



Drought Management

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Regardless of one's personal feelings about the science and significance of climate change on a global scale, temperature and precipitation changes in New England are well documented:

- Higher average temperatures and extended growing seasons
- More of our annual precipitation is coming during the winter months, with less coming during the summer growing season when plants' water needs are at their peak.
- Summer rainfall trends include an increase in "heavy precipitation events" – That means more of the rainfall is delivered in high intensity deluges, which tend to run off rather than absorbing into root zones.

While overall our region is trending towards stable or slightly increasing levels of annual precipitation, the occurrence of extended dry periods during the peak growing season is creating a challenge for green industry managers – farmers, landscape managers, golf course superintendents, foresters – and arborists.

With the increasing prevalence of seasonal water bans, it is also creating a challenge for homeowners who want lush grass, trees and shrubs. For those of us who work with plants every day, the cumulative effect of drought on woody plants becomes more obvious with every passing season:

- Reduced growth and vigor –particularly in new landscape installations or areas where soil volume and quality are already an issue
- Proliferation of secondary insect and disease pests
- Increased mortality of our "senior citizen" trees

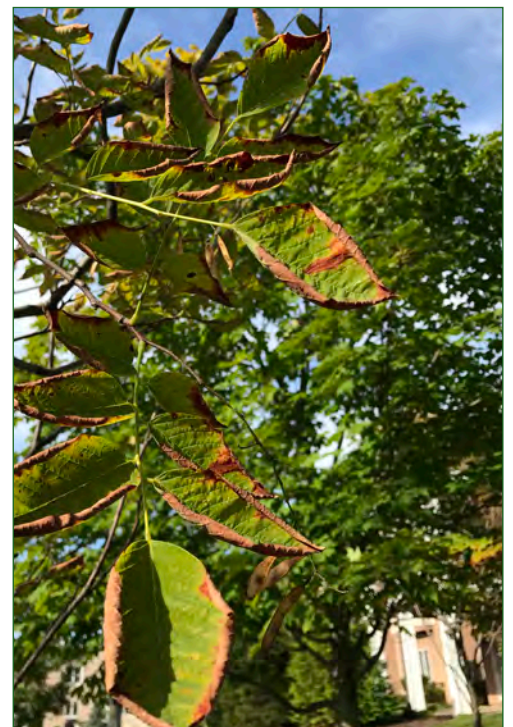
Hygroscopic Humectants

Hydretain is an organic, biodegradable soil additive that increases the soil moisture absorption and retention capacity of soils. It also has the ability to extract water vapor from the air, holding it in place for plant roots to absorb. These qualities make it ideal for many of our client's soil types, and one application can potentially provide 3 months of increased soil moisture retention and availability. This product has been used on golf courses and in crop settings for a number of years, and we feel that it has a great application for tree preservation as well. We will be applying this product in conjunction with an organic bio-stimulant fertilizer, in both liquid and granular formulations.

Please review the attached fact sheet, and contact our office if you are concerned about your trees!



Chronic dry spells kill roots weakening plants and inviting disease.



Marginal leaf scorch signals extreme moisture stress.

How Hydretain® Works

ROOT ZONE MOISTURE MANAGER

Hydretain is a totally unique concept in root zone moisture management that effectively reduces the overall watering requirements of plants, shrubs, trees, turf and agriculture by as much as 50% or more. Hydretain is not another wetting agent, surfactant or super absorbent polymer crystal. It is actually 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.

Material/Function

Hydretain is a unique liquid formula containing a group of synergistic organic derivatives. In combination these derivatives create a sub-surface film which absorbs and stores moisture as microscopic droplets on plant roots and soil particle surfaces. Hydretain continually draws additional moisture through the soil to the root zone where it is needed most in the plant-soil system. The end result is increased effectiveness of watering, light rainfall, dew and even humidity in retaining significant moisture levels in the soil of containerized plants as well as flower and shrubbery beds. The times between watering of indoor and outdoor plants can thus be significantly extended.



How Hydretain Works

We must first examine how Hydretain affects moisture movement and availability within the plant-soil system. Regardless of whether plants are grown in the ground or in containers, moisture is constantly being drawn up through the soil by capillary action and vaporized into the air (V1). Moisture is also extracted from the soil by plant roots, transported up the stem and transpired into the air through the leaf stomata (V2). Moisture loss from both the plant and the soil is accelerated by temperature, wind, and rate of growth.

Hydretain Works Two Ways

First of all, Hydretain slows the evaporative loss of moisture from the soil by attracting moisture (Hygroscopic) and holding this moisture (Humectant) within the soil particles. Second, as a result of reduced evaporation, the lateral movement of moisture into the vicinity of the root zone is dramatically improved. This moisture is then held within the Hydretain film, readily available to the root system.

The water component of this film, which is in contact with the root cells, is then absorbed into the plant through the process of osmosis, a process which occurs in living cells. With osmosis, water moves through cell membranes from a dilute solution into a concentrated one. Fluid in plant cells is normally more concentrated than in soil solutions surrounding them. Moisture tends to move from a relatively weak Hydretain solution through the semi-permeable membranes into the root cells.

Hydretain Stays in the Soil

Because Hydretain is composed of large complex molecules it cannot pass through the plant cell membranes into the plant roots. However, water molecules, being much smaller, are able to move into the plant roots from the surrounding film of dilute Hydretain. As the water moves into the plant the Hydretain component remains in place continually seeking additional moisture.

Hydretain Is Eco-Friendly

Hydretain is biodegradable and contains no derivatives of any petrochemicals, phosphates, or other toxic fractions that may cause groundwater or runoff contamination.

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Moisture Manager

Manages Soil Moisture to Reduce Watering Requirements

Applications

- **Golf Courses**
- **Athletic Fields**
- **Grounds Maintenance**
- **Greenhouses**
- **Landscaped Areas**
- **Nurseries**
- **Tree Care**
- **Shrubs**
- **Sodding**
- **Seeding**
- **Established Turfgrass**

Description:

Moisture Manager is a unique liquid blend of patented hygroscopic and humectant, combined with an advanced, naturally derived, non-ionic wetting agent for improved penetration and performance.

- *Drenched into the soil around all types of turf, trees, shrubs and bedding plants, Moisture Manager forms a subsurface film which attracts and stores moisture as microscopic droplets on plant roots and soil particle surfaces. These droplets are drawn into plant roots while the Moisture Manager remains in place extracting additional moisture from humidity within the soil. Moisture Manager converts otherwise unavailable soil moisture, into plant usable water droplets.*
- *Moisture Manager reduces overall watering while eliminating or minimizing plant wilt cycles and drought stress.*

Reduce Watering • Maximize Production • Minimize Drought Stress

Moisture Manager is a proprietary blend of patented soil moisture management technology and an advanced naturally derived soil surfactant. 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, Moisture Manager works to provide the proper soil moisture needed to maximize the effectiveness of most plant production and maintenance products.

Benefits

- Reduce Watering up to 50%
- Control or Eliminate Dry Spots
- Minimize Hand Watering
- Maximize Nutrient and Biostimulant Efficiency
- Improve Seed Germination
- Minimize Transplant Loss
- Drought Protection

Where to Use

New Plantings:

- Transplant establishment of bedding plants, shrubs, trees
- Installation of sod, sprigging, seeding, hydroseeding, overseeding

Turf Maintenance:

- Dry spot control (Especially for dry spots not cured with simple wetting agents)
- Commercial & residential landscapes to reduce water bills
- Golf course greens, tees and fairways to manage watering schedules
- Athletic fields to manage watering schedules

Greenhouse:

- Control dry areas and even up growth across benches
- As a post harvest drench to increase retail shelf life of plants

While Moisture Manager is effective in all types of soil and soilless mixes the most dramatic results are noted on sandy and well drained areas.

Composition: 50% Humectants (sugar alcohols-polysaccharides – neutral salts of alpha-hydroxypropionic acid), 15% non-ionic surfactant.

#084853 1 gal.	#084854 4 x 1 gal.	#084855 2.5 gal.	#084856 2 x 2.5 gal.
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Moisture Manager

Manages Soil Moisture to Reduce Watering Requirements

Application Information

Moisture Manager is only beneficial when within the root zone and therefore must be watered in thoroughly after application. Moisture Manager is biodegradable – reapply every 3 months or as needed.

Dilution: Moisture Manager is a concentrated formula designed for large scale applications. Dilute with water before applying. Minimum dilution rate 15:1 (water to Moisture Manager). Moisture Manager may be tank mixed or applied through injections and fertigation systems.

Turf: General Application Rate – Apply 9 oz. of Moisture Manager per 1,000 sq. ft. (3 gallons per acre) by spray or drench once every 3 months or maintain monthly at 1/3 rate after initial full rate application. For best results apply to moist soil. Water in with at least 1/10 inch of water within the first couple of hours to insure Moisture Manager is washed off foliage and into the soil. Within 24 hours, follow with enough additional water to carry Moisture Manager down to and throughout the root zone. (The amount of additional water required to carry Moisture Manager throughout the root zone is dependant on the depth of the root zone of the treated area.) Additional Moisture Manager may be required to correct difficult and extreme dry spot areas.

Overseeding, Sodding, Sprigging

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

Trees, Shrubs & Individual Plants

Dilute Moisture Manager 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 1 to 2 ounces of concentrate for each 1/4 inch of trunk diameter. Dilution rate is variable from 50:1 up to 300:1.

Potted or Containerized Plants

Dilute Moisture Manager 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 Moisture Manager as possible. Moisture Manager may be applied through existing injectors at rates between 50:1 and 100:1. Higher dilution rates may be used and will require multiple applications to achieve desired results.

Large Planters & Gardens

Dilute Moisture Manager 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 approximately 4,000 square feet.

For Best Results

Water thoroughly when re-watering Moisture Manager treated plants. Proper fertilization will enhance Moisture Manager's effectiveness.

Moisture Manager is biodegradable. For maximum effectiveness reapply every three months or when required watering becomes more frequent. Reapply if a reduction in watering is not apparent within the first two weeks.

Caution: If Moisture Manager is applied to open flower blooms, rinse with plain water to reduce possibility of the Moisture Manager pulling moisture from sensitive flower petals.

Moisture Manager is manufactured in the United States under one or more U.S. Patents, and is available exclusively at all John Deere Landscape locations.

