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## Sugar beet case

Soil moisture measurement to increase agricultural productivity

### What?

A **Finapp cosmic ray probe** was **installed** - CRNS technology - to monitor soil moisture in a plot of land at a farm operating **in the sugar beet sector**.

### Why?

The purpose of this installation is to provide **irrigation support** to **optimise beet growth**. Monitoring started in April 2022.

### How?

The CRNS method relates the count of neutrons from cosmic rays striking the soil, with the water content of the soil.

Knowing soil moisture is one of the pillars on which to build an appropriate irrigation strategy.

Finapp provides a real data representative of soil moisture:

**Large-scale:** over 5 hectares, a radius of about 125 metres

**In depth:** approximately 30-50 cm inside the ground

**In real time**

**Not affected by pipes, poles, sheeting structures, cables, plants**

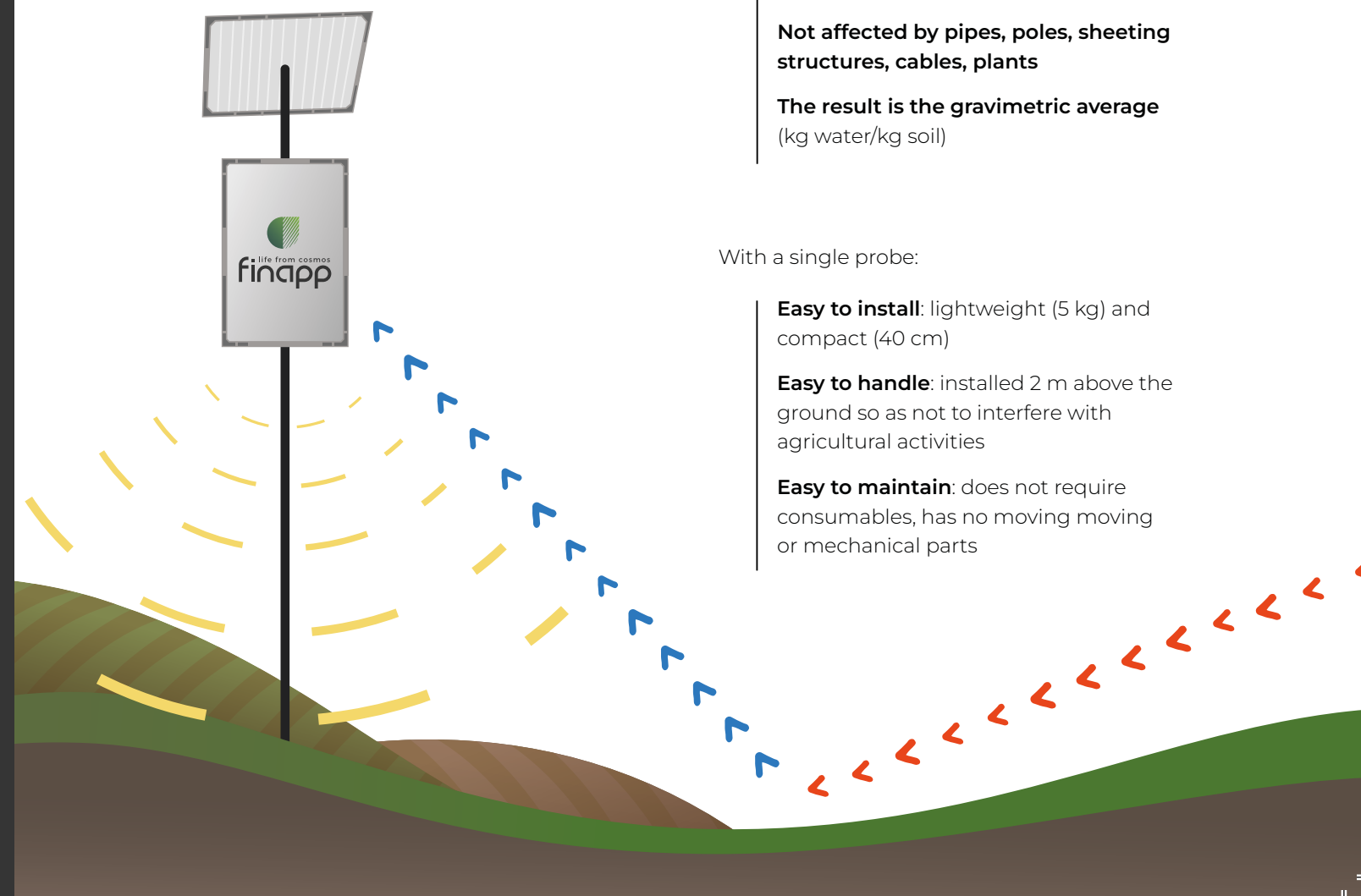
**The result is the gravimetric average** (kg water/kg soil)

With a single probe:

**Easy to install:** lightweight (5 kg) and compact (40 cm)

**Easy to handle:** installed 2 m above the ground so as not to interfere with agricultural activities

**Easy to maintain:** does not require consumables, has no moving or mechanical parts



# Information obtained

In the graph:

- **Soil moisture** (green line)
- █ **Precipitation** (green bars)
- █ **Irrigation** (blue bars) during the 2022 season.



The **threshold of field capacity** and the **avianisation point** are set by the farm agronomist as references

# Benefits

Knowing the soil moisture on a large scale makes it possible to have a representative value of the entire plot and to overcome the limits of punctual probes, especially in the case of **drip irrigation**.

Equally important is knowing the soil moisture in depth, where plant roots gets the needed water.

In the 2022 season, the farm irrigated using data from a TDR point probe that had already been in the field for years as a reference, as it was considered reliable and had already been tested, using the Finapp probe only as a comparison.

In July, the continuous irrigation resulted in an increase in soil moisture above the threshold value of 35% (gravimetric moisture), which we had identified as an upper limit. In August, some storms, even intense ones, prolonged this condition of high humidity. This asphyxiated condition facilitated the onset of Cercospora beetola, reducing the crop yield by around 20%.

“ The long dry spell and the data from the point probe led me to overdo the irrigation ”

- this was the farmer's comment at the end of the season, analysing an unsatisfactory harvest.

The soil moisture values provided by the TDR probe were lower than those of Finapp, not because the instrument is inaccurate, but because the point of installation could not be representative of the entire plot.

