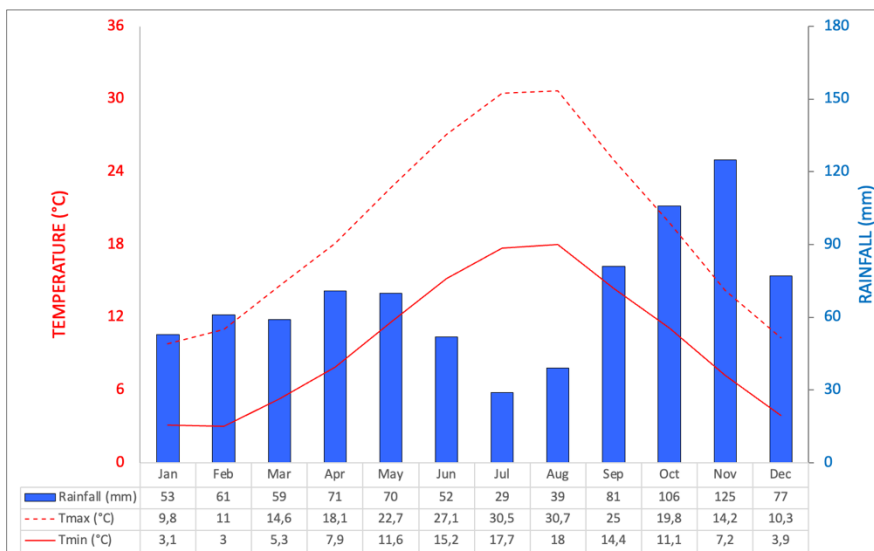


# Testimonial video and associated training material

## 1. Spotlight on Minimum Tillage



Tonino Congiu is the owner of the Baccoleno farm, located in the province of Siena, Tuscany (Central Italy). As is typical in the area, suitable for cereals, Tonino alternates the cultivation of durum wheat, oats and barley with soil improving crops such as field beans and clover. In recent years, he has transitioned from conventional farming to conservation agriculture, and he soon realized the numerous advantages of this approach.



*The area has a typical temperate Mediterranean climate, with warm and relatively dry summer and cold and relatively moist winters. The mean annual temperature is 13.6°C and cumulative precipitation 850 mm, distributed mostly during winter and autumn.*

*It is a hilly area, with slopes reaching 38-40%, with predominant clay loam soils.*

## Observed benefits

### Ø *Saving of diesel and related economic and environmental cost*

For traditional sowing, an average of 130 l of diesel per hectare is required for ploughing and soil refinement (harrowing or clod breaking). With sod seeding, on the other hand, 10-12 l of diesel per hectare are required. At a cost of around 1.20 €/l this means a reduction from almost 250 €/ha to around 16 €/ha, with a huge cost saving.

### Ø *Reduction of working time*

Ploughing and preparing the seed bed on a farm like Baccoleno could require 400-500 hours of work per year. With minimum tillage or sod seeding, 100-150 hours of work per year are sufficient. This drastically decreases labor costs.

### Ø *Strong reduction of soil erosion*

Minimum or no tillage, together with the maintenance of soil cover with crop residues or cover crops, help to protect the soil from erosion. On the one hand, there is a reduced impact of raindrops on the soil, avoiding erosion and runoff particularly in hilly terrains. On the other, there is an increase in organic matter and thus in the soil water retention capacity and infiltration rate.

### Ø *Increased soil moisture*

Thanks to the increased infiltration and water retention capacity, the soil retains moisture even in the driest periods. This makes it unnecessary to irrigate after sowing, as the soil moisture is sufficient to soak and germinate the seed.

### Ø *Increased soil health*

Although to see a real and stable improvement of soil it takes at least 10 years, already after a few growing seasons it is possible to notice an increase of earthworms in the soil. Earthworms mix large quantities of organic material with the soil, so that the microorganisms in the soil are able to break down organic substances more easily, producing humus, thus improving soil health.

## Observed limits

### Ø *High investment costs*

The transition to conservation agriculture requires a large initial investment because the acquisition of specialized machinery is required to seed directly on stable soil. However, the investment is related to the extent of the farm and the high initial cost can be recouped in a few years thanks to abatement of tillage and labour costs.

### Ø *Weeds increase*

The lack of mechanical tillage makes weed control more difficult. Despite the presence of crop residues and cover crops that physically hamper weed emergence, typically high quantities of chemical herbicides are used, especially in the early years of transition to CA.

### Ø *Possible compaction in clay, heavy soils*

In particularly clay and heavy soils, the recurrent passage of heavy machinery for sowing, fertilising and treatment, and harvesting operations lead to progressive soil compaction. For this, it is necessary to cyclically subsoil in order to restore the deep soil structure.

## Conservation agriculture in practice

Conservation agriculture is an ecologically based farming system that is characterized by three main principles:

**Minimizing tillage.** The minimum disturbance of the soil consists in a reduction of mechanical interventions on soil, excluding moldboard plowing as a preparatory tillage, and working at the minimum possible depth in rapid times. Both minimum (tillage up to 10-15 cm of soil depth) or no tillage (zero tillage or sod seeding) are possible. A specialized machinery is needed, equipped with discs capable of opening a small furrow of a few centimeters, depositing the seed through a pneumatic system, and closing the furrow again. This operation is carried out on soil stubble soil.



### SOWING

*In Conservation Agriculture, sowing can be done in three ways:*

*Sod (direct) seeding. This technique involves sowing directly on the stubble of the previous crop. No tillage is carried out, but special seed drills are needed, capable of cutting the crop residue, depositing the seed and covering it.*

*Minimum tillage. Technique in which the soil is tilled to a depth of no more than 15 cm. With one or two passes of the machine, a satisfactory seedbed is obtained while maintaining a cover of crop residues on at least 30% of the tilled area.*

*Strip tillage. This technique involves working the soil in 'bands' of a maximum width of 15-20 cm and a maximum depth of 15 cm. Sowing must then take place within the tilled bands. It is generally carried out for rooted crops such as maize, soya or sorghum.*

**Keeping the soil covered.** The presence of cover crops, living mulches or crop residues at all times protect it from erosion and retain moisture. For soil protection to be effective, land cover should be at least 30%.



**Diversifying crops.** Using a variety of different crops together or in rotation, rather than planting the same crop year after year. Both crop rotations and intercropping promote biodiversity, improve soil health and help contrasting weed emergence.



**Which crop?**

In general all those crops that do not require inter-row tillage can be sown with no-till seed drills and cultivated following the CA approach. Typical examples are cereals (wheat, barley, oat), legumes (pea, chickpea) and forage crops (maize, sorghum).



**Which soil?**

The most suitable soils for CA are medium textured, loamy and loamy clayey soil. In coarse soils, there are not significant advantages as organic matter cannot accumulate, while in clay heavy soils, compaction is a risk.

Conservation agriculture has become an internationally recognized method of sustainable land management, contributing to the achievement of key Sustainable Development Goals:

**2** ZERO HUNGER



Conservation agriculture improves crop yields and food security, particularly in smallholder and rainfed farming systems

**12** RESPONSIBLE CONSUMPTION AND PRODUCTION



Conservation agriculture reduces the use of synthetic inputs such as fertilizer and pesticides, and improves water use efficiency

**13** CLIMATE ACTION



Conservation agriculture helps to make farms more resilient to climate change, and reduces the emission of carbon from the soil

**15** LIFE ON LAND



Conservation agriculture helps to protect against soil erosion, which is a major driver of land degradation