Soil Water Monitoring

What are BMPs?

Best Management Practice (BMP) programs are an effective mechanism to help drive the productivity and profitability of farm businesses. They assist primary producers to identify on-farm practice management changes that can lead to environmental benefits and production gains. BMPs aim to demonstrate environmental benefits and natural resource stewardship helping them to be embraced by primary producers.

Agriculture farmers, industry groups and government agencies in the Great Barrier Reef catchment area are working collaboratively to develop a BMP for many industries to accelerate uptake and adoption of on-farm practice changes that can contribute to improvements in Reef water quality.

What is Hort360?

Hort360 is the horticulture BMP program, designed to give horticulture businesses a 360-degree view of their farm operations.

Through Hort360, growers can identify potential risks and off-farm impacts of their practices, capitalise on business opportunities and highlight unnecessary farm expenses. It is a whole of farm business approach, and it's being embraced by growers and horticulture stakeholders throughout Queensland.

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Growers from all over Queensland have successfully installed and used soil moisture monitoring to improve irrigation scheduling and increase productivity. Here is a selection of case studies who use different monitoring systems and irrigation types.

Squeezing the most out of a defined water allocation

Crop: Citrus
Irrigation type: Micro sprinklers
Monitoring system: C-probe soil moisture monitors

A 10% increase in bottom-line profit without any additional outlay on water is a handsome windfall in anyone's language. Tim Ulcoq estimates this is the margin he gained after finetuning irrigation techniques on his Gayndah property in the Central Burnett where he grows citrus. A dry year highlighted the need to use water to maximum efficiency, and Tim says that paying attention to irrigation details has helped improve tree health, fruit size and therefore overall productivity.

Tim's property is irrigated from the Burnett River, which is completely regulated. He converted to micro sprinklers some years ago to improve delivery and has subsequently refined his monitoring by investing in C-probe soil moisture monitors to track water use. By improving his water scheduling, Tim is using the same amount of water but has increased the percentage of fruit reaching premium sizes by better matching irrigation with the trees' water requirements. "Because water is a scarce commodity, we were interested in checking out our irrigation system and looking at ways to improve productivity," Tim said.

There were no increased costs associated with better water scheduling, but tree health improved because they were not subjected to either water stress or over watering. By being more precise with scheduling he provided the trees with the required soil moisture for the tree's current growth stage. Tim estimated that he had achieved about a 10% increase in the number of fruit in premium size categories, translating into about a 10% increase in profit.

Irrigator takes the "waste not, want not" rule to the edge

Crop: Citrus
Irrigation type: Drip

Wayne Parr, of Isis River Orchards, manages his irrigation so precisely that in a recent severe drought he knew exactly how much was needed to maintain orchard productivity. His attention to water use efficiency really paid off when the Isis River dried up and he was reliant on poor-quality bore water. The drought forced him to put into practice all the techniques learned during the past few years.

The drought was an expensive learning curve but by monitoring soil moisture and water quality, Wayne was able to stretch out the available water to make sure none of it was wasted. The orchard's water use benchmark for citrus is between 6 and 8 ML/ha a year but through monitoring and learning about the water needs of the crop, Wayne was able to reduce water use to 5 ML/ha a year. The process helped him really understand what the orchard's true water requirements are.

This means future developments for Wayne and his partners at Childers will be undertaken with known water requirements. He uses the non-traditional method of drip irrigation, which is not common in Australian citrus but is used extensively overseas. Wayne says that drip irrigation is the most efficient technique when you use it properly. When driplines are kept clean, the maintenance factor is minimal and nutrients can be supplied direct to the trees' root systems. "There has been a tendency in the past to over-water trees but with drip irrigation, the water is put directly on the roots and with the aid of pulse watering the water will move laterally so that overall we use less water than traditional mini sprinkler and spray systems," he explained.

Although some traditional growers are sceptical of drip irrigation because it requires different management skills, Wayne says that once you gather all the relevant data and get on top of it then much less water is required.

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Overcoming under watering leads to production efficiency

Crop: Avocados and persimmons
Irrigation type: Micro sprinklers
Monitoring system: Enviroscan

Stephen Jeffers' avocado trees were suffering up to 30% fruit drop before he realised that the cause was water stress at critical periods of their growth cycle. Although the soil appeared moist enough, Stephen discovered the trees were suffering from a lack of water in the crucial part of the soil profile. But with enhanced irrigation management, Stephen's trees more than doubled their production during a very dry and difficult season.

Stephen discovered he was not irrigating enough and his avocado and persimmon orchards were under stress despite their high rainfall environment. Because the surface of the soil always seemed to be moist it took a while for Stephen to identify that water stress was responsible for the fruit drop because the trees draw their water from deeper down in the soil profile.

Stephen had an irrigation audit and installed an Enviroscan system to monitor soil moisture on his 10 ha production area near Nambour on the Sunshine Coast. The audit monitored his irrigation and made changes to achieve more uniform distribution from sprinklers at the top of the steep hills in the orchard and the bottom sprinklers. Stephen was fertigating and noticed the top of rows had less growth, which he put down to soil types. However, the system audit showed that the sprinklers at the top were putting out half the water the trees were getting at the bottom which meant these top trees were stressing as a result of not getting enough fertiliser or water. Previously, this sort of information about irrigation had been difficult for him to obtain.

The Enviroscan system shows the water through the soil profile and reflects the effects of irrigation in different depths of the soil. It can show what water the tree is using during the day and pinpoint an obvious period of stress when trees are not irrigated enough.

Tree crops irrigator reduces water use by a third

Crop: Stonefruit and persimmons
Irrigation type: Micro sprinklers
Monitoring system: Enviroscan

Queensland primary producer Ross Stuhmcke reduced on-farm water use by more than 30% after using soil moisture monitoring devices to determine the exact water needs of his tree crops. He grows persimmon, peach and nectarines using a micro-sprinkler irrigation system at Blackboy Ridge near Gatton. By using Enviroscan technology he discovered he was watering trees for too long and wetting deeper down the soil profile than needed. It also helped him to understand more about water scheduling and how much water he needed to use. The monitoring devices show him exactly what moisture is in the soil profile at different depths and he is now watering more often, but for shorter periods. Overall he is now using a lot less water to produce the same amount of fruit.

Moisture monitors "the best thing since sliced bread"

Crop: Mangoes, avocadoes and peanuts
Irrigation type: Various
Monitoring system: Tensiometers

Robert Pin says the devices that monitor soil moisture in his mangoes, avocados and peanuts are the best thing since sliced bread. Robert now owns 14 tensiometers that help him decide when crops need watering and is now a much more efficient irrigator. The tensiometers proved Robert's old methods of irrigation were not efficient in providing crops with the correct amount of water.

He and his wife Maria have achieved a 38% increase in production on their Mareeba property by combining more efficient watering with management practices such as mulching. Before they installed the tensiometers, they didn't use any measurements other than the old farming practices Robert learned from his father and grandfather, which was to water once a week. When they put the tensiometers in, it was a totally different kettle of fish. When the tensiometers said the ground was dry Robert said that they would dig with a shovel and it was dry. He rapidly concluded that these devices don't lie. He now relies on them to decide on when and how much to water. When there's fruit on the trees or when the peanuts or watermelon are maturing, then they need to keep the moisture up and he says the accuracy pays off.