



Eclipse Soil Products: Technical Basis for their Efficacy in Water Savings

Eclipse Soil's core business is to produce high quality long lasting mulches and soil products which can reduce irrigation requirements by up to 50% compared with Bassendean sands.

The technical background which supports the way in which we have derived our ingredient blends are set out below.

1. Soils are classified with reference to their dominant particle size, also referred to as soil texture.
2. In the simplest analysis 3 textural classes are recognised:
 - Sands – are coarse grained soils with particle size between 50µm (0.05mm) to 2mm,
 - Clays are very fine grained soils with particle size less than 2µm (.002mm)
 - Silts are intermediate grained soils with particle size between clay and sand i.e. 2µm (0.002mm) to 50µm (0.05mm).
3. In nature we do not always find soils match either of these general textural classes as there are mixtures of particle size, so;
 - Loam soils are a mixture of a small amount of clay, and approximately even amounts of silt and sand,
 - Sandy clays are clay soils with some sand mixed in
 - Sandy loams are loams which have a higher proportion of sand than straight loam.

There are many intermediate textural classes described in this way.

4. The variations in textural classes of soils cause variations in the physical properties (and geo-chemical properties) of soils.
5. In land use planning and management, these varying physical (and geochemical) properties of soils need to be taken into account to produce the operational and productive outcomes which are desired because:
 - clays are very fine grained and the resultant small inter-particle spaces create very low infiltration rates for water, so they make good materials to build dams as leakage is very low
 - sands have large particle size and large inter-particle spaces and therefore they drain very well and prevent rainfall from pooling in urban areas where this is not desired
 - loams and sandy loams have a mixture of clay, silt and sand, and allow water to infiltrate, but also hold this water in the soil profile much better than sand
 - this ability to hold water (amongst other geo-chemical factors related to nutrient retention) is why loams and sandy loams are generally regarded as the superior soil for agriculture and plant growth as rainfall is not lost to gravity drainage and more soil water is available for plants. Bassendean sands amended with Aquamor soil improver retain about 6 times as much plant available water than un-amended sand.

6. Perth is built on a geomorphic unit known as the Swan Coastal Plain. It consists of several shore parallel belts of sand dunes of varying ages which extent to the base of the Darling Scarp:
 - the Safety Bay Sand Dunes are located at the coast and are the typical white sands found along the beaches and at places like Rockingham,
 - the Spearwood Dunes are next inland and comprise the high gently undulating dunes with a core of limestone and yellow sand at the surface in varying depths and suburbs such as Subiaco, South Perth and Settlers Hill are built largely on Spearwood Dunes
 - the next inland and oldest are the Bassendean Dunes, which are dunes formed of deep high silica sands, and include areas such as Bassendean and Ellenbrook
 - all of these sand types are low in organic matter, nutritionally poor and require substantial fertiliser addition to sustain plant growth.
7. It is because almost all of Perth's suburbs are, essentially, built on sandy soils (some places like Guildford are built on riverine clays), the amount of water required to maintain healthy plant growth is very high.
8. In the context of a drying climate, and an expanding metropolitan area, the very large amount of good quality water used to irrigate gardens and open space, as compared to the need for adequate supplies of good quality water for human consumption is creating increasing tension for water resource managers and developers.
9. Eclipse Soils wishes to contribute to the easing of this tension by supplying products and services which reduce the volumetric requirement for irrigation water to establish new estates as well as existing POS areas and other landscaped areas within the urban fabric.
10. The technical basis for our product formulation is that we have created soil products (the Aquamor Soil product range) which *when mixed in with the native sands, change the soil structure from sand to sandy loam.*
11. We have conducted a great deal of research to identify an optimum blend of clays, silts and organic matter which when added to Perth sands transform the soil texture into a sandy loam. We do this using materials recovered at the Eclipse Soils Abercrombie Resource Recovery site, and thus our soil products are made from verified clean, recycled materials.
12. We have tested our products using independent laboratories (Sydney Soil Laboratory and Bioscience) and can confirm they comply with appropriate Australian Standards. We have also conducted evaporation tests and plant growth tests under water stressed conditions which show that water sensitive plants (lettuces) grown in Aquamor™ soil products require only 50% as much water as plants grown in Bassendean Sand.
13. We note that because we use inorganic material to modify soil texture to improve water holding capacity, the benefits achieved by amendment will be enduring as the inorganic soil components we use cannot degrade. This is in contrast to the approach taken in the 1970's and to this day, in which the absence of organic matter in our local sands is seen as the primary problem regarding water retention and peat and biosolids are added to the sand as an amendment. Whilst peat and biosolids will initially work, by definition they will degrade over time as they are organic. It is for this reason that, for example, backyard vegetable gardens need annual dressings of compost, as the compost being organic, degrades and is consumed by soil fauna and is lost from the soil profile.

Technical Note

14. We have submitted our test and trial results to the Smart Approved WaterMark organisation who have evaluated our data and awarded accreditation on the basis that our products create a statistically reliable reduction of 50% in irrigation requirements compared to Bassendean Sand to maintain healthy plant growth.

15. Smart Approved WaterMark is the independent national organisation that evaluates products which claim to save water, and accredits those which meet their published performance criteria.

Please direct any further technical questions or requirements for clarification to either Ben Matthews or Sean Bennett at Eclipse Soils office number as noted on this information sheet.

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