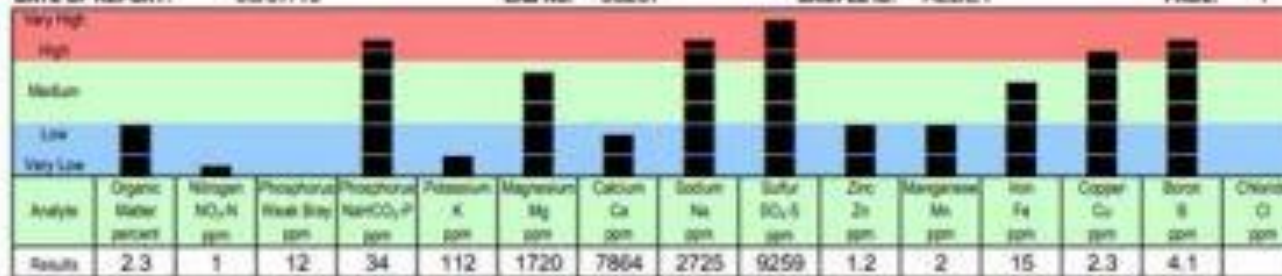
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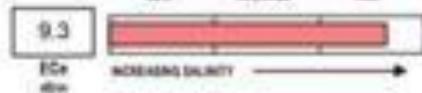
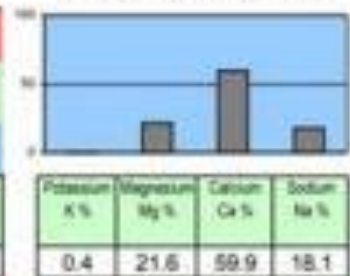
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Use the season to your advantage?

What's going on with trees these days?

- Salt buildup from reclaimed water
 - Great time to apply Gypsum & Sulfur
- Flush salts through profile with seasonal rains

- **Excess Soil Salinity**
 - **Impacts:**
 - Turf Performance
 - Germination of Overseed
- **Excess Soil Sodium**
 - **Impacts:**
 - Soil Structure
 - Water Infiltration
 - Turf Performance
- **Specific Ion Toxicities**
 - **Impacts:**
 - Trees & Ornamentals
 - Foliar Damage and/or Plant Death

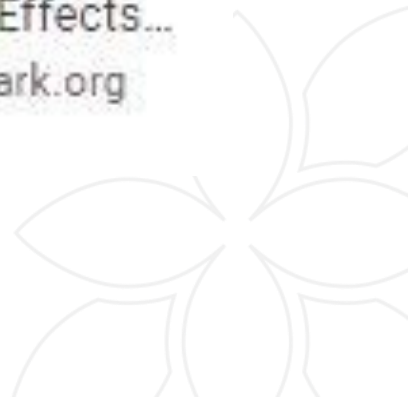
Reclaimed water



Redwoods and recycled water | Bill ...
napavalleyregister.com



Recycled Water Effects...
fanswashingtonpark.org



- Dry Spots develop when hydrophobic organic acids build up and coat soil and sand particles with a water repellent coating.
- The creation of hydrophobic sand and soil is an inevitable process as plant exude this material from the roots. (Fertilizers can also add salts)
- Humic and Fulvic acid in the soil can contribute to LDS when those materials weather and lose their natural **polarity**.
- No amount of water will infiltrate and re-wet localized dry spots when the condition is severe. Applied rainfall and irrigation water will shear off the LDS area and drain through surrounding soils that are not hydrophobic

D-Solve™

SODIUM & BICARBONATE MITIGATION



Specialty



Increases
Infiltration Rates



High Acid Value



Fights Sodium and
Bicarbonate



Increases
Infiltration Rates



High Acid Value



Fights Sodium and
Bicarbonate



Many turf stands suffer from poor irrigation water quality. High levels of sodium and bicarbonates lead to reduced infiltration rates, gas exchange, and overall turf quality. **D-Solve™** is a proprietary blend of acids and a soil penetrating surfactant that work to dissolve bicarbonate layering and increase calcium and magnesium availability. Calcium in soil solution works to replace sodium on the soil's cation exchange system.



Cleanse

Organic Soil Remediation System

Cleanse is a powerful tool for use on soils that display signs of localized dry spot (LDS), poor infiltration, or poor soil health. **Cleanse** combines an even stronger solvent than in previous formulations added to Turf Fuel's proprietary Soil Sync technology. This two-part system works to attack hydrophobic organic acids responsible for LDS while delivering key enzymes to promote healthy soil biology and root system development. This combination gives treated soil an improved rewetting capability and more robust biological portfolio.

Removes Organic Acid | **Restores Natural Hydration** | **Increases Infiltration**

Organic Soil Remediation System

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Stand alone application...



Cleanse +

Organic Soil Remediation System

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Removes Organic Acid | Restores Natural Hydration | Increases Infiltration



D-Solve™

SODIUM & BICARBONATE MITIGATION

Increases Infiltration Rates

High Acid Value

Fights Sodium and Bicarbonate

- 1) Water them in
- 2) Flush salts out of the root zone
- 3) Replace nutrition

Penetrants & Polymers



ARGO™

A potent blend of soil penetrants, joined with a humic/ fulvic acid supplement. Argo's combination of multiple action compounds work to manage difficult soils. Manage soil moisture, air and nutrient ratios.

38% Penetrant	0.4% Fulvic Acid
2% Humic Acid	0.6% Fe

32-64oz/100 Gallons of Water



VANQUISH™

Vanquish is fortified with four distinctly different polymers. Together they maximize water penetration, hydration and rehydration through the soil. Vanquish is a great pre-treatment option for areas challenged by too much or too little moisture.

32-64oz/100 Gallons of Water



Moisture & Nutrient Management



VERTICAL



↑ ABOVE GROUND:

- Anti-stress technology
- Wellness triggers
- Super efficient potassium
- Antioxidants
- Growth promotion
- Improved photosynthesis

↓ BELOW GROUND:

- Rooting technology
- Food for soil microbiology
- Proprietary three part organic acid blend
- Improved nutrient availability
- Key sugars for plant health and microbial stimulation
- Rich carbon supply for rhizosphere

Vertical

- VERTICAL's unique three part organic acid blend drives incredible nutrient availability while providing a food source for beneficial microorganisms. VERTICAL is a unique formulation of rich organic material blended with a proprietary sugar complex, potassium chelated with carbon

GUARANTEED

Soluble Potash (K_2O) 8.0%

Derived from: Potassium humate, potassium acetate, proprietary carbohydrate blend.

Application Rate:

3 - 6 fl. oz. / 1,000 sq. ft.
every 7 - 14 days.

Use weekly at 3 fl. oz. / 1,000 sq. ft. or biweekly at 6 fl. oz. / 1,000 sq. ft. throughout the growing season. Use more frequently during stress periods or in recovery situations. VERTICAL does not have to

**Improved Soil &
Plant health**



**Improved Rooting
Technology**



**Stress Fighting
Power**



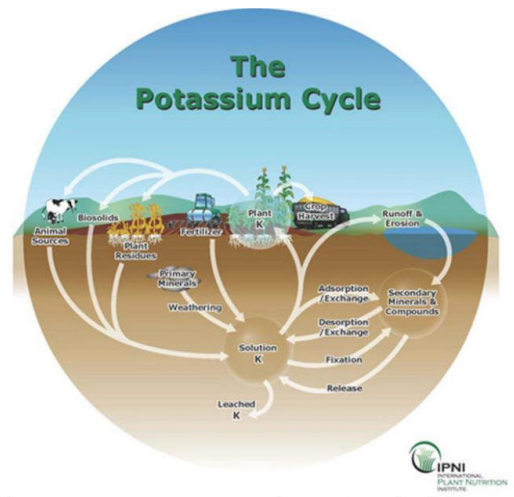
Moisture management impacts

- Increases root growth and improves drought resistance.
- Maintains turgor; reduces water loss and wilting.
- Aids in photosynthesis and food formation.
- Reduces respiration, preventing energy losses.
- Enhances translocation of sugars and starch.
- Produces grain rich in starch.
- Increases plants' protein content.
- Builds cellulose.
- Helps retard crop diseases.



Potassium acetate

- Potassium is **associated with the movement of water, nutrients and carbohydrates in plant tissue**. It's involved with enzyme activation within the plant, which affects protein, starch and adenosine triphosphate (ATP) production. The production of ATP can **regulate the rate of photosynthesis**.



- In general, potassium acts the same in all plants by the following: **formation and translocation of starches, sugars, and fats.** regulates plant stomata opening/closing and thus, water use.
- Potassium humate is **used in agriculture as a fertilizer additive to increase the efficiency of fertilizers especially nitrogen- and phosphorus-based fertilizer inputs.**



Moisture Management

(in the soil and the
plant)





Granular products

- Moisture magnet
- Hydretain
- Cascade 16G

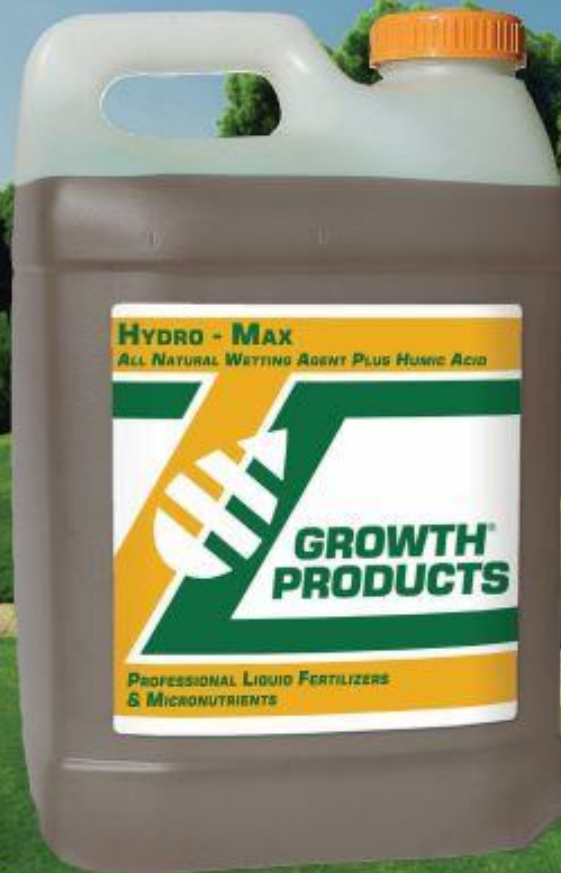


Moisture Magnet

Sprayable and Granular Formula

Moisture Magnet enhances the soils ability to hold moisture in times of drought or where poor irrigation coverage exists. The proprietary formulation is a unique blend of polymers, moisture retention and penetrant compounds. Able to hold 50 times it's weight in water, **Moisture Magnet** is also effective at improving infiltration in tight soils.

HYDRO-MAX



USING NATURE'S POWER-OVERRIDING BENEFITS FOR THE ENVIRONMENT

- Based on *Yucca schidigera* – the highest-yielding source of steroidal saponins
- A natural wetting agent
- Faster penetration of difficult soils
- No salt build-up in soil
- A natural food source for nitrogen-fixing bacteria
- Increases water and fertilizer penetration
- Softens hard, compacted soils
- Effective sticker/spreader
- Both Yucca and Humates help leach salts from soils
- Alleviates dry spots
- Reduces surface tension of water

NutriRoot 2-2-3



NutriRoot[™]

GRADE: 2 - 2 - 3

LIQUID SOIL APPLIED FERTILIZER

NutriRoot[™] is a unique blend of essential minerals, seaweed extract, humates, surfactants and humectants designed to increase root development and to reduce water stress in trees, shrubs and lawns.

Treatment Uses:

- Root Development
- Transplant Success
- Water Stress Management
- Nutrient Deficiencies
- Sandy Soils
- Dry Soil Conditions
- Summer Stress
- Winter Stress

KEEP OUT OF REACH OF CHILDREN

EXTRA STRENGTH

Hydretain® ES Plus

Root Zone Moisture Manager

Hygroscopic and Humectant Technology Plus 10% Renewable Resource Non-Ionic Surfactant



Hydretain ES Plus Root Zone Moisture Manager Composition:
54% Humectants (sugar alcohols, polysaccharides and neutral salts of alpha-hydroxypropionic acid), 10% non-ionic surfactant and 36% inert ingredients.

Hydretain ES is a unique blend of humectant and hygroscopic compounds that manage root zone moisture, significantly extending periods between required waterings for turf, ornamental plants, shrubs, trees and agriculture. **Hydretain ES Plus** combines Hydretain's root zone moisture management technology with an advanced environmentally sound, renewable resource, non-ionic surfactant.

Hydretain ES Plus is biodegradable - reapply every 3 months or as needed. Water in thoroughly after application.



Hydretain® ES Plus

GRANULAR QD

(Biodegradable and Eco-Friendly Quick Dissolve Granule)

Hydretain Reduces Watering

Hydretain is a patented root zone moisture management technology that is designed to reduce the overall watering requirements of plants, shrubs, trees, turf and agriculture. Hydretain is a liquid group of hygroscopic and humectant components that attract moisture like tiny "water magnets" and make available to plant roots microscopic moisture which would otherwise be lost to evaporation. Hydretain ES Plus combines the patented Hydretain® soil moisture management technology with a naturally derived soil surfactant for chronically dry or hydrophobic soils.



Hydretain[®] ES Plus

GRANULAR OC

(Biodegradable and Eco-Friendly Dispersible Granule)

Hydretain Reduces Watering Up To 50%

Hydretain is a patented root zone moisture management technology that effectively reduces the overall watering requirements of plants, shrubs, trees, turf and agriculture by as much as 50% or more. Hydretain is a liquid group of hygroscopic and humectant components that attract moisture like tiny "water magnets" and make available to plant roots microscopic moisture that would otherwise be lost to evaporation. Hydretain ES Plus combines Hydretain's root zone moisture management with an advanced, naturally derived soil surfactant designed to improve penetration into and throughout hydrophobic soils. In combination these synergistic technologies provide unequalled water conservation and drought stress reduction through efficient subsurface soil moisture management. In addition to reducing overall water requirements, Hydretain ES Plus works to provide the proper soil moisture needed to maximize the effectiveness of most fertilizer and pesticide products.

Hydretain ES Plus Granular OC puts the power of Hydretain ES Plus in an easy to spread, environmentally friendly granule that is convenient for dry spreader applications where liquid applications are impractical or labor intensive. Hydretain ES Plus Granular OC uses a rapidly dispersing, biodegradable organic compost carrier to deliver the power of the Hydretain technology for all types of professional applications. Hydretain ES Plus Granular OC is easily applied to localized dry spots, flower beds, around shrubs, trees and containerized plants as well as for large scale applications such as golf courses, sports fields, residential lawns and commercial landscapes, etc.



IAKOL
SPECIALTY PRODUCTS™

Overseeding, Sodding, Sprigging: Apply Hydretain ES Plus at general application rate (9 oz. per 1,000 sq. ft.) by spray or drench after seeding, sodding or sprigging. Water in with only enough water to rinse Hydretain ES Plus off foliage and into the soil at seed level or the root area of new sod or sprig. An application of Hydretain ES Plus made prior to overseeding, sodding or sprigging and watered into the root zone will manage soil moisture for existing turf during new turf establishment.

Trees, Shrubs & Individual Plants: Dilute Hydretain ES Plus at a rate of 2 oz. per gallon of water and apply by drench thoroughly saturating the root zone. For maximum effectiveness on trees apply 4 to 8 ounces of concentrate for each inch of trunk diameter. Dilution rate is variable from 50:1 to 300:1.

Potted or Containerized Plants: Dilute Hydretain ES Plus at a rate of 2 oz. per gallon of water and apply by drench, thoroughly saturating the planting media. Media should be dry enough to hold as much diluted Hydretain as possible. Hydretain ES Plus may be applied through existing injectors at rates between 50:1 and 100:1. Higher dilution rates may require multiple applications to achieve desired results.

Large Planters & Gardens: Dilute Hydretain ES Plus at a rate of 2 oz. per gallon of water or through injectors at a rate of 50:1 to 100:1 and apply at a rate of 2 ounces of concentrate per 60 sq. ft of area. One gallon treats 4,000 square feet.

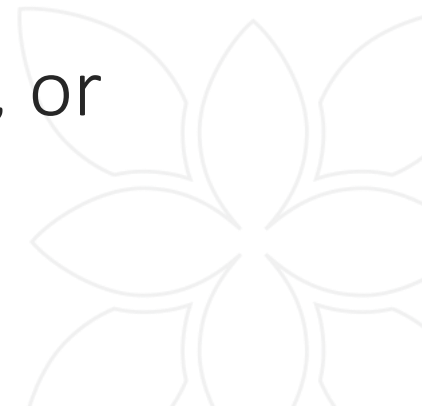
Turf: Hydretain ES Plus Granular QD can be applied to established turf, or at the time of seeding, sodding, QD is 120 pounds per acre (2.7 pounds per 1,000 square feet) and repeated every 3 months or as needed. a 1/2 rate following the initial full rate application.





Plant Health Care(PHC) cocktails

(They will work on turf, planter beds, or
trees)



Ultimate Care Spring and Fall	Rates per 100 Gal Tank Mix
Arbor Care 15-8-4 (Spring) Autumn Care 6-12-12 (Fall)	96 oz. (3 qt)
Essential Plus®	64 oz. (2 qt)
Micrel Total	64 oz. (2 qt)
pH Reducer	32 oz. (1 qt)
BioNutrients Injectable OR BioNutrients (8-0-9)	1 -2 pack (8 – 16 dry oz.)

Standard Maintenance Spring and Fall	Rates per 100 Gal Tank Mix
Arbor Care (Spring) Autumn Care (Fall)	96 oz. (3 qt)
Essential Plus®	64 oz. (2 qt)
Micrel Total	64 oz. (2 qt)

Stress & Disease Pressure Minimum of two applications per year	Rates per 100 Gal Tank Mix
Recover Rx 3-18-18 with Salicylic Acid OR TKO Phosphite 0-29-26	96 oz. (3 qt)
Essential Plus®	32 oz. (1 pt)
Micrel Total	64 oz. (2 qt)
Hydro-Max	64 oz. (2 qt)
Companion® Biological Fungicide	32 oz. (1 qt)
	64 oz. (2 qt)

Difficult Soils – Compaction, pH Issues, Sub-soil Minimum of two applications per year	Rates per 100 Gal Tank Mix
Hydro-Max (Natural Wetting Agent)	64 oz. (2 qt)
BioNutrients Injectable OR BioNutrients (8-0-9)	1 -2 pack (8 – 16 dry oz.)
pH Reducer	64 oz. (2 qt)

Have a plan



SUGGESTED SOLUTIONS

Complete Plant Nutrition

Delivers optimal plant nutrition throughout the growing season. Each product was selected and combined to help overall plant health as well as to build much greater tolerance to stress caused by pests or environmental factors. Applications can be made any time of the year and will provide consistent results.

PROGRAM PRODUCT RATES:

Element 6	64 oz/ 100 gal
TS Pro 18-3-6	2 gal/ 100 gal
MZ23	64 oz/ 100gal

Recovery

Throughout the growing season plants face many challenges and sometimes there are setbacks. When we face these situations, Turf Fuel's landscape Recovery Program can help. Providing essential nutrients, phosphite and Turf Fuel's Nutrifense technology found in Vertical will set you on the road to recovery.

PROGRAM PRODUCT RATES:

Greens Phite Supreme	64 oz/ 100 gal
TS Pro Micro 6-0-0	64 oz/ 100 gal
Vertical	64 oz/ 100 gal

Establishment

Understanding that new plantings are an investment, it is crucial to set them up for success. The main focus with this program is not only proper nourishment but also soil conditioning. Providing food sources for healthy microbial populations is a key to success. Conditioning soils at the time of planting will increase the ability for root growth and increase the plant's ability to mature.

PROGRAM PRODUCT RATES:

XChange	64oz/100G
Better Soil	64 oz/ 100 gal
Argo	32 oz/ 100 gal

Winter Preparation

When getting ready for the winter months don't forget to get your plants ready too. Whether you're in the northeast all the way to the southwest plant physiology is changing. Providing key sugars, stress tolerance compounds and essential nutrients, this program can set your plant's up for a much healthier spring.

PROGRAM PRODUCT RATES:

MZ23	64 oz/ 100 gal
Base K 26	64 oz/ 100 gal
Element 6	64 oz/100 gal

Soil Reboot

Whether you are battling heavily compacted soils, high pH soils, or high sodium soils, Soil Reboot is here to help. With the unique ability to unlock bound soil and move off organic material you can start to reset the soil. The combination of these products will increase waters ability to break through even the toughest of soils taking with it much of the unwanted hydrophobic coatings. Give your soil the break it needs and allow it to function as you desire.

PROGRAM PRODUCT RATES:

Cleanse	64 oz/ 100 gal
DSOLVE	64 oz/100 gal
Vanquish	64 oz/100 gal
Root Down	32 oz/ 100 gal



•Liquid products

- Scale to fit
- Liquids for spring or fall season
- Salt remediation
- Slow release liquids
- Nutrifense-'Extremefitic Extract' (tricks the plant into 'stress' mode)
- Build thicker roots
- Shortstop, Atrimmec, Companion Maxx



Soil Products

Product Descriptions

Turf Fuel Xchange	Humic Acid, Iron & Sea Kelp - Improves soil health, enhances rooting, chelates soil nutrients
Lessen 11	Calcium Fertilizer & Sodium Remediation - Increases infiltration, stress recovery
Root Down 18-0-0	Acidified Nitrogen & Key Micronutrients - Excellent Turf Color, Fights Sodium and Bicarbonates
D-Solve	Sodium & Bicarbonate Mitigation - High acid value, releases soil nutrients, non-hazardous
Cleanse	Organic Soil Remediation System - Removes organic acids, restores natural hydration
Infinite	A multipurpose soil surfactant to manage soil moisture and plant stress
Vanquish	An all purpose soil surfact delivers consistent rewetting, hydration and penetration in all soil cor
Kraken	A specialty wetting agent to provide firm soil conditions when tournament conditions are dema
Abyss	Premium penetrant provides improved infiltration and water movement

Foliar Products		Product Description
Greens Force	Photo Fuel	Improve Color and Health, Initiates Plant Defenses, Enhances Photosynthesis
	Respo Fuel	Drives Roots, Conserves Plant Energy, Aids Respiration
	Carbon 21	Provides Plant Energy, Benefits Shaded Turf, Increases Rooting
	Element 6	Increases Plant Energy, Improves Rooting, Prepares Turf for Stress
	Minors Fuel	Superior Color, Aids Metabolic Reactions, Comprehensive Minors
	Greens Phite Premier	Increases Turf Strength, Improves Wear Tolerance, Promotes Plant Health
	Quick Green	Quick Color in Cool Weather, Increased Density, Expedited Recovery
	Blade Fe	Rapid Greenup with Controlled Growth. 6%Iron
	Base N18	18-3-6 Base Nutrition powered by G2D Turf Fuel Biostimulant
	Base N25	25-0-0 Base Nutrition with 50% SRN from Triazone and G2D Turf Fuel Biostimulant
	Base K26	0-0-26 Base Nutrition powered by G2D Turf Fuel Biostimulant

COMPANION[®] MAXX

2-0-1

Guaranteed Analysis:

Total Nitrogen (N)	.....	.2%
2% Water Insoluble Nitrogen		
Soluble Potash (K ₂ O)	.....	.1%
Magnesium (Mg)	.....	.05%
Iron (Fe)	.....	.01%
Derived From: Corn Steep Liquor, Ferrous Citrate, Molasses, Ascophyllum Nodosum		

ALSO CONTAINS NON PLANT FOOD INGREDIENT:

Bacillus subtilis	.....	.0003%
14 X 10 ⁶ cfu/ml		
Weight per gallon	.....	9.16 lbs./gallon @68°F

Product Description

Neonics

Neonicotinoids

Discussion & Options



Oregon Bee Deaths Important Lesson in Tree Care

Posted on [July 8, 2014](#) by [Lisa Tadewaldt](#)



Last month, the Oregon Department of Agriculture (ODA) suspended the licence of an Oregon tree care company for allegedly using a chemical pesticide spray that killed about a thousand bees outside a Eugene apartment complex. The commercial pesticide service ignored or overlooked label instructions not to spray flowering trees.

The incident is one of several in Oregon that have involved pesticides. In Wilsonville, a landscaping company sprayed 44 linden trees in a Target parking lot in order to kill aphids, an insect that produces a sticky liquid that drips

on cars or anyone walking under the trees. The ODA confirmed that the insecticide called Safari was to blame.



Our S

- [Tree](#)
- [Tree](#)
- [Tree](#)
- [Tree](#)
- [Tree](#)
- [Cert](#)
- [Orga](#)
- [Fine](#)

How it all started...



OUR WORK ▾

GET INVOLVED ▾

GIVE ▾

RE!

[Home](#) - The Wilsonville Bee Kill

The Wilsonville Bee Kill

More than 50,000 bumble bees died when 55 blooming linden trees were sprayed with the pesticide dinotefuran (also known as Safari).

On June 17, 2013, the largest native bee kill ever recorded occurred in Wilsonville, Oregon. More than 50,000 bumble

How it all started...

The Oregon Department of Agriculture suspended the license of Glass Tree Care and Spray Service Inc., a commercial pesticide operator following a recent incident that killed some 1,000 bees at a north Eugene apartment complex.

An agriculture investigation into the bee die-off found similar conditions to a 2013 episode that killed thousands of bees in Portland.

In the Glass Tree case, an employee sprayed 17 linden trees with a product containing imidacloprid. The pesticide, toxic to bees, killed bumblebees and some honeybees.

If the American bumble bee ultimately receives an endangered species listing, it will join the rusty patched bumble bee and **the Franklin's bumble bee**, which was added in August 2021. The Franklin's, which has an extremely restricted range on the West Coast, hasn't been seen since 2006. Sep 30, 2021



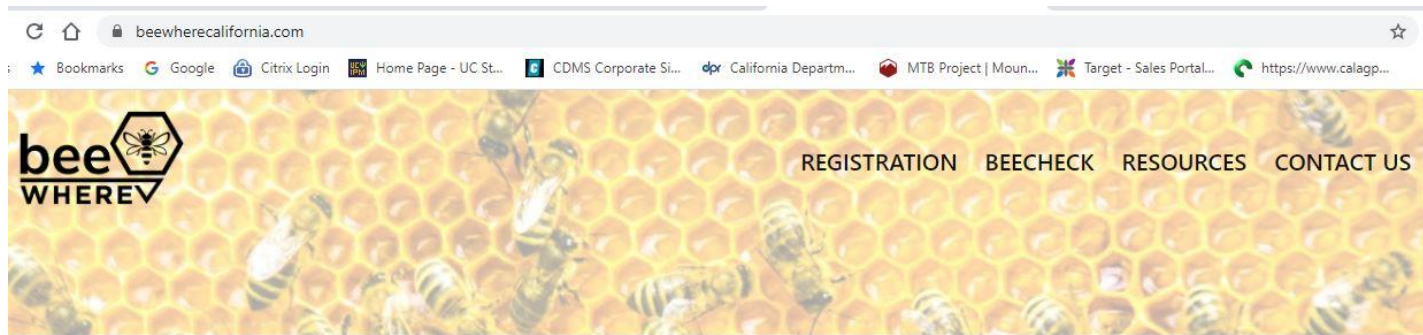
<https://news.wttw.com> > 2021/09/30 > american-bumble-b... ⋮

American Bumble Bee Could Be Next on Endangered ...

 About featured snippets •  Feedback



BeeWhere – Webstie (local hives)



BeeWhere is a collaborative initiative to bring beekeepers and pesticide applicators together to share best practices by tracking and safeguarding hive locations across California using innovative mapping tools.



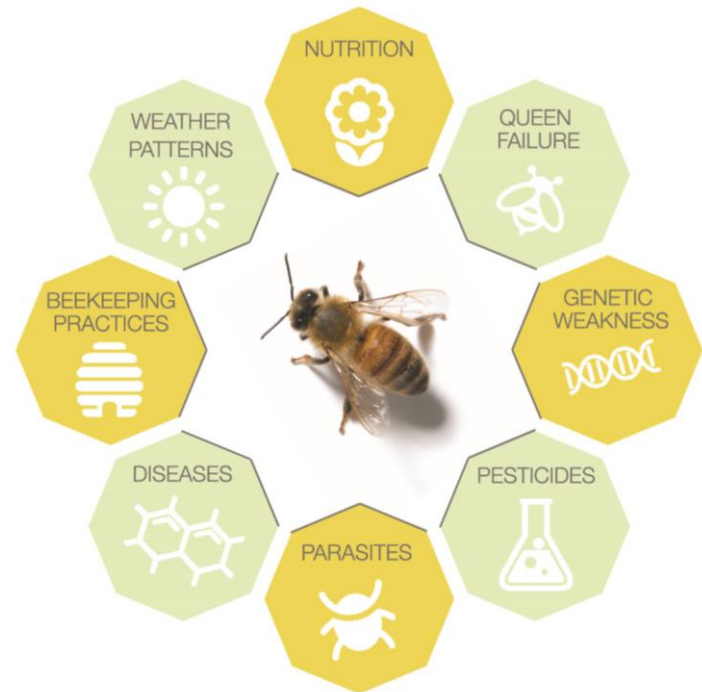
- Bumble Bee Profiles
- **Crotch's bumble bee (*Bombus crotchii*)**, has declined by 98% in relative abundance. This bee historically occurred from the northern Central Valley to Baja Mexico.
- **The western bumble bee (*Bombus occidentalis occidentalis*)** range that extends across the western U.S. and southern Canada. It currently persists primarily in the Sierra Nevada; its abundance has declined by 84%.
- **The Suckley cuckoo bumble bee (*Bombus suckleyi*)** is found only where its host species of bumble bees, remain. It is considered Critically Endangered
- **Franklin's bumble bee (*Bombus franklini*)**, Of Northern California and southern Oregon may already be extinct.



Multiple Stressors Affecting Bee Health

Scientists are focused on the interaction of multiple factors:

- Parasites (*Varroa*; tracheal mites)
- Nutrition deficiencies
- Diseases (Nosema; bacteria; viruses)
- Weather
- Beekeeping practices
- Pesticides (hives; agriculture)
- Genetic weakness
- Queen issues



Bee Health Concerns


- EPA Requirements:
 - Insertion of a “Pollinator Protection Box”
 - Use of the EPA approved ‘Bee Icon’ in above and under directions for use where pollinator exposure may occur.
 - Submission of proposed label by September 30, 2013.
 - Enforceable as of January 31, 2014.




THE NEW EPA BEE ADVISORY BOX

On EPA's new and strengthened pesticide label to protect pollinators

PROTECTION OF POLLINATORS



APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.



Look for the bee hazard icon in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators. Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.

Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at:
<http://pesticidestewardship.org/pollinatorprotection/Pages/default.aspx>

Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state/tribe, go to: www.aapco.org. Pesticide incidents can also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: beekill@epa.gov

Alerts users to separate restrictions on the label. These prohibit certain pesticide use when bees are present.



The new bee icon helps signal the pesticide's potential hazard to bees.

Makes clear that pesticide products can kill bees and pollinators.

Bees are often present and foraging when plants and trees flower. EPA's new label makes it clear that pesticides cannot be applied until all petals have fallen.

Warns users that direct contact and ingestion could harm pollinators. EPA is working with beekeepers, growers, pesticide companies, and others to advance pesticide management practices.

Highlights the importance of avoiding drift. Sometimes, wind can cause pesticides to drift to new areas and can cause bee kills.

The science says that there are many causes for a decline in pollinator health, including pesticide exposure. EPA's new label will help protect pollinators.



Read EPA's new and strengthened label requirements: <http://go.usa.gov/jHH4>

Use Directions Changes



**FOLLOW THESE ADDITIONAL APPLICATION RESTRICTIONS FOR
USE PATTERNS MARKED WITH THE BEE ICON**

NON-AGRICULTURAL PRODUCTS

**Do not apply Temprid SC while bees are foraging. Do not apply Temprid SC to plants that are flowering.
Only apply after all flower petals have fallen off.**

- Then the specific foliar directions have to include the bee icon and a referral statement.
- Subject to substantial misinterpretation by enforcement or PMP legal advisors

What Products are Affected?

- **Neonicotinoids** are a class of neuro-active insecticides chemically similar to nicotine.
- Neonicotinoids act on the central nervous system of insects
- Neonicotinoids cause less toxicity in birds and mammals than insects, compared to the previously used organophosphate and carbamate insecticides.
- Dinotefuran
 - Safari, Alpine
- Imidachlorprin
 - Merit
- Acetamiprid
 - Transport , Assail, Chipco
- Chothianidin
 - Arena
- Thiacloprid
 - Calypso
- Thiamethoxam
 - Helix Xtra and Cruiser

Pest Management Professional – Stewardship

- If applying where bee exposure is possible or blooming plants are close to the application site consider:
 - Apply in cooler temperatures - honey **bees general start foraging above 55°F**. This is not always possible and some products are less effective at cooler temps.
 - Reduce bee attractive blooming plants/weeds in the treated area
 - **Spray when drying conditions are good.**
 - Apply around dusk when bees are less active
 - **Be aware of wind speed and direction** during application to minimize movement onto flowering plants and weeds
 - Communicate with beekeepers in the area if feasible

Know your flowering plants!



Blooms/Foraging bees?



Blooms

Lantana

HOW ARE WE GOING TO GET RID OF OUR VISITORS?

- Bio control
- Cultural/Mechanical
- Nutrient and water management
- Chemical treatments



Do I need to treat?

- Correctly ID the pest or disease that you are dealing with
- With many pest in trees a final diagnosis requires the services of a lab
- Without the correct ID you cannot formulate the best control program for your problem
- What is the cost of an incorrect ID?



What / how am I going to treat?



- Discuss possible options with others
- Consult with university personnel PCA's, manufacturers
- Try and find as host specific of a material as possible
- Look for materials that will have the least environmental impact

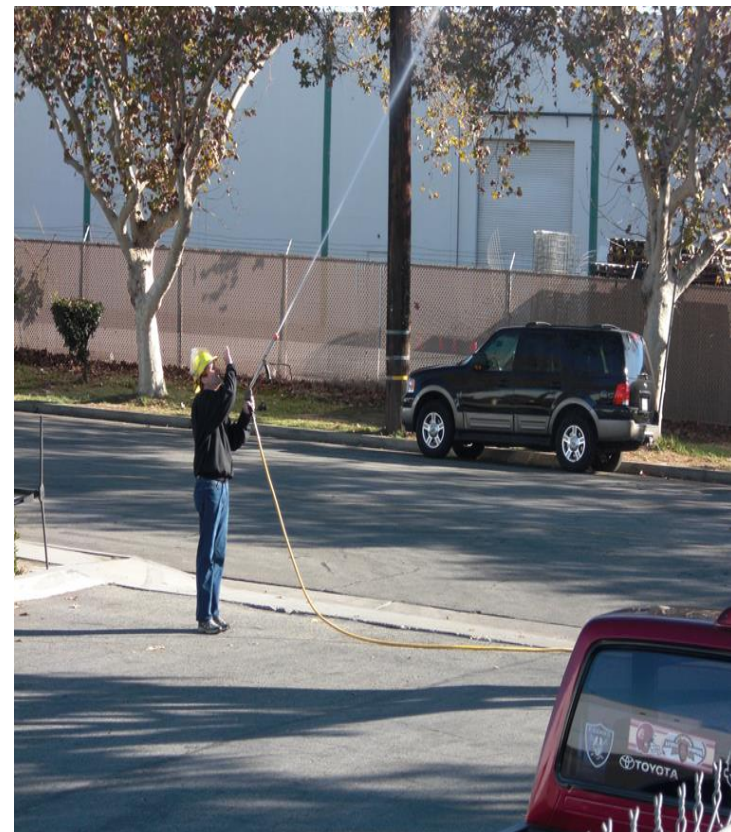
HOW SHALL WE APPLY

Foliar
Drench
Soil injection
Trunk injection
Basal bark spray



Foliar Applications

- Requires power eq.
- High drift potential
- High visibility activity
- Coverage issues
- Bad on most beneficial insect populations
- Restrictions on when work can be done.



Soil Injection / soil drench

- Can be done with power or hand equipment
- Material stays put
- Less environmentally invasive.
- Puts material where needed only
- Not disruptive to



Systemic Soil Injections

- “Action Threshold”
- 12-24 months of control
- Start in February (Trees are blooming earlier)
- Prevent multiple generations (Disease Vectors)
- Pests: Chewing, Piercing, Boring Insects



- Minimal impact on the tree
- Application is rapid
- Minimal impact on beneficial insects
- No off site movement
- Done in close proximity to the public



- Requires drilling
- Injects large amount of chemical
- No off site movement
- Minimal chemical exposure



Pyrethroids as an alternative insecticide
may not be a good choice.



Directions for use changes for outdoor applications

- Requirements for Liquid, Dust, and Ready to Use Formulations products labeled or intended for outdoor residential uses:
 - “Do not water the treated area to the point of run-off.”
 - “Do not make applications during rain.”
- Requirements for Granular Formulations labeled or intended for outdoor residential uses:
 - “Apply this product directly to the lawn or garden area. Water treated area as directed on this label. Do not water to the point of run-off.”
 - “Do not make applications during rain.”



Pyrethroid Label Changes

- Important Definitions:
 - Impervious surfaces
 - means hard surfaces, such as concrete or asphalt streets, sidewalks and driveways



Pyrethroid Label Changes

- Another addition to all the labels is the following:
- Environmental Hazards (addition to the labels):
 - To protect the environment, **do not allow pesticide to enter or run-off into storm drains, drainage ditches, gutters or surface water.**
 - **Applying this product in calm weather when rain is not predicted for the next 24 hours** will help to ensure that wind or rain does not blow or wash pesticide off the treatment area.
 - Rinsing application equipment over the treated area will help avoid run-off to water bodies or drainage systems



Non-Neonic options at a glance...

- Organics
 - Azadirachtin
 - Organic Spray Oil
 - Soaps
 - Neem Oil
 - High Pressure Water
- Systemics
 - ~~Imidacloprid~~
 - ~~Dinotefuran~~
 - Emamectin benzoate-mites
 - Abamectin-Mites, Aphids, Thrips and Whiteflies.

- ## Contact (Inorganic)
- Organophosphate
 - ~~Cyfluthrin~~
Tempo
 - ~~Bifenthrin~~
 - Acephate



Non-Neonic option

ACE-JET

*Systemic Insecticide
for Micro-Infusion®*

Micro-Injectable and Micro-Infusible Insecticide for use with the Arborjet Injection Systems in the Management of Specific Insect Pests of Trees and Landscape Ornamentals including Conifers, Christmas Tree and Deciduous Tree Farms, Seed Orchards and Plantations, and Forest Trees.

ACTIVE INGREDIENT:

Acephate

[O,S-Dimethyl Acetyl Phosphoramidothioate].....97.4%

OTHER INGREDIENTS.....2.6%

TOTAL.....100.0%

EPA Reg. No. 74578-2 • EPA Est. No. 74578-MA-001

Net Contents: 20 Packets at 0.529 oz. (15 grams) each

**KEEP OUT OF REACH OF CHILDREN
CAUTION**

STOP - READ THE ENTIRE LABEL BEFORE USE.

AVISO Precaución al usuario: Si usted no puede leer o entender inglés, no use este producto hasta que la etiqueta le haya sido explicada ampliamente. **To the user:** If you cannot read or understand English, do not use this product until the label has been fully explained to you.

Manufactured for: ARBORJET INC.: 866-ARBORJET (866-272-6758) 99 Blueberry Hill Road, Woburn, MA 01801

Non-Neonic options

BOXER™ Insecticide-Miticide

Injected insecticide for two-year control of listed insect and mite pests in deciduous and coniferous trees and palm trees.

ACTIVE INGREDIENT:

Emamectin Benzoate
(CAS No. 155569-91-8) 4%

OTHER INGREDIENTS 96%

Total 100%

Contains 0.36 lb Emamectin per gallon

Net Contents: 4 fl oz (120 ml)

Net Contents: 1 qt 2 fl oz (1000 ml)



Non-Neonic option



Tempo[®]
SC ULTRA

INSECTICIDE

ACTIVE INGREDIENT: β - Cyfluthrin,
Cyano(4-fluoro-3-phenoxyphenyl)methyl
3-(2,2-dichloroethenyl)-2,2-dimethyl-cyclopropanecarboxylate 11.8%

OTHER INGREDIENTS: 88.2%

TOTAL: 100.0%

Contains 1 lb cyano(4-fluoro-3-phenoxyphenyl)methyl
3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate per gallon.

EPA Reg. No. 432-1363
EPA Est. No. 92564-TX-01

KEEP OUT OF REACH OF CHILDREN
CAUTION

No 'Bee Diamond'!!!

HOW TO APPLY (Also see APPLICATION FOR ORNAMENTAL PESTS)

Apply as a dilute spray just to the point of run-off but do not allow excess run-off. For hard-to-wet foliage such as holly, pine, or ivy, consider adding a spreader-sticker. For best results, spray thoroughly for good coverage including the underside of leaves for pests that feed or rest there.

- Spray plants in bloom at times when **pollinating** insects are not present, such as early morning or late evening.
- Remove any animal feeding dishes prior to treatment.

Avoid contact with treated surfaces until dry.

WHEN TO APPLY

- Apply when pests first appear. Re-apply as needed based on pest infestation.
- Consult your State Cooperative Extension Office for the specific timing in your area.



Non-Neonic option

GROUP 4D INSECTICIDE



Altus™

For insect control in landscape and production ornamental plants, greenhouse vegetables and transplants, fruits, and nut trees. Not for use in residential greenhouses.

ACTIVE INGREDIENT:

Flupyradifurone*17.09%

OTHER INGREDIENTS:82.91%

TOTAL:100.00%

Contains 1.67 pounds Flupyradifurone per gallon

*CAS Number 951659-40-8

EPA Reg. No. 432-1575

**KEEP OUT OF REACH OF CHILDREN
CAUTION**

For MEDICAL and TRANSPORTATION Emergencies ONLY Call 24 Hours A Day 1-800-334-7577
For PRODUCT USE Information Call 1-800-331-2867



Non-Neonic option



Technical sheet

Altus[®] Sprayer Application

Altus provides systemic, broad-spectrum control of sucking pests in greenhouses, nurseries and landscapes:

// Apply to point of runoff

// 7.0 - 10.5 fl oz/100 gal treats aphids, leafhoppers and planthoppers at 7-day minimum application interval

// 10.5 - 14.0 fl oz/100 gal treats whiteflies, scales and thrips at 7-day minimum application interval

// 10.5 - 14.0 fl oz/100 gal treats mealybugs, plant bugs, lace bugs and psyllids at a 10-day minimum application interval

Non-Neonic option

TRIACT[®] 70

GROUP	NC	FUNGICIDE
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GROUP	M	INSECTICIDE
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FUNGICIDE / INSECTICIDE / MITICIDE

SPECIMEN LABEL

FOR INDOOR/OUTDOOR USE ON ORNAMENTAL FLOWERING PLANTS, TREES, SHRUBS, FOLIAGE, VEGETABLES, AND FRUIT GROWN IN; NURSERIES, GREENHOUSES, OTHER COVERED STRUCTURES, INTERIORSCAPES, AND LANDSCAPES.

CONTROLS FUNGAL DISEASES INCLUDING BLACK SPOT, MILDEWS, RUSTS, SCAB AND INSECT/MITE PESTS.

FOR ORGANIC PRODUCTION

ACTIVE INGREDIENT:

Clarified Hydrophobic Extract of Neem Oil 70.0%

OTHER INGREDIENTS: 30.0%

TOTAL: 100.0%

OMRI[®]
Listed

This product contains 5.46 lb. of clarified hydrophobic extract of neem oil per US gallon.

This container will treat up to 0.5 acres when used at the highest application rate (only for containers less than 5 gallons).

EPA Reg. No. 70051-2-59807

EPA Est. 70051-CA-001

Non-Neonic option

How do you extract azadirachtin from neem oil?

- Extraction of oil and azadirachtin from neem seeds was carried out **using n-hexane and ethanol varying extraction time and solvent ratio**
- Azadirachtin. The main component of neem oil, leaves, flowers, and fruits with insecticidal properties is Azadirachtin.
- **Cold Pressed Neem Oil contains azadirachtin**, which is the compound that makes neem oil work. If you're not buying 100% Cold Pressed Neem Oil, you're not buying azadirachtin.



See inside panel for additional precautionary statements and directions for use.



AzaGuardTM

BOTANICAL INSECTICIDE / NEMATICIDE

FOR CONTROLLING AND REPELLING INSECTS

For controlling and repelling insects such as:

aphids
armyworms
beetles
budworms
cutworms
fungus gnats

houseflies
leafhoppers
leafminers
loopers
leafrollers
other caterpillars

mealybugs
mushroom flies
sawflies
scales
thrips
webworms

weevils
whiteflies; and plant
parasitic nematodes such
as burrowing, dagger,
golden and various root
knot nematodes

FIRST AID

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.

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.

Have the product container or label with you when calling a poison

KEEP OUT OF REACH OF CHILDREN CAUTION

ACTIVE INGREDIENT:

Azadirachtin 3.00%
Other Ingredients..... 97.00%
TOTAL..... 100.00%
Contains 0.28 lb (128 grams) of azadirachtin
per gallon

Non-Neonic option

AZATIN[®] 0

BIOLOGICAL INSECTICIDE

SPECIMEN LABEL

INSECT GROWTH REGULATOR

**FOR INDOOR AND OUTDOOR USE ON ORNAMENTALS, TURF (INCLUDING
COMMERCIAL LAWNS), VEGETABLES, AND OTHER HORTICULTURAL CROPS**

ACTIVE INGREDIENT:

Azadirachtin 4.5%

OTHER INGREDIENTS: 95.5%

TOTAL: 100.0%

This product contains 0.39 lbs. (175 g) of azadirachtin per US gallon.



**CAN BE USED IN
ORGANIC PRODUCTION**

EPA Reg. No.: 70051-9-59807

EPA Est. No.: 39578-TX-01

If you have questions or comments regarding the use of
this product, please call 1-800-356-4647.

**KEEP OUT OF REACH OF CHILDREN
CAUTION**

PRECAUTIONARY STATEMENTS

HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION: Avoid contact with skin, eyes or clothing. Harmful
if swallowed or inhaled. Avoid breathing vapors or spray mist.

Application Rates for Whiteflies and Other Key Insect Pests in Greenhouses (Including Lathe and Shade), Nurseries, Mushroom Houses, and Interiorscapes. *(continued)*

Apply **AZATIN O** at the indicated dilution rate per 100 gallons of water. Use 1 – 2 gallons of spray solution per 1,000 square feet to ensure adequate plant coverage.

Pests controlled by AZATIN O	Rate of AZATIN O per 100 gallons of water	Remarks
Whiteflies, including: Greenhouse Whitefly, Silverleaf Whitefly, and Sweetpotato Whitefly	6 – 16 fl. oz.	Foliar application against nymphs. Spray should be directed to undersides of leaves.
Others, such as: Leafhoppers, Sawflies	10 – 16 fl. oz.	For foliar application against larvae or nymphs. For leaf- hoppers, spray should be directed to undersides of leaves.



Spray Oil Emulsion Fungicide, Insecticide and Miticide

TriTek™

OMRI
Listed

See inside booklet for
complete Precautionary
Statements and
Directions For Use.
EPA Reg. No. 48813-1
EPA Est. No. 48813-IL-1

CAUTION: KEEP OUT OF REACH OF CHILDREN

2011-02

NET CONTENTS: 2.5 GAL. (9.46 L)

Active Ingredient	
Mineral Oil*	80.0%
Other Ingredients	
	20.0%
Total	100.0%
*Contains petroleum distillates	
Un sulfonated Residue of Mineral Oil	92.0%

Manufactured By:
Brandt Consolidated, Inc.
2935 South Koke Mill Road
Springfield, Illinois 62711 USA
www.brandt.co
800.300.6559

FOR ORGANIC PRODUCTION

BRANDT

OMRI Herbicides vs Insecticide Active Ingredients

- OMRI Herbicides
 - Avenger (d-limonene or Citrus Oil) – Burn down only
 - WeedZap (Clove Oil & Cinnamon Oil) – Burn down only
 - Corn Gluten – Pre Emergent (Don't waste your \$\$\$!!!)
 - Fiesta – Iron HEDTA
 - Finalsan – (Warning-Ammoniated soap of fatty acids)
- Fireworxx (Capric & Caprylic Acid)
- Suppress EC (Capric & Caprylic Acid)



essentria™

IC³

INSECTICIDE CONCENTRATE

Kills: Crawling and Flying Insect Pests



Safe and Effective*

Quick Control with residual protection

**Multi-purpose: for indoor, outdoor, fogging, turf and ornamental,
on animal and mosquito misting applications**

Contains natural essential plant oils with fresh scent

ACTIVE INGREDIENTS:

Rosemary Oil	10.00%
Geraniol	5.00%
Peppermint Oil	2.00%

OTHER INGREDIENTS:

Oil of Wintergreen, White Mineral Oil, Vanillin, Polyglyceryl Oleate	83.00%
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TOTAL: 100.0%

Need help?

Questions?



Thank you!

Eric Carlson

Target Specialty Products

San Jose, CA

QAL, PCA, & ISA Arborist

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- 1) Salinity build can change soil structure and reduce soil to plant nutrient exchange (True or false)
- 2) Pre-emergent herbicides are only available in liquid form (True or False)
- 3) Organic or OMRI certified insecticides are often systemic (True or False)
- 4) Neonicotinoids have significant application restrictions to protect pollinators (True or False)
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