

CHANGING WATER INFILTRATION RATE, COMBATS DETERIORATING WATER QUALITY **IN AFRICA**

In Africa, competition for water between agriculture, industry and humans is on the increase. Water quality is on the decrease. If it continues to worsen the silt and salt content of the water will rise and soil health will deteriorate when irrigated. This will increase the health risk for humans consuming these agricultural products.

Over time the silt and salts from irrigation water accumulate in the top 40cm of the soil, causing the soil structure to be destroyed. When the top soil loses its 'breathing capacity' soil borne diseases start to flourish. The first reaction from a farm manager on experiencing yield losses and deteriorating product quality, is to increase irrigation as well as fertilizer application in a bid to try and uphold the yield. In fact, this will just make matters worse.

SGS Precision Farming Services (PFS) in Africa has established a reputation for analysing agriculture conditions (soil, water, leaves), interpreting the data and making recommendations that change farming operations to become more profitable and therefore, sustainable. By these measures the pollution of aquifers and soils is minimised as well as producing products that are safer for human consumption.

SGS starts by analysing the soil (its physical and chemical composition) on a grid basis, using GPS technology. The variability in the soil is mapped and the highest risk areas are identified. Effective water infiltration needs to be re-introduced for the farmer to be in a position where excessive salts can be leached out of the top soil. Two areas of concern are overhead irrigation on pivots for annual crops and drip- or micro irrigation in orchard crops.

ORCHARDS

Salts and silt will build up in the top soil. As soon as this starts to happen yield losses of up to 50% can be experienced over a period of three to five years. Spreading fertilizer products on the soil surface to combat the problem is unsuccessful. Better water infiltration rates need to be established first, so that excessive salts can be leached out of the fertile top soil. Holes of up to 50cm in depth are drilled, one per tree.

These holes are filled with coarse textured organic material, like wood chips



Holes drilled up to 50cm in depth

for example. Gypsum is spread around the 'mouth' of the hole. Every time water moves down the hole it will take salts and indirectly, silt with it to deeper layers, creating a more fertile and breathable top soil. As time goes by, nature will widen the diameter of the hole.

Yields increased by up to 25% in the first year by alleviating the stressed condition of the soil.

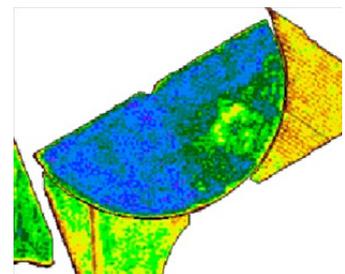
PIVOT IRRIGATION

Build up of salts and silt normally occurs between 20-40 cm from the top of the soil, the conventional tillage depth. As the silt increases and the %silt + %clay gets higher than the soil layer below this depth, irrigation water will stop flowing to the deeper soil layers. Subsequently, over irrigation causes anaerobic conditions in top soil that will result in poor utilization of applied nutrients by the crops root system. A chain reaction of events starts that may include higher fertilizer application. As part of our recommendations we combat this problem by breaking up the silted layer using a rip tillage practice,

then broadcast apply gypsum that will dissolve quickly when irrigated. After spreading and irrigating the gypsum, its dissolution will bind with the salts in the soil and move them down rip furrows with the water. This also has the effect of indirectly starting the uplift of the silt layer.

SGS PFS has experts in soil science, agronomy/horticulture, geographical information specialists and irrigation. They are trained to be able to identify problems by a holistic approach. This means taking all variables that can influence a problem into account. These experts are supported by a first class soil lab in South Africa that has received top honours as lab of the year 2012, out of 54 soil labs in South Africa, as evaluated by Agrilasa.

Farmers cannot control the water quality problem but can manage the problem by using SGS's expertise. This also has the desirable effect of producing food in a more environmentally friendly way, whilst also enhancing food safety.



Satellite imagery of Citrus trees in an orchard. Blue represents less stress on trees and yellow/green represents more stress. The blue area in the half pivot is where holes were drilled the year before in a Citrus orchard and the yellow/green area has not yet been drilled

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