Growth Regulators and Hormones used on Bermuda Grass Turf

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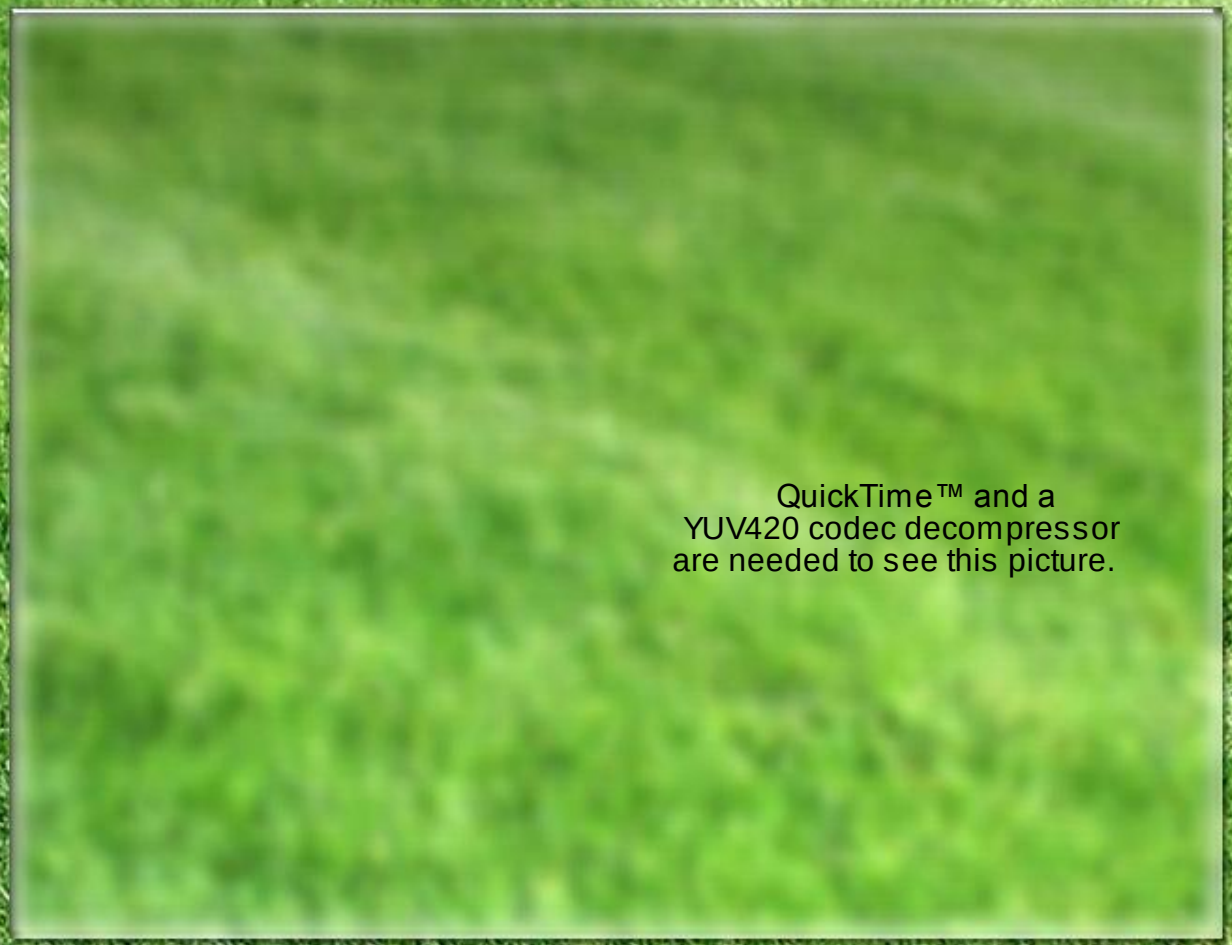
Del Mar Turf Track

Horse Racing

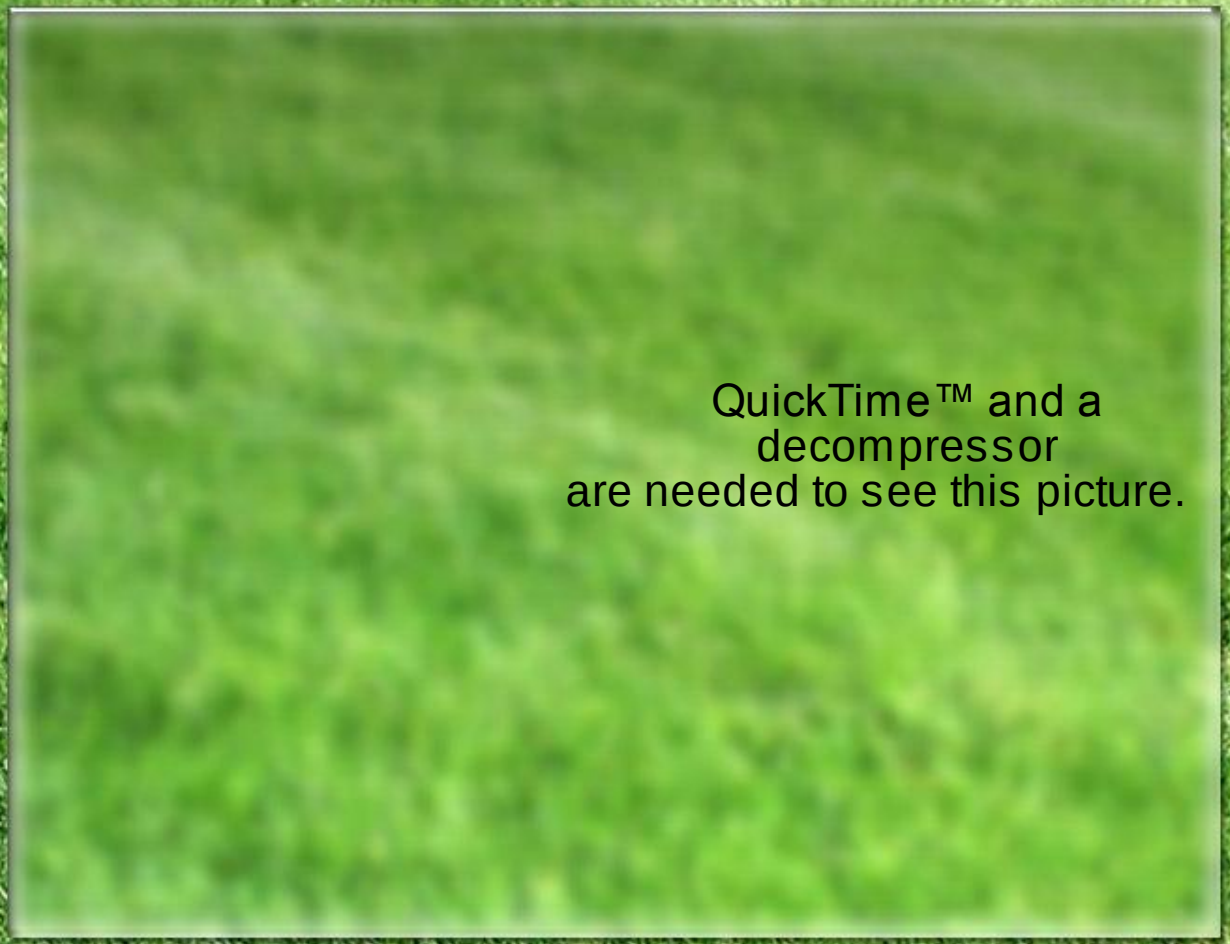


Horse Racing

- The most dangerous sport
- Injuries happen

Del Mar Horse Park

Jumping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Plant Growth Regulators

- PGR's are placed into groups based on their biological mode of action, that is; the activity inside the plant that causes the regulation of growth
- May be synthetic compounds that mimic natural plant hormones, or they may be natural compounds that were extracted from plant tissue
- Effecting flowering, aging, root growth, distortion and killing of leaves, prevention or promotion of stem elongation, color enhancement of fruit, prevention of leafing or leaf fall and many other conditions
- Very small concentrations of these substances produce major growth changes

Hormones

Chemicals produced naturally by the plant. Each cell is capable of producing hormones

- Shape of the plant
- Seed growth
- Flowering
- Sex of flowers
- Senescence
- leaf & stem growth
- Fruiting

Five Primary Groups

These represent the five primary groups of plant growth regulating compounds. For the most part each group contains natural and synthetic substances.

- **Abscisic Acid:** Functions to close stomates and inhibit germination. Induces dormancy and prevents seeds from germinating
- **Auxin:** Apical dominance, cell enlargement, root growth and inhibits axillary buds at leaf nodes
- **Cytokinins:** Cell division and enlargement, flowering (Seed Head suppression) senescence and inhinits auxins
- **Ethylene:** Stimulates stress and root growth
- **Gibberellins:** Controls cell elongation, photoperiod response and chilling tolerance

Growth Regulators and Hormones

Growth Regulators and Hormones are used to enhance quality of turf.

Late Gibberellic Acid Synthesis blocker:

- Suppresses growth but does not stop it by targeting the part of the plant which inhibits vertical growth
- Interferes with the biosynthesis of GA and occurs late in the biosynthetic pathway preventing the conversion of GA20 to GA1
- Example: Trinexapacethyl Primo

Growth Regulators Enhance Quality

Early GC Synthesis blocker:

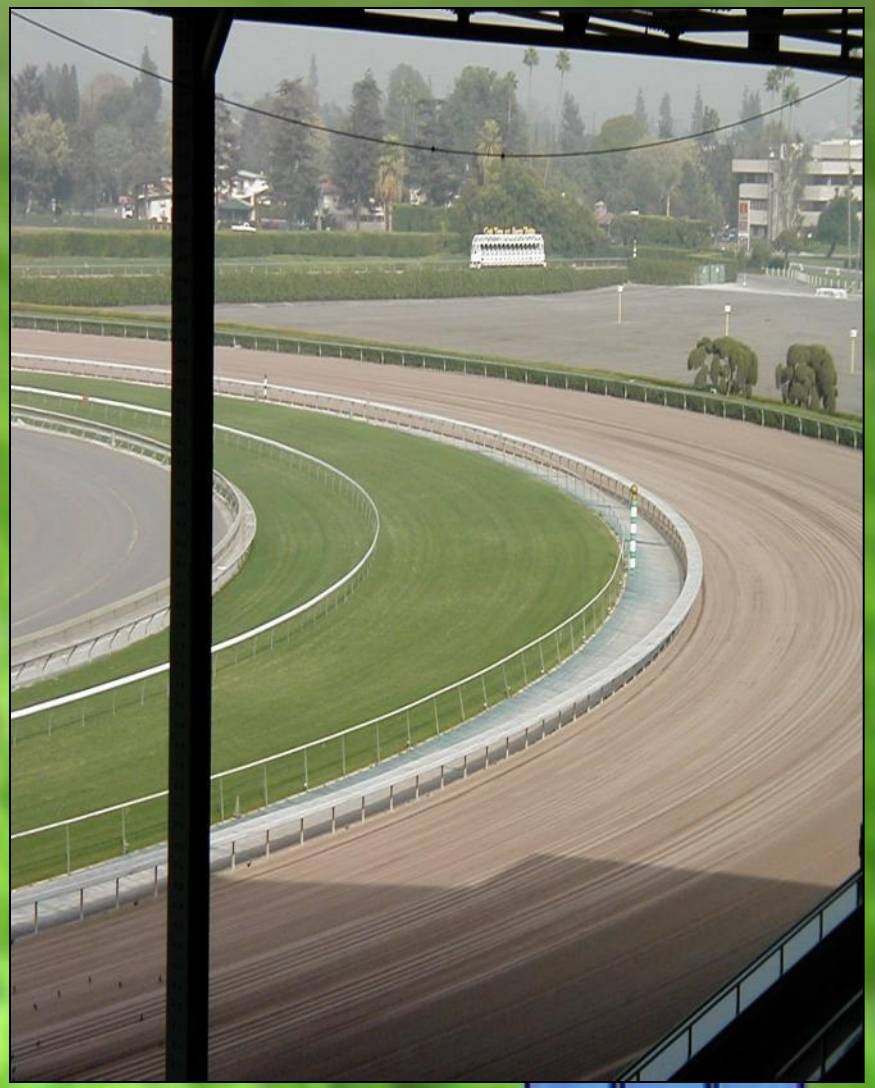
- **Interferes with the Biosynthesis of GA early in the biosynthetic pathway which completely stops the production of GA.**
- **Early GA synthesis blockers are root absorbed which means irrigation or rainfall are important to incorporate the products**

- **Example: Paclobutrazol Atrimmec & Flurprimidol Cutless**

Growth Regulators Enhance Quality

Mitotic inhibitors :

- **inhibit the division and differentiation of cells in the meristematic regions of plants by slowing the metabolism of Cytokinins.**
- **They are foliar absorbed and inhibit both foliage growth and seed head development.**
- **Example: Mefluidide (Embark) for seed head suppression**



Growth Regulators Enhance Quality

Herbicidal; compounds that possess post-emergent herbicidal activity that have also been shown to inhibit growth and development by the interruption of the synthesis of Amino Acids. These compounds have an extremely narrow margin of safety and misapplications can cause severe injury or death

- **Examples:** Glyphosate (Round-Up) kills plants by inhibiting a specific enzyme that plants need to grow

Ethylene Production Enhancers

Promote the production of Ethylene which is a regulatory hormone that restricts plant growth.

Ethylene restricts the elongation of stems, roots and leaves.

- **Example:** Ethephon (Proxy), absorbed by the foliage for suppression of seed heads

What do you want from a Plant Growth Regulator?

Research over the past few years has revealed other benefits apart from growth regulation

- Reduction in Mowing
- Reduced Edging time
- Better Turf Color
- Better Rooting
- Shade Tolerance
- Drought Tolerance
- Cold Tolerance
- Reduced Watering
- Better Disease Control
- Over seeding
- Higher mowing
- Divot Recovery
- Improved Ball Lie
- Traffic Recovery
- Turf Paint Residual-lines and markings
- Increased density more plants per square inch
- Pre-stress conditioning, prepare turf for extreme conditions

Increase Rooting

Wear Tolerance

160 Races

Trinexapac-ethyl

A must have for Bermuda, going without is not an option!!!!

Turf Type	Residential	Fairway	Greens	Racing
Common Bermudagrass	0.75	0.25	----------	
Bermudagrass, Tifdwarf	0.20	0.20	0.062	
Bermudagrass, Tifgreen	0.25	0.20	0.125	
Bermudagrass, Tifway	0.38	0.25	----------	
Bermudagrass, GN-1 & Santa Ana Horse Racing & Jumping				.08 - .25 oz per 1000

Typical Warm Season Growth

Regulator Mixes

Trinexepc ethyl during active during growth period?

- Alfalfa and Worm casting Tea
- Apple cider vinegar at 1 gallon per acre
- Calcium or Potassium phoshite at 1 % – 2% by volume
- Silicon at 1% - 2% by volume
- N,K, Fe & Mn as needed
- Hormone Biostimulant:
  - Choose a biostimulant that contains low levels of gibberellic acid. GB can consume the turfs carbohydrates and promote excessive top growth at the expense of rooting and root mass

Growth Stimulation

- **Gibberellic acid:** In Bermuda used to maintain growth and prevent color change during periods of cold stress. Supply Bermuda grass with an additional source of naturally occurring gibberellins

Fall Bermuda Stimulation Mixes

- Potassium nitrate
- Chelated Iron
- Phosphite
- Silicon
- Alfalfa and Worm Casting Tea
- Apple cider vinegar
- Gibberellic Acid?

Alfalfa Tea

Claims and Benefits from Tricontanol a compound that has been called the most powerful growth hormone ever used on plants

- Early breaking of dormancy
- Doubling of weight of plants in one year
- Increased root growth
- Stimulation of mycorrizae and possible inhibition of pathenogenic organisms
- Improved growth with increased number, thickness and color of leaves
  - Be careful not to apply to much keep the rate within 2 gallons of tea per acre, over application can do more harm than good

Worm Castings

Benefits and Claims

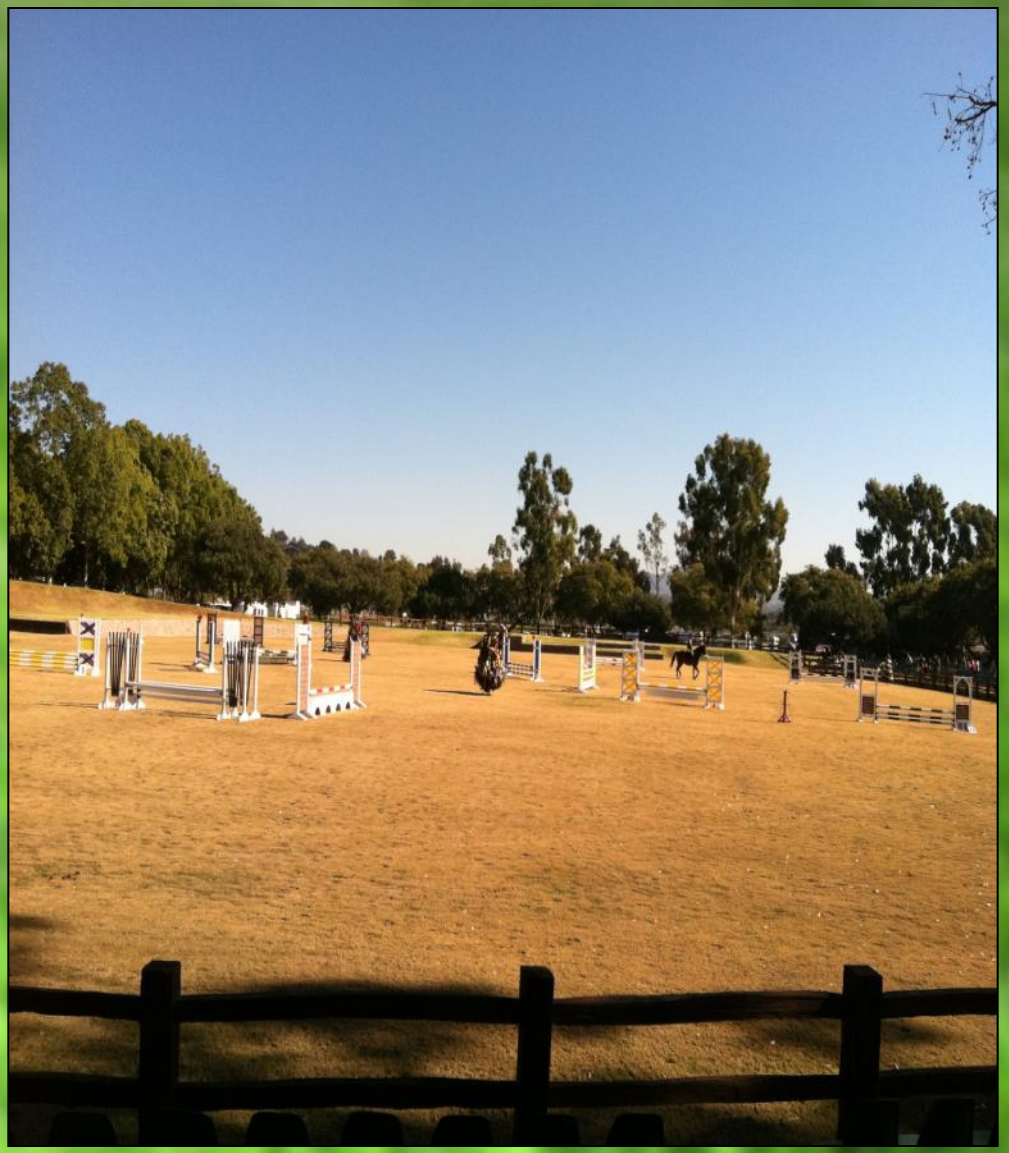
- Growth enhancing compounds
- Provides the plant with soluble plant nutrients that are not lost during rain or irrigation
- Consortium of microbial life delivering a on -going food source where bacteria and fungi feed on the organic matter

Mixing Tea for Turf

- 24 hours before application add 1 gallon of worm castings to a triple layer of paint strainers and place in 5 gallon bucket filled with water ; like a tea bag
- 24 hours before application add 1 gallon of alfalfa pellets to a triple layer paint strainers and place in 5 gallon bucket filled with water
- Add 5 gallons each of the alfalfa and worm castings tea per acre of spray volume
- Use at least 100 gallon per acre rate of water using large nozzles such as a 8008 to avoid clogging.
- Use mash produced from the tea as a topdressing for landscape plants
- All alfalfa is not created equal** use caution

Dormant Santa Ana Bermuda

- Low temperature 30 degrees
- Standard dry fertility application only



GN-1 Bermuda

- Low Temperature 30 degrees
- Alfalfa and worm casting tea, Gibberellic acid, Calcium phosphite, Silicon, Iron and Potassium nitrate

Thank you for your time

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