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Water Grip™ Growing Media Product Datasheet/Evaluation

Water Grip™ Growing Media product from Ez Care has multiple uses green roofs, landscaping and is suited for living wall applications. The product name "Brownie" refers to the fact that the media is a structured product which can be formed in a way to resemble a sheet of baked brownies. This patented growing media combines traditional organic mix ingredients such as bark, and coconut coir with proprietary ingredients. The sponge-like hydrophilic medium has a stabilized macro/micro pore structure with superior capillary action and has superior water holding capacity and porosity. The medium does not breakdown upon saturation and exhibits only minute compaction (e.g. snow load on green roofs) after long periods of use. The medium contains beneficial properties that promote plant growth. This is based on more than 8 years of testing in harsh winter conditions. We estimate a product life of more than 15 years.

Testing for water holding capacity of the Water Grip growing media began in November 2011 at the University of Massachusetts, Amherst. The initial tests to determine water holding capacity of Water Grip “brownie” growing media were performed in the agronomy group’s chemistry analysis laboratory in Bowditch Hall by Sarah Weis, Ph.D., for the Center for Agriculture.

Samples of the initial Water Grip Brownie were evaluated for maximum and drained water holding capacity as a percent of the dry brownie weight. Air dry samples of Water Grip media were weighed and then saturated with water excluding most air from the Water Grip media then reweighed to determine saturated weight. Samples were then allowed to drain until water stopped dripping and were reweighed to determine the water holding capacity akin to field capacity in soil.

Multiple samples had maximum saturation ranged from 581% to 799% and drained weight of 518% to 600%. Given a depth of 2.5 inches for the dry Water Grip growing media then the air dry media would absorb 1.76 to 2.27 inches of rainfall or on average almost 1.10 to 1.41 gallons per square foot and 5.48 to 7.07 gallons per cubic foot.

A second test for water holding capacity was conducted using inverted bottomless bell jars in a comparison with two common green roof media labeled in Figure 1 below as Roof Mix A and Roof Mix B. These commercial green roof materials both contained Norlite an expanded shale and other organic and inorganic materials. WaterGrip brownie media (WGs) cut to shape was place in the jar to the same depth as the comparison mixes. All mixes were initially dry. Four liters of water was slowly added to the top of each jar. The drainage water was again slowly poured into each jar and then the amount draining through each was measured and the amount retained calculated as the difference. Roof Mix A retained 1 liter of the 4 liters added. Roof Mix B retained 1.4 liters while the Water Grip (WGs) media retained 3.4 liters. This test has been repeated with similar results.

The results from these tests coupled with the lab determination of water holding capacity clearly demonstrate the superior water holding capacity of the Water Grip growing media and demonstrate the benefit over alternative roof mixes. A further test of the benefit of Water Grip growing media for

green roof installation is shown in Figure 2. In this test the Water Grip media (Brownie) on the right was planted with sedum the same day as the conventional green roof mix was planted on the left. Not only has the Water Grip media shown greater growth but the weight of the box with the Water Grip Brownies (wet) is much less (1/2 to 1/3) of that of the conventional Norlite based mix.

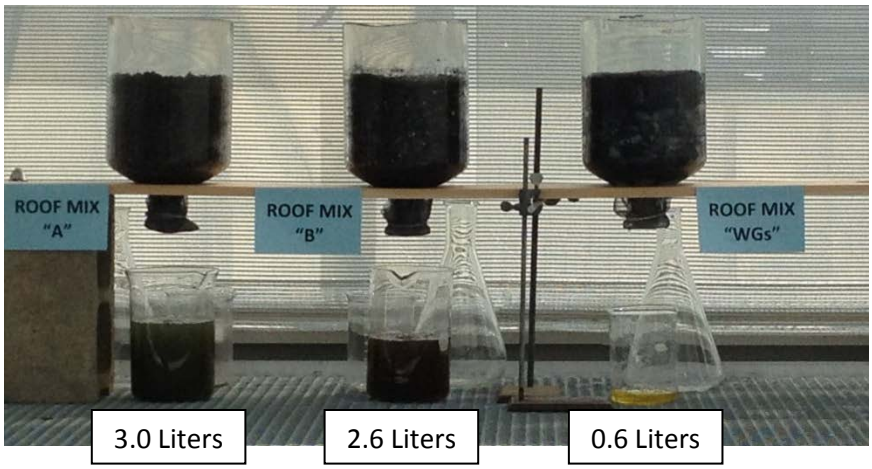

Figure 1. Two common green roof media (A and B) and Water Grip media test with 4 liters of water added to the top and amount of drainage water collected below shown in text boxes.

Figure 2. Comparison of two green roof materials planted the same day with plugs, conventional Norlite roof mix left, and Water Grip Brownies right box (October 2012).

Greater water holding capacity is a desirable characteristic of the Water Grip growing media as this will aid in controlling storm water runoff from roofs and will benefit plant material as higher water storage will help plants survive between rain events especially during dry periods. An estimate of water storage capacity of partly wet Water Grip (20% full capacity) would be more than 800 to 1,130 gal. per 1,000 sq. ft. up to almost 50,000 gal. per acre. This stored water would reduce the need for irrigation from public sources as well as the time and labor involved. The Water Grip Brownie should not be allowed to completely dry as it will shrink. However, it will readily rewet with rain or irrigation. The state of dryness can be deceiving because the surface of the brownie may appear dry but below the surface it can be wet. Water Grip contains coconut coir and has water holding capacity exceeding other coir and peat products and inherit growth promoting properties not found to the same extent in other growing media products. The Water Grip Brownie media at or near saturation would weigh 9.1 to 11.8 lbs per square foot. Dry the Water Grip Brownie media averaged 1.7 to 1.9 lbs per square foot whereas dry Norlite-based media weighed 10^{+} lbs per square foot with a depth of 2.5 inches. Besides the favorable lighter weight of the Water Grip Brownie it also provides some insulating advantage to the roof. The Water Grip Brownie was not frozen solid until a long period of very cold days while other Norlite-based materials were frozen as soon as freezing conditions occurred.

Measurements were also to the pH and electrical conductivity of Water Grip-water slurries. When measuring soil pH, it is conventional to use a 1:1 (weight:weight) soil:water ratio. This does not work for Water Grip as the water holding capacity is so high in that a 1:1 Water Grip:water the Water Grip media is barely wetted. Instead a weight:weight ratio of 1 Water Grip:9 water was used. Because the Water Grip does not really make a slurry three methods were devised to help keep the water and Water Grip in a slurry similar to that of soil-water slurries for pH measurement. First, some of the Water Grip was broken into small pieces by hand or ground briefly in a coffee mill. Figure 1 depicts the three Water Grip phases. Secondly, the slurries were incubated with containers of water on top of them to keep the Water Grip in good contact with the water (Figure 2). Thirdly, the slurries were left for either 1.5 or 3.0 hours before being vacuum-filtered through Whatman #41 filter paper. Both pH and electrical conductivity (EC) were measured on the filtrate. Because the EC of the Water Grip incubated as whole pieces had a very low EC, a third piece of Water Grip was incubated for almost two days before vacuum filtration. Table 1 shows pH and EC of the samples. The pH of the Water Grip can be manipulated in the manufacturing process so low and high pH values are possible.

Figure 1. Water Grip: left to right, coffee milled, broken, or a whole sample.

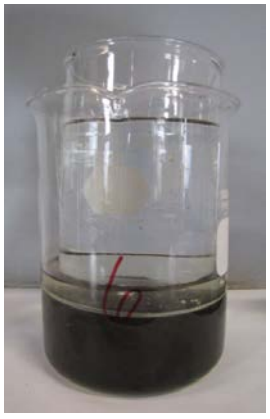

Figure 2. Whole Water Grip incubated in water for pH measurement. A beaker of water keeps the piece of Water Grip under water.

Table 1. Water Grip pH and electrical conductivity by form and incubation time.

WaterGrip form	Hours incubated	pH	EC[z]	Water Grip dimensions (inches)
Coffee milled	1.5	6.2	0.65	N/A
Coffee milled	3.0	6.1	0.70	N/A
Broken bits	1.5	6.3	0.58	N/A
Broken bits	3.0	6.3	0.62	N/A
Whole	1.5	6.6	<0.10	3 x 2.5 x1.25
Whole	3.0	6.4	<0.10	3 x 2.5 x 1.25
Whole	46.2	6.6	0.55	2.5 x 2.5 x 1

[z] EC is electrical conductivity in millimhos per centimeter.

Tomato plants were grown in the fall in various potting mixes containing Water Grip with leaf compost and coarse sand or in mixes containing Promix® with similar proportions of leaf compost and coarse sand (Figure 3). Five percent of carbonized biomass was added to each mix as a constant

across all mixes for Water Grip and Promix. The above ground plant materials (leaf, stem and fruit) were harvested when fruit in water Grip mixes were in a small green state on December 18, 2012.

Significant increases in plant growth, branching and leaf area development, and fruiting were shown for the Water Grip mixes over the Promix mixes (Figure 3). There were 5 replications of each treatment mix and the interaction between media type and proportion of media in the mix was significant ($P<0.05$). Total tomato biomass was increased with greater proportions of Water Grip or Promix in the mixes. For Water Grip there was no further increase in fruit produced above 40% Water Grip whereas 50% of Promix resulted in the most fruit growth with the Promix media mix.

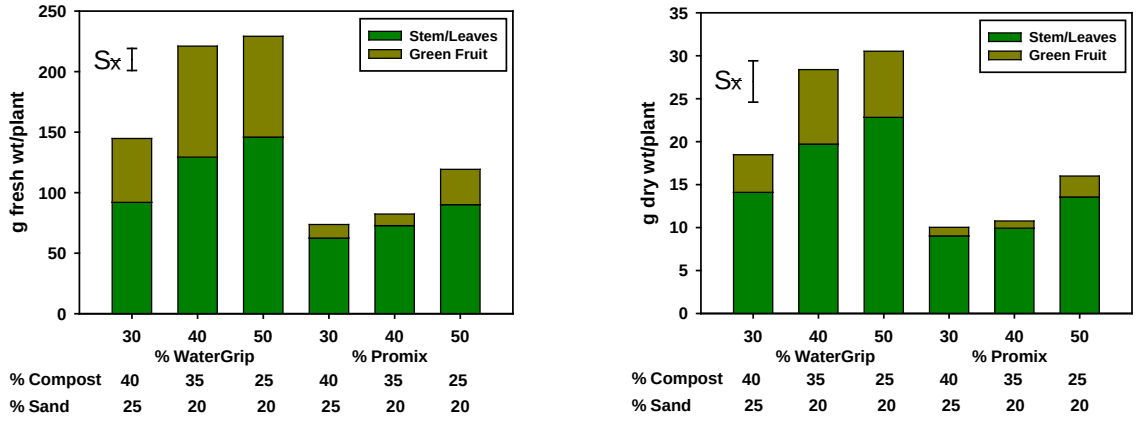

Figure 3. Tomato Growth Study – University of Massachusetts, Amherst transplanted mid-October 2012 and harvested December 18, 2012. Results are an average of 5 replications per treatment. The interaction was significant ($P<0.05$).

The growth promoting aspects of Water Grip over other growing media like Promix have also been shown in early seedling stages of many crops. This is shown below for tomato and other seedlings with a 50/50 mix of Water Grip and Promix verses Promix media alone (Figure 4A) and for cucumber seeded directly into Water Grip verses the Promix media (Figure 4B).

A

Promix

50% WG
50% Promix

B

Promix

Water
Grip

Figure 4A. Seedlings started in Promix and a 50/50 mix of Water Grip and Promix, and 4B. Cucumber seeded into Promix and Water Grip in a 2012 UMass Study

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