

# Soil Solver

creating the best soil for the future

www.soilsolver.com.au

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## The best soil for the future

The backbone for a fertile and healthy garden is the quality of the soil. Sandy gardens in Perth lack the essential clays and silts to form a true soil. Removing existing soil from a garden and replacing it is costly and wasteful, and increasing organic matter without adding clay does very little to increase the water holding capacity of soil as it is still quickly lost to gravity and evaporation.

With the new focus on our drying climate, an increasing value placed on water, and an awareness of polluting our waterways, better methods for improving the capacity of garden soil to retain water and nutrients should be used. The long term and sustainable solution used in agriculture for many generations, is known as 'soil claying'. It has been shown that 5% clay content in sand achieves a massive increase in water holding capacity, overcomes water repellency and creates a true soil. This will take about 7 to 10kgs of Soil Solver per sqm, to a depth of 10cms. The soil will continue to improve for years to come as it holds onto increasing amounts of humus, and the beneficial soil organisms and fungi multiply. The investment will save money within a short period of time due to less ongoing need for wetting agents, organic matter, water and fertilisers.

## Advantages to Landscapers and Gardeners:

- increase cation exchange capacity, phosphate and water buffers
- permanently overcome and prevent water repellency and "run off"
- create a water retentive and fertile soil, clay holds onto more water and nutrients
- provide sufficient enhanced calcium for the healthy growth of beneficial soil organisms
- significantly extend the time that soil remains moist from hours to days
- increase the quantity of plant available water in the soil
- prevent soil nutrients from leaching
- slows degradation and breakdown of organic matter
- no need to add trace elements in the future
- increases infiltration and storage, decreases evaporation
- improves the lateral spread of water - best for drip irrigation
- suitable for native and exotic plants

## Description:

A blend of previously unavailable ingredients. Soil Solver is a concentrated high quality mix of high CEC calcium clays, silts and rock minerals that are added to existing garden sand, which change its structure to a fertile loamy soil. Unlike plain clays, Soil Solver is friable and easy to blend with sand. It provides plants and soil organisms with a perfectly balanced and fertile soil which are better able to survive hot summers with less water and less waste of costly nutrients. A clayed garden will thrive on twice weekly watering and only a small amount of organic matter will be required in the future for nutritional purposes. Water use can be slashed by up to 70% from the addition of clay and organic matter with a thick mulch, and the use of a drip watering system.

## Contents:

Unique regional calcium enhanced clays and long lasting rock mineral silts covering all plant mineral requirements. The clays are correctly Ca/Mg balanced for optimum growth.

**Cations:** Calcium, Magnesium, Potassium, Sodium.

**Other minerals:** Phosphorus, Sulphur, Manganese, iron, Zinc, Copper, Cobalt, Molybdenum and Boron

## Scientific background:

Scientists at UWA and SA, have shown that Kaolin clay outperforms Montmorillonite clays in overcoming water repellency on the short and long term<sup>1</sup>, and results are enhanced by a further 20% when silts are also added. Kaolin clay has a greater affinity to water<sup>2</sup>, and is readier to exchange nutrients with plants. Kaolin continues to increase the plant available water content the more you add, without creating a water barrier. Montmorillonite clay content of over 3% in soils has been shown to depress growth.<sup>3</sup> The addition of Zeolite and Spongolite cause an insignificant increase in CEC capacity of soil (Gilkes UWA) and are not beneficial to the texture of soil. They are useful in areas where clay cannot be added. WA Kaolin clay has a 10 times higher CEC (58 to 100) compared to the 'standard' Kaolin clay from Georgia (4.8) and its P sorption is about six times larger. *B Sing and R Giles 2006*

## The Soil Science:

The most fertile soils contain clays, silts, sand and organic matter, and have a complex variety of textures. Clays and silts are essential ingredients to hold onto humus as it is difficult to retain more than 1 to 2%

organic matter in a sandy soil. Humus, which is the residue of organic matter that has fully decomposed has a CEC up to 5 times greater than clay. Humus is safely held in the soil by the particles of clays, sand and mineral rich silts aggregating together. The clayed soil is capable of holding enormous quantities of cations, and acts as a storehouse of nutrients for plant growth. The soil fertility will continue to improve as the humus naturally increases over time and beneficial organisms fungi multiply and thrive in the increased time the soil stays moist.

## The roles of clay and silts in soil

The primary role of the clay is to improve the water holding capacity and moisture content of the soil. Water can be held in the soil for days rather than hours. The secondary role is to reduce the pore size distribution, which improves the hydraulic conductivity of the soil and water is more evenly spread through the topsoil. The role of silt, which is also a tiny size particle and composed of weatherable minerals, allows weathering at rapid enough rates to release significant amounts of plant nutrients and water and increases the textural variety within the soil profile. The improvement from adding clay, silts and organic matter, is immediate and ongoing.

## Quantity to use:

10 kgs of Soil Solver per sqm.

Soil Scientists have noted that while it can take only a small percentage of clay in a laboratory to overcome water repellency in sand, in the field the percentage of clay needs to be over 5% to at least 10 cms depth due to the varying factors of sand grain size and organic matter. The clay and silt particles need to be close enough to plant roots to usefully release nutrients, and in sufficient quantity to create a good number of stable soil peds. Between 6 kgs to 30 kgs of clays per sqm are recommended by Dept of Agriculture. Increasing the percentage of organic matter will lead to an increased requirement for clay to avoid water repellency recurring. Using 'Compost Plus' with 5% Soil Solver already incorporated slows down the degradation of the compost, allowing the microorganisms to break down any waxes.

## Incorporation

Spread the Soil Solver on the surface of the area to be clayed, and water well. If possible allow it to be thoroughly wet and dried on the surface for a few weeks. This allows the soil organisms to start increasing, which break down the water repellent waxes and makes incorporation easier. Then either rotary hoe it into the sand, with 5 litres per sqm of 'Compost Plus', or hand mix it with a hoe into the top 10 cms of the garden. You can do this around existing plants if you are careful of the surface roots. In existing gardens add reduced amounts twice at 5 kgs per sqm at each incorporation.

It is very important to mix the ingredients together thoroughly, the aim is to coat the grains of sand with the clay and silts so they aggregate together to create peds of soil.

New Product - 'Compost Plus' contains 5% clays and mineral rich silts. It is made from fully composted organic wheat straw and chicken manure. 60% humus. 1.5% of nitrogen. Perfect for top dressing lawns to gradually increase organic matter and clays and a useful all round fertiliser for all plants.

The changes in total ppm in sand when Soil Solver is added at 10 kgs per sqm

N	P	K	Ca	Mg	S	B	Cu	Zn	Mn	Fe	Co	Mo	Se	Ph	clay	silt
16	19	900	9881	5205	2090	85	14	63	192	2449	0.9	0.29	0.03	7.5	5%	3%

## References

- 1 Properties of soil kaolinities from south-western Australia B. SINGH,R. J. GILKES
- 2 Effect of kaolinite and Ca-montmorillonite on the alleviation of soil water repellency P. Dlapa1, S.H. Doerr2, . Lichner3, M. Šir4, M. Tesa 4
- 3 The influence of clay type on reduction of water repellency by applied clays: I McKissock, E L Walker, R J Gilkes, D J Carter
- 4 <http://www.soilhealth.segs.uwa.edu.au/index>