

Happi100

SEE YOUR SOIL BREATHE



**Wireless soil oxygen monitoring
in real-time – for the first time**

SOIL  SCOUT

The journey to Happi100

Introducing the first real-time subsoil oxygen sensor

Healthy roots are the foundation of robust plants, leading to greater above-ground biomass and better overall health. However, soil oxygen levels are crucial for maintaining healthy roots, and it has been nearly impossible to monitor this data point. Until now.

Why Happi100 was produced

Over the past years, we've become aware that more of our sports customers are coming under increased pressure to justify the essential maintenance work needed to keep their surfaces playable. Likewise, our agriculture customers were seeing their operating margins diminish as the economy and the environment became more unstable.

That's when we realised that oxygen was the critical missing critical data point that linked soil and plant health for all people that tend to the plants on which we rely. And that's when production of Happi100 began.

Alongside moisture, temperature, and salinity, we knew we needed to provide real-time insights into subsoil oxygen levels. This would allow turf professionals and cash crop growers to justify – and optimise – their soil management practices, and validate the impact of their work.



How it works

Happi100 is interoperable with all existing Soil Scout products and is set up in exactly the same way. Simply add Happi100 to the Soil Scout Hub and see your soil breathe for the first time.

● Oxygen sensor:

The Happi100 employs a galvanic cell sensor that functions like a battery, measuring both oxygen concentration and ambient temperature. This capability allows for temperature compensation, resulting in a precise relationship between oxygen levels and signal output.

● Signal processing:

The amplified signal is converted to digital format and sent to the Soil Scout Hub, where the oxygen percentage is calculated based on the known standard of 20.9% at sea level.

● Durability:

Designed to withstand moisture, Happi100 can even measure oxygen levels when submerged. Happi100 is robust and maintenance-free, maintaining the standard set by all Soil Scout sensor products.

Technical specifications

Dimensions (L x W x H) 129 X 88 X 55mm (5.1" x 3.5" x 2.2")

Sensors

- Temperature
- 3-prong integrated Capacitive (moisture content)
- Galvanic cell-type oxygen

Oxygen range 0 to 21%

Oxygen accuracy + 1% across range when calibrated in ambient air

Life expectancy Five years in ambient air (up to ten years when buried)



The **benefits** of soil oxygen monitoring

Soil oxygen is vital for root respiration, nutrient uptake, and overall plant health. Here's a breakdown of the key agronomic insights

- **Prevent root hypoxia:** When soil oxygen levels starting to dip, you can plan and perform the needed maintenance to prevent plant root death
- **Avoid over irrigation:** A clear picture of your soil oxygen dynamics during rain or irrigation events will help avoid accidental over saturation
- **Improves drainage insights:** When you can clearly identify poorly draining areas, you can focus your efforts on interventions like aeration to improve overall soil health
- **Support precision aeration:** Instead of aerating entire fields, focus on areas where oxygen levels are slow to rebound to healthy thresholds
- **Increase nutrient uptake:** healthy sub soil oxygen levels are critical for the plant's ability to absorb the nutrients needed to grow
- **Increase crop yield:** With more stable nutrient uptake, each plant is able to divert more resources and time towards growth of biomass, leading to increases in crop yield and quality

- **Optimise water usage:** By monitoring both soil oxygen and moisture, irrigation can be fine-tuned to ensure plant root zones receive the precise amount of water needed to avoid drying out or becoming flooded throughout every stage of growth
- **Adapt to in-field variation:** Oxygen and moisture levels vary across properties and within fields due to different soil conditions and characteristics. Tailored irrigation and aeration is therefore needed to support optimal growth on every square metre of land
- **Promote faster recovery:** Well-drained areas can recover oxygen levels within 1 day, while poor drainage can take up to 7 days. Monitoring ensures timely, precise interventions for faster recovery
- **Maximise playability:** Selective aeration keeps a larger percentage of your playing surfaces open for longer, reducing closures and labour costs while increasing play time

// Soil oxygen is vital for root respiration, nutrient uptake and overall plant health //

Soil dynamics during weather events

During rainfall, oxygen levels initially spike due to the influx of water acting like a hydraulic press and driving oxygen deeper into the soil. After the spike, we observe a sharp decline in oxygen concentration. Driven by gravity, the sheet of moisture now drags a water column downwards through the soil.

Recovery from this low point can take anywhere from one day to a week, depending on the drainage capacity of the soil, natural processes like evaporation and temperature increases, and mechanical interventions like fans, aeration practices, and subsoil ventilation equipment.

- **Rainfall on soil** – acts like a press, causing initial oxygen levels to spike.
- **Oxygen Level Drop** – Following the spike, oxygen levels plunge due to soil saturation.
- **Recovery** – Moisture evaporating and natural drainage
- **Slow Recovery in poorly draining area**
- **Quicker recovery in drier area (increased pore spacing)**



A game-changer for sport:

Whether it's on a golf course or a sports pitch, root zone health directly impacts turf resilience, playability, and overall player satisfaction. And, until now, one of the most overlooked aspects of turf health is the availability of soil oxygen.

The challenge

Our current perception of turf management is that major aeration is needed to prevent soil compaction and maintain healthy roots. As an example, turf professionals typically need to aerate 25% of their playing surfaces annually to maintain optimal conditions.

Traditionally, this means large-scale, disruptive aeration, often leading to closures and unhappy players. In addition the speed of processes like drainage can significantly vary across any sporting location, making it difficult to plan timely and appropriate interventions.

The solution

The Happi100 soil oxygen sensor enables turf professionals to take a targeted approach to aeration and maintenance. By delivering real-time data on soil oxygen, moisture, and temperature levels, turf professionals can identify where drainage and aeration issues are most acute and where oxygen levels take longer to recover. This allows for:

- **Selective aeration:** Instead of aerating an entire playing surface, it is now possible to focus on areas where oxygen recovery is slower, minimising disruptions to play.

- **Efficient drainage interventions:** As healthy areas need minimal intervention, this frees up time for more restorative work on problem areas, lifting the overall resilience and quality of the entire venue.

The benefits

- **Maximize playtime:** Keep more of the playing surface open by avoiding unnecessary closures for maintenance

- **Reduce costs:** Targeted maintenance saves on aeration machinery, labour, and fuel costs, leading to lower operational expenses.

- **Improve surface conditions:** Healthier roots, supported by optimised oxygen levels, result in more resilient playing surfaces that stay green and lush for longer

- **Boost revenue:** Just one extra 4-ball per day can generate around €1000 in extra revenue

“ It's eye-opening to see how quickly our well-performing areas self-stabilise after rainfall, and how long the oxygen recovery process takes in our low areas ”

Erwan Le Cocq, WINSTONGolf



Unlock yield in agriculture

For commercial growers of high-value crops, competition from exports, erratic weather patterns, and rising costs mean maintaining healthy profit margins has never been more challenging.

The challenge

Many growers use drip-feed irrigation to deliver moisture and nutrients, but these systems overlook soil oxygen levels, which are critical for root health. Aeration is not commonly performed mid growing season, so over-irrigation – especially after rain or in poorly-draining soils – is a real danger. Root death begins just four hours after soils become hypoxic, reducing nutrient uptake and yield. Unpredictable weather and varying soil types add more complexity, underlining the importance of optimal water usage in maintaining yield.

The solution

The Happi100 sensor provides growers with a previously unavailable data point: real-time soil oxygen levels. The interplay of soil oxygen and moisture levels provides a deeper understanding of how different parts of their fields behave, and new guidelines for precision irrigation practices.

- **Targeted irrigation:** Monitor soil oxygen levels to prevent over-irrigation, ensuring that roots stay oxygenated even after heavy rain or irrigation events.

- **Optimize drainage:** Identify areas with poor drainage that may take up to 7 days for oxygen levels to recover, allowing growers to focus interventions where they are most needed.

- **Enhance root health:** Healthy root systems are the foundation of strong, productive plants. Monitoring oxygen ensures roots stay healthy, leading to higher crop yields.

The benefits

- **Boost yields:** By maintaining optimal root oxygen levels, growers can expect a potential 5-18% increase in yield.
- **Save water:** Fine-tuning irrigation for specific areas of a field reduces water waste, conserves resources, and ensures crops get the moisture they need without suffocating the roots.
- **Adapt to climate challenges:** Soil oxygen data helps growers quickly adapt to weather events, preventing root hypoxia and reducing crop loss.
- **Reduce input costs:** With better irrigation management, growers can reduce their water usage and prevent unnecessary fertilisation, which often gets flushed out due to over-irrigation.

Real results

Studies from Puglia tomato growers show that an increase of just 5% in yield through irrigation on a 50-hectare farm could generate an additional €24,000 annually.

Ready to change how you manage your soil?

If you're interested in using wireless soil sensor technology in sport, agriculture, green spaces, or research, we'd love to hear from you.

Get in Touch

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