



# THE USE OF HYDROMULCHES IN ORGANIC FARMING: EFFECT ON DIFFERENT SOIL PARAMETERS IN CENTRAL SPAIN



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In recent years, the problem arising from the weed control in perennial crops is increasing, both in young woody crops during the first years of cultivation and in established plantations. The control of weeds through herbicides, the most widespread practice, presents many inconveniences, among which we can mention the appearance of weeds resistant or tolerant to them, crop phytotoxicities, especially in young plantations, or the significant reduction in the active materials allowed. Another aspect to take into account is the search for techniques that allow saving crop water consumption by reducing soil evaporation.

The **aim** of this work was to evaluate the effect of three mixtures based on **by-products** derived from the agricultural sector and applied in liquid form on the ground with subsequent solidification (**hydromulch**) on different soil parameters (**soil water content, temperature and flow of CO<sub>2</sub>**) in a **young olive plantation**.

□ **SITUATION:** Ciudad Real (Central Spain), 4°2' W, 38°59' N, altitude 640 m

□ **CROP**

Olive crop: cv. *Picual*  
2-year trees,  
Trees in containers of 700 liters capacity  
Subsurface drip irrigation (20 cm depth)  
Organic management

□ **CONTROLS:**

- **Soil water content:** Diviner 2000 (Sentek Pty, Australia). Weekly measurements.
- **Soil temperature:** Mod. 107 probe (Campbell Scientific, Inc). 5 cm depth.
- **Soil CO<sub>2</sub> flux** (infrared gas analyser, EGM-4 PP System, SRC-1 chamber). Monthly measurements at the same points.

□ **TREATMENTS:**

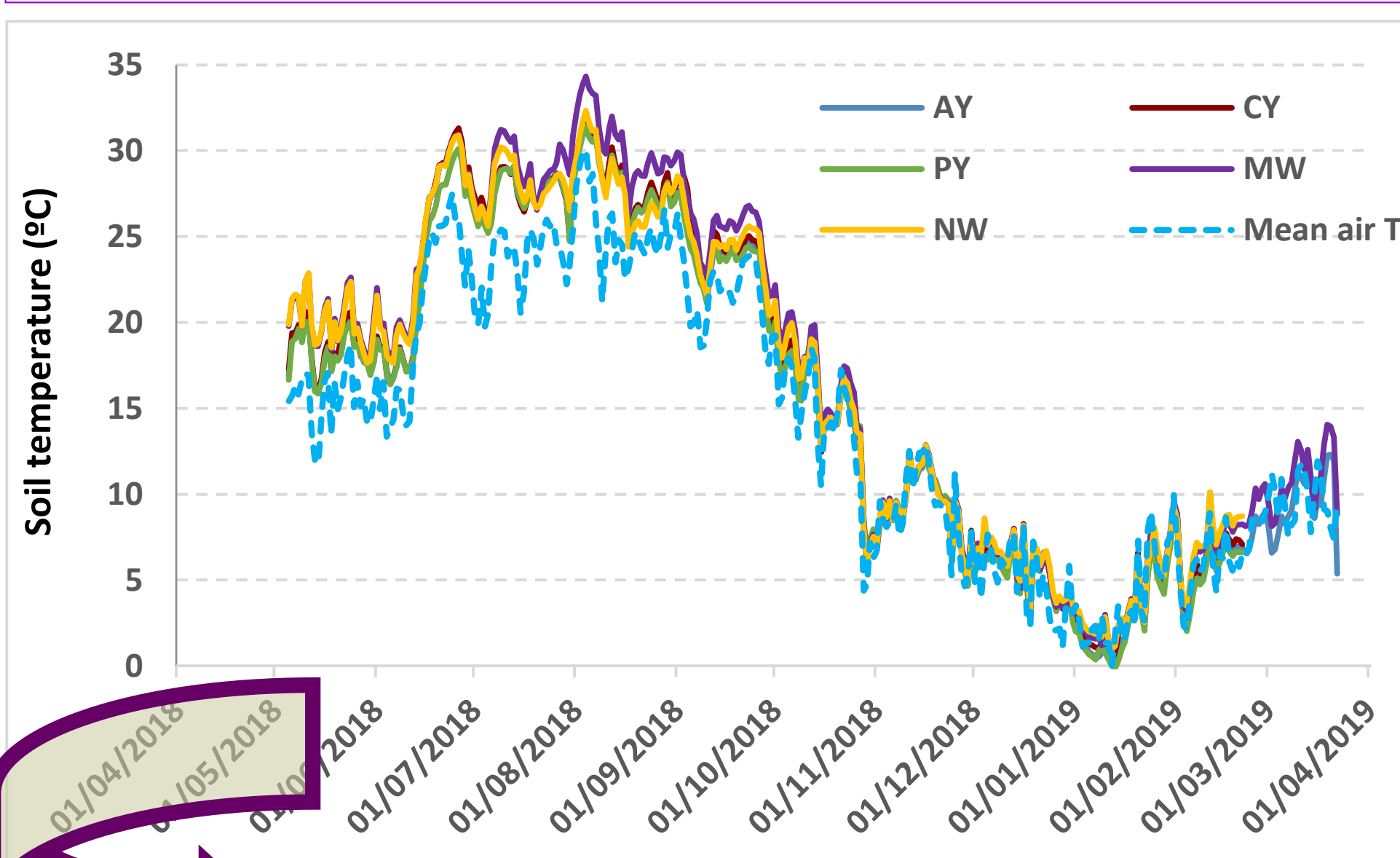
1. Agriculture byproduct 1 + recycled paper paste (**AY**)
2. Agriculture byproduct 2 + recycled paper paste (**CY**)
3. Agriculture byproduct 3 + recycled paper paste (**PY**)
4. Manual weeding (**MW**)
5. No-weeding (**NW**)

□ **EXPERIMENTAL DESIGN:** 5 treatments, 6 trees (= 6 containers) per treatment, randomly distributed.

□ **MANAGEMENT:**

- **Mixtures *in situ*.**
- **Hydromulch thickness** ≈ 1,5 cm
- **Trial period:** April 2018 - April 2019
- **Irrigation period:** 20 June - 10 Oct. 2018

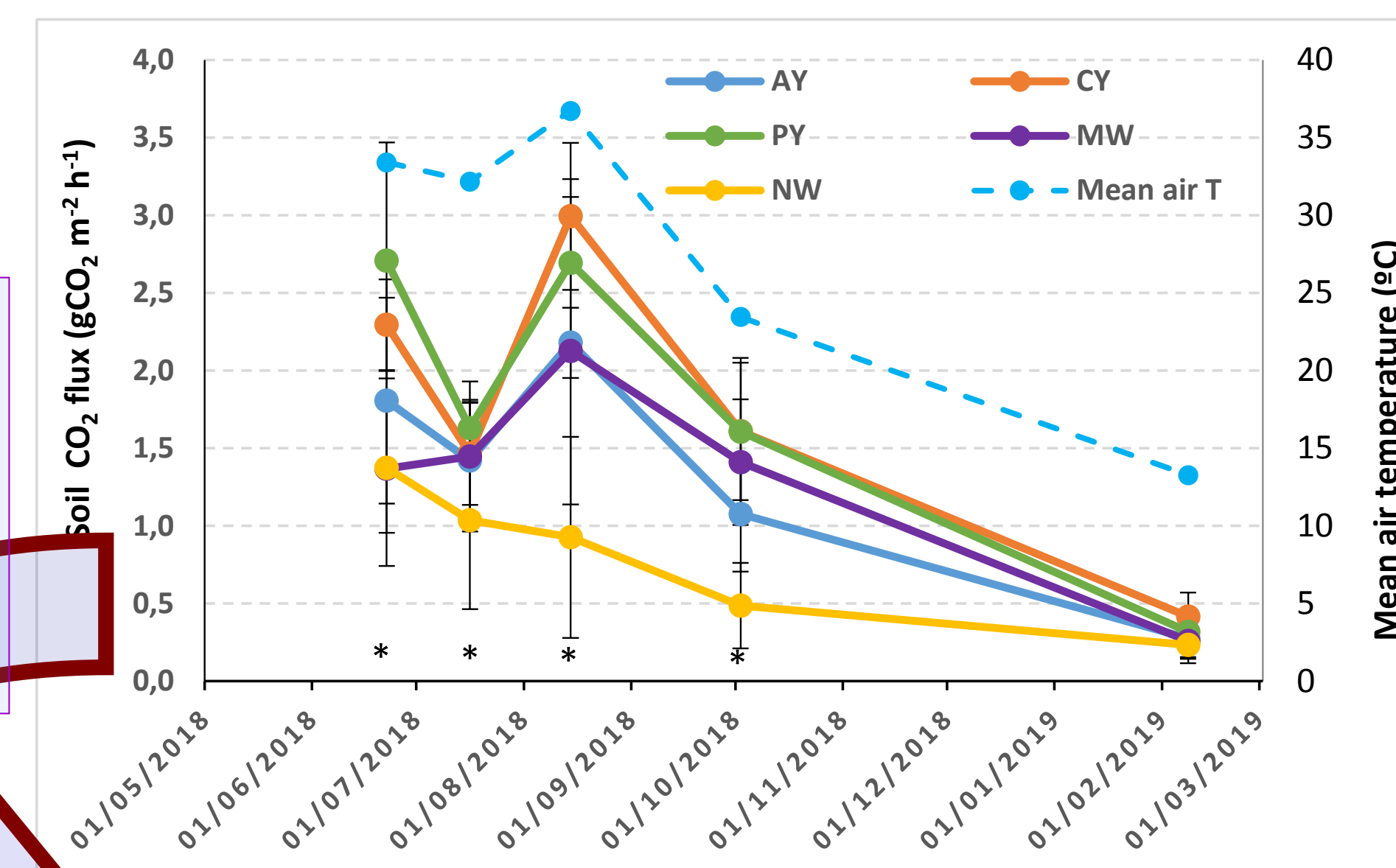
## Methodology



Soil temperature higher than air temperature during spring and winter. Low differences among hydromulches, slightly lower in PY. Lower values in the unmulched treatments.

## Results

Sharp decrease in soil CO<sub>2</sub> flux in all the treatments on the second date (July) due to the lower environmental temperature at the time of taking the measurements.



Respiration in NW decreased from July (lower soil water content). Significant differences ( $P < 0.05$ ) among treatments in all dates except in the last one (winter period). The mean values followed the order: **PY > CY > AY > MW > NW** → increased microbial activity and mineralization of soil organic matter under the hydromulch treatments (good soil functioning).



No differences among the hydromulches in relation to soil water content, but ≈ 5-10% higher than MW and 20-30% higher than NW, especially at the deepest zones.

## Conclusions

As preliminary results, hydromulches increased the soil water content, reduced slightly the soil temperature in the summer season and increased the flow of CO<sub>2</sub>, indicative of a higher soil microbial activity, closely related with the air temperature and the soil moisture. These preliminary results position hydromulches as an interesting alternative to herbicides and the conventional plastic mulches.