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Apple orchard case

Soil moisture measurement to **increase agricultural productivity**

What?

Two CRNS (cosmic ray) probes were installed to monitor the soil moisture of a apple orchard in Val di Non (TN).

How?

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

This revolution is possible thanks to cosmic rays. CRNS technology - Cosmic Ray Neutrion Sensing - uses neutrons generated by the interaction between water molecules and cosmic rays to find out the water content of soil, snow and plants.

The data is always just a click away, on your smartphone, PC, tablet, without installing any software, as easy and intuitive graphs or by downloading numerical values.

Why?

The purpose of this installation is to provide irrigation support to optimise apple trees growth.

Finapp provides a real data representative of soil moisture:

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

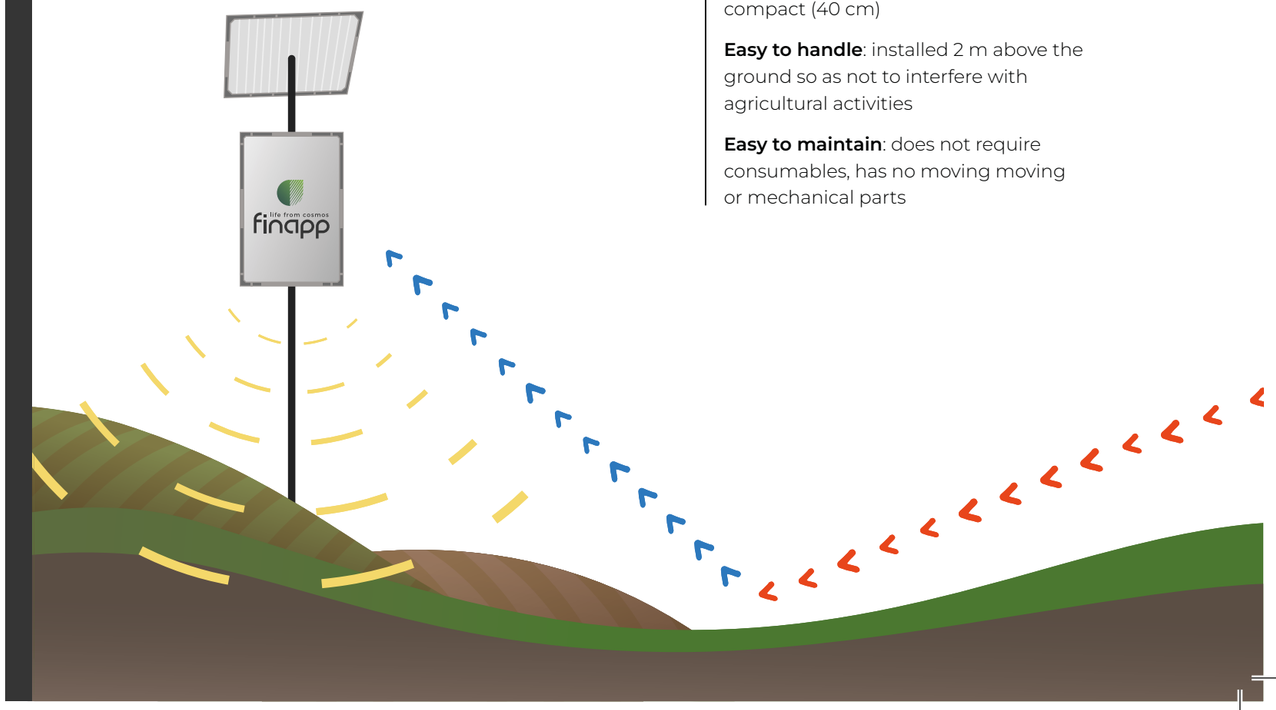
In depth: approximately 30-50 cm inside the ground

In real time

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

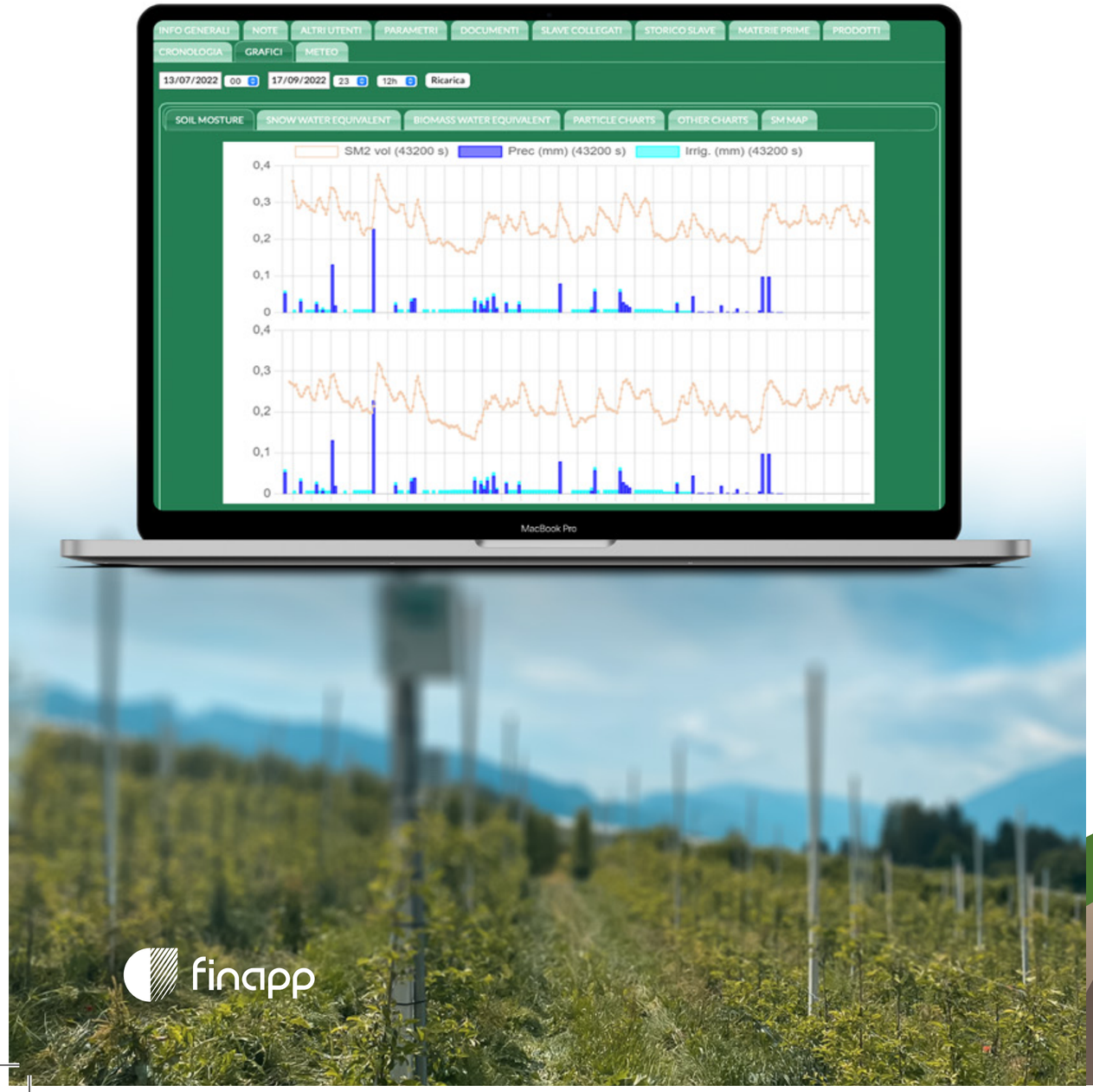
Easy to maintain: does not require consumables, has no moving moving or mechanical parts



Information obtained

In the graph:

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



The apple orchard case

During the **2022** season, characterised by exceptional water stress, we installed two Finapp probes at two apple orchards in Trentino, a few kilometres apart.

The rainfall between the end of May and the beginning of June (blue histogram), supported by drip irrigation (blue histogram), made possible to maintain the soil moisture within the optimal range, i.e. between field capacity (gravimetric moisture of around 33%) and the wilting point (gravimetric moisture close to 15%).

In July, the almost total absence of rainfall, combined with strong sunshine and temperatures well above average, **brought the humidity to values close to the wilting point**.

Irrigation was not sufficient to compensate for the evapotranspiration, and only the return of the rains in August made it possible to restore optimal conditions, with a more than satisfactory harvest.

It is also noticeable that the correlation between the two graphs is very strong. This result is not surprising, since the soil moisture measurement of the Finapp probe is able to overcome the punctual inhomogeneities of the soil, covering a sufficiently large area to be representative of the entire zone. This shows that, with the right conditions, it is possible to map soil moisture over large areas with a small number of probes.

Finally, the terrain characterized by the presence of many stones makes it difficult to measure soil moisture with traditional probes, e.g. TDR, which is not the case with the Finapp probe, making field work easier and more functional.

Benefits

Knowing soil moisture on a large scale allows you to have a representative value of the whole plot and to overcome the limitations of punctual probes especially in the case of drip irrigation. Equally important, it is to know the soil moisture at depth, where water is made available to plant roots.