

**Conserve Water
Conserve Life**



Integrate®





Integrate®

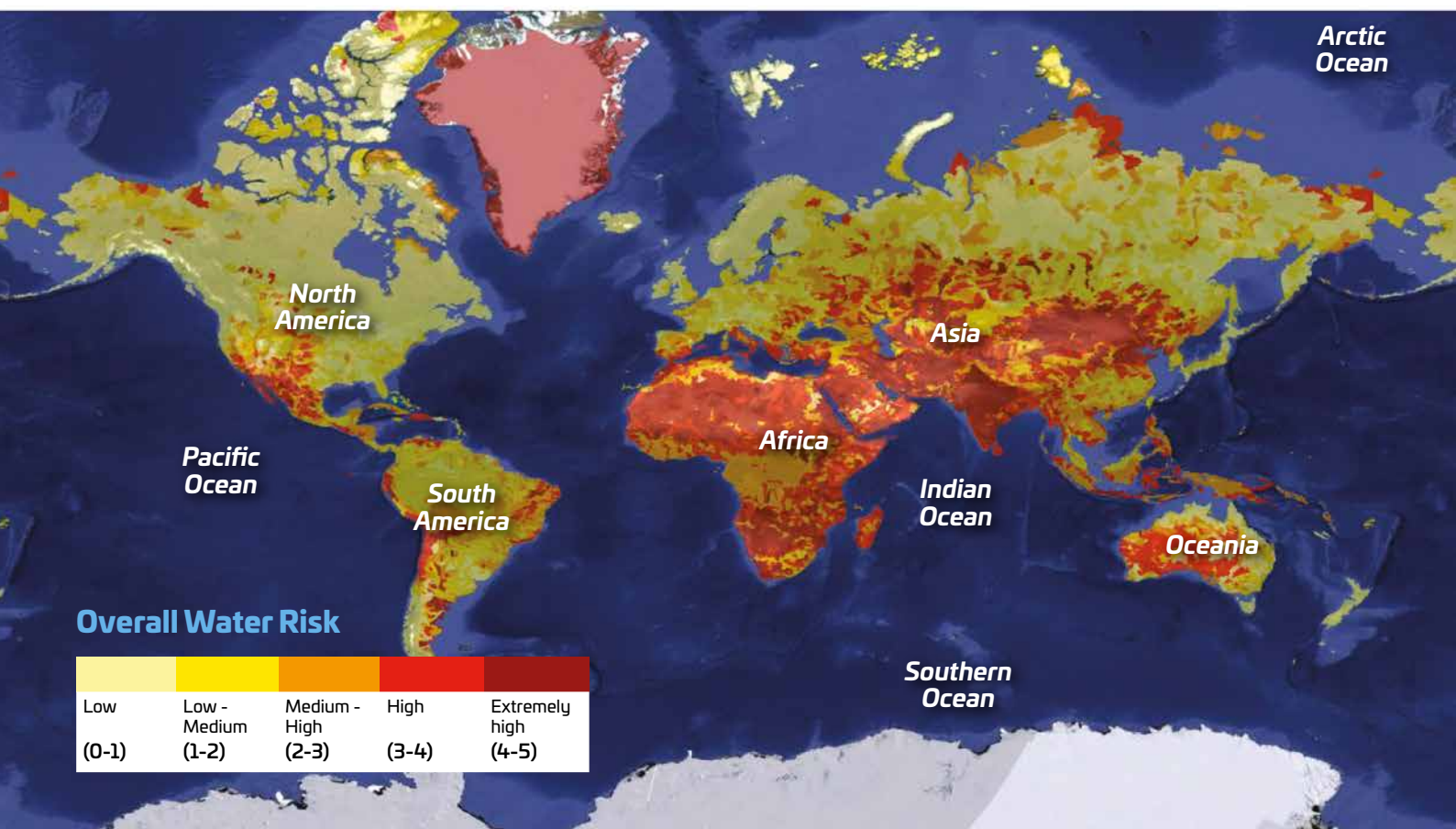
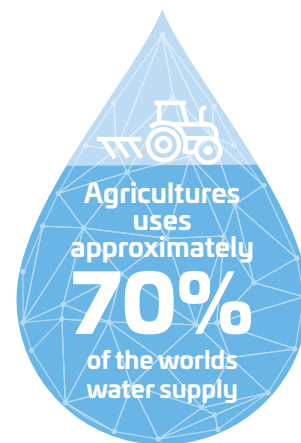
Significant areas of the world are at risk of catastrophic water shortages and more parts of the world are seeing extended periods of drought leading to a water crisis for global agriculture. Water security is fast becoming one of the largest political issues for many countries and as a result agriculture will come under more scrutiny in how it manages its water use.

Agriculture uses approximately 70% of the world's water supply. As demand for arable crops increases year on year due to changing palates, climate change, population density and water wastage, greater pressure is being placed on water availability and quality across the world.

In 2012, Engage saw a necessity for innovation in this sector and began development on a new water saving technology, specifically for use in soils. This technology is Integrate.

Now, Integrate's advanced liquid soil applied technology is the leading water saving technology for farmers and growers across the world and is fully proven in over 13 years of independent trials to reduce water loss from evaporation, surface run off and leaching, even in the most arid conditions by up to 65% and will lock moisture in the rootzone of crops. It is unsurpassed in initial wetting and long term rewetting of all agricultural soils and substrates and is providing growers and farmers all over the world with water security, and importantly, in doing so, is saving them significant cost in water, fertilisers and energy use.

So, in the past 13 years of sales and trials what has Integrate proven to do to make it the market leader and how much can it help growers in use and why should they be using it.





Integrate®



65% Reduction in water usage

The most important benefit of using Integrate is the saving in water.

Engage and its partners across the world have proven that up to 65% reduction on water use is possible without any loss in quality of growth of a crop. The reason this is possible is due to the huge reduction in natural water loss Integrate brings to the soil when applied via irrigation.

Water is lost to the growing crop in three main ways:

- Surface runoff
- Surface evaporation
- Leaching through the soil due to gravity.

Integrate introduces billions of microscopic structures in irrigation water which naturally adhere to soil particles to increase the moisture holding capacity of the soil.

Surface runoff and evaporation are almost completely eradicated and gravitational movement is dramatically slowed.

Reducing this natural water loss allows for irrigation volumes to be much lower and timings to be shorter as the soil is more retentive.

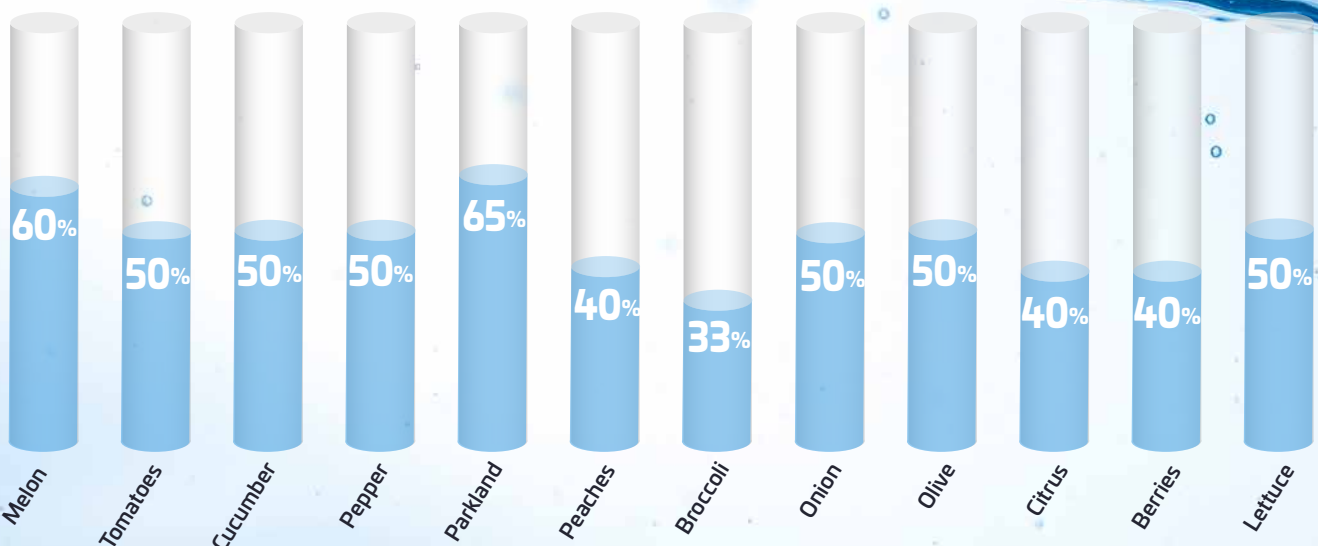
Save up to
65%
water



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Integrate - % of water saved





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With regular use of Integrate, the slowing of gravitational movement of water, naturally promotes increased lateral water movement.

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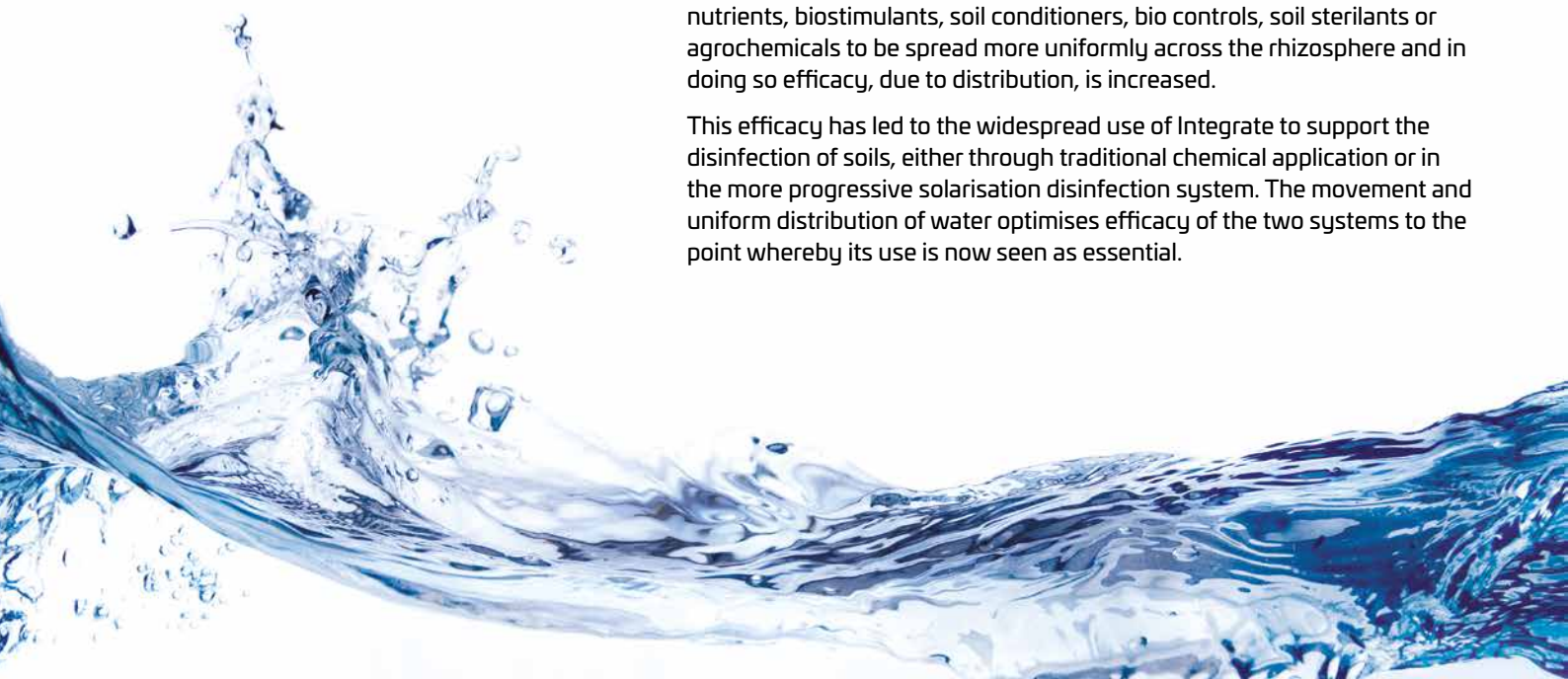
Saving water, saves fertiliser and energy

Sales of Integrate are the highest in areas of the world where arid conditions prevail, due to the necessity for use, so many growers have already adopted its regular use and rely on the benefits Integrate brings. One of the most frequent reports Engage see and hear from growers is that once they have used Integrate for more than six weeks and they have measured how much water they save in their reduced irrigation practice, they also save fertiliser and energy as both are linked directly to the lower volume of irrigation applied. In light of the dramatically rising cost of fertiliser and energy, the saving on these two important costs is now a considerable saving.

Increased efficacy of nutrients and soil applied products

With regular use of Integrate, the slowing of gravitational movement of water, naturally promotes increased lateral water movement as the microscopic micelles in Integrate coat more soil particles. The coating of more soil particles begins to bring uniformity to the soil profile across the rhizosphere and this allows anything dissolved in the irrigation such as nutrients, biostimulants, soil conditioners, bio controls, soil sterilants or agrochemicals to be spread more uniformly across the rhizosphere and in doing so efficacy, due to distribution, is increased.

This efficacy has led to the widespread use of Integrate to support the disinfection of soils, either through traditional chemical application or in the more progressive solarisation disinfection system. The movement and uniform distribution of water optimises efficacy of the two systems to the point whereby its use is now seen as essential.





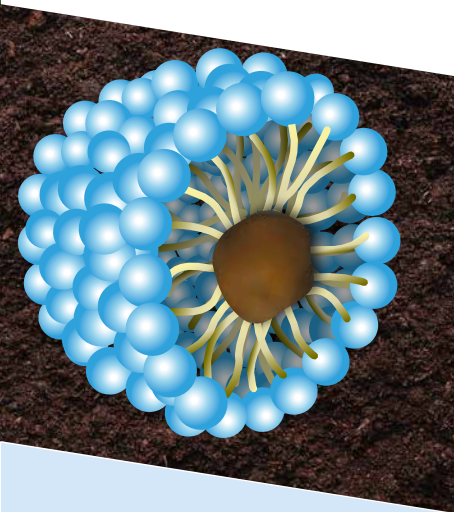
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Equilibrium of air and water

One of the most dramatic changes seen under the regular use of Integrate in irrigation water is how it creates an equilibrium of air and water due to the soil profile. The micelles in Integrate are microscopic carbon structures about 3-10nm in size and have hydrophilic head and a hydrophobic tail. The micelles act as microscopic bridges to increase the adherence between the soil particles and water.

Once the micelles have attached themselves to soil particles, they begin to form a micellar web through the soil/rootzone. It is this that eradicates surface run-off, dramatically reduces surface evaporation and slows the vertical movement of applied water. Greater lateral movement is promoted which results in optimised root available water whilst maintaining oxygenation.

The balance of air and water has dramatic short and long term effects on the soil profile from improved root activity, uniform soil aggregation and unparalleled water management.



Soil Aggregation

Under regular use, Integrate in irrigation water not only manages the balance of air and water but also its micelles create a carbon web, which is very much like a mycelial network, in the soil. This has dramatic positive long-term effects on the soil profile which aids a growing crop.

Heavy, compacted soils or soils with a tight structure such as silts or clays open up and become more plasticine in texture which make it easier for crops to grow in and also far easier for growers and farmers to work with. For example, compacted soils in the Cordoba region of Spain, Arizona region of the USA and the Vredendal region of South Africa become as hard as concrete in the summer heat due to their complex soil structures. Under the management of Integrate, these difficult soils become more open allowing greater movement of irrigation water and do not cap or harden. The long term effects of Integrate showed that in all cases in these regions, farmers stated, land was easier to work and the hard compaction which normally plagues them every season, is no longer an issue.

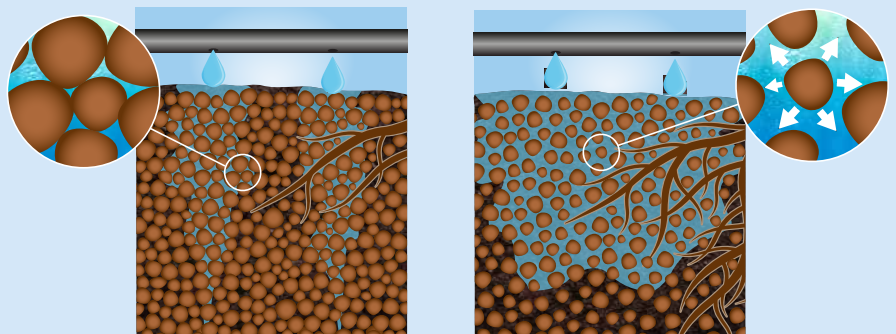
Conversely the open sandy soils of Southern Spain, North Africa and the Middle East where surface evaporation is at its highest and drainage is so fast water cannot be retained, Integrate applied via irrigation pulls together the soil particles in the lattice web of the micelles so evaporation of water is greatly reduced as is water drainage. In trials in these kind of soils water loss due to evaporation and drainage has been reduced by as much as 65% allowing the soils to be far more productive and remedial applications for organic application and soil conditioning, far more effective.

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Compacted Soil





Water Management

Under the influence of the micelles contained with Integrate, the uniformity of water and air across the rhizosphere is between 80-100% and this provides for excellent water management. Water logging of soils or anaerobic conditions are impossible to achieve even during flood events to provide continued support for crop growth. In open soils where the Integrate creates an equilibrium of air and water in the micellar web, optimal moisture levels (55-65%) can be maintained to provide optimal irrigation and nutrients to support a growing crop which can produce greater yield and be far more resilient and healthier, resulting in higher quality fruits or produce.



The retention of moisture is a long term effect and has been known to be a major reason Integrate is successful in many parts of the world.

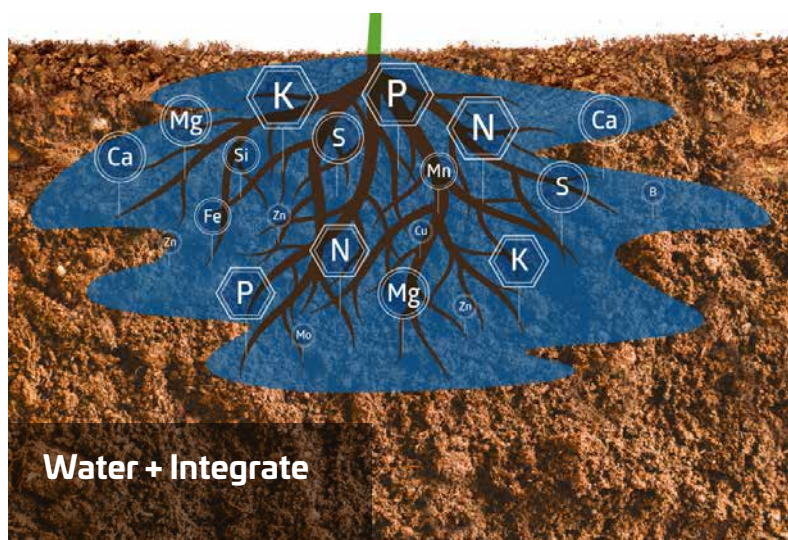
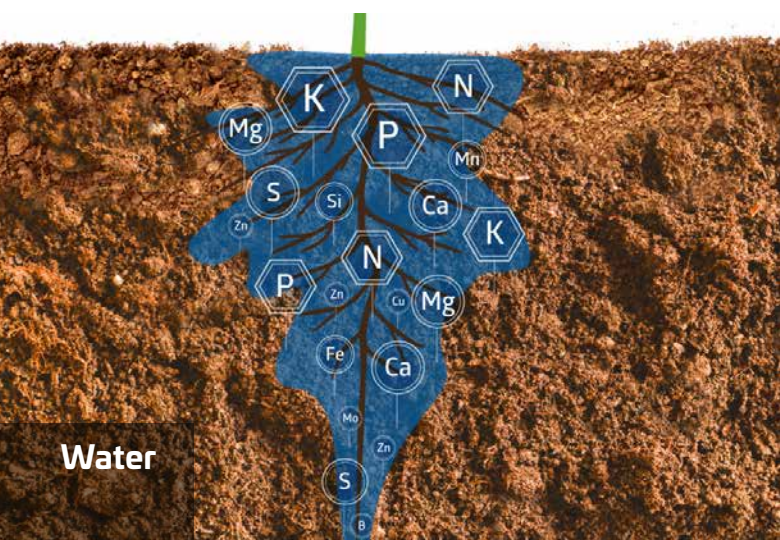


Root Activity

Within a month of starting using Integrate the water/air equilibrium is achieved and this effects plant roots very quickly. The lateral roots which access water and nutrients find it far easier to grow and work and the increased lateral movement of water, nutrients and any support compounds added via irrigation, means they are uniformly placed across an extended area. This stimulates roots to growth more uniformly through the soil profile across this larger area.

As an example, during a citrus trial at Twaktuin Fruit Farm, Clanwilliam, South Africa, roots on a two year old orange bush were measured to a growing area of 5m^3 compared to the control which had a rootzone of just 1.5m^3 .

The retention of moisture is a long term effect and has been known to be a major reason Integrate is successful in many parts of the world where energy is an issue and irrigation application can be interrupted for many days. Integrate's water retention potential allows crops to extend their root reach to greater levels of moisture to maintain optimal growth for far longer even if irrigation water is not reinforced for several days.





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Business Case

So, the next question we need to know is does it stand up in cost in use?

Application of Integrate is very easy as, due to its unique formula and environmental safety, it can be added to any irrigation system with no added cost, injected into the water or mixed with water holding tanks.

Application is just 2-4 litres once per month depending upon soil type and soil/air temperature.

This means cost of application is relatively low when compared to the savings that can be made in:

- Saving in water by 40-65%
- Saving in fertilisers
- Saving in energy in pumping or desalinating water
- Reduced carbon footprint
- Reduced wear on pumps and irrigation
- Reduced irrigation piping layout
- Increased plant growth and retention

In practice, Integrate has proven to provide a return on investment from 5-10:1.

As the pressure on water, fertiliser and energy costs increases technologies such as Integrate once seen as only viable in high value crops are now becoming essential tools to maintain water security, crop quality and financial return.

The question of whether growers can afford to use a technology such as Integrate is fast being replaced by can growers afford not to!



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