

## PNRR AGRITECH Spoke 8 Task 8.3.2

# Biochar: production and field tests

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### Intro

Within the activities on biochar, our unit has been focused on both production and use of biochar, as integrated production "from biomass to field" chain.

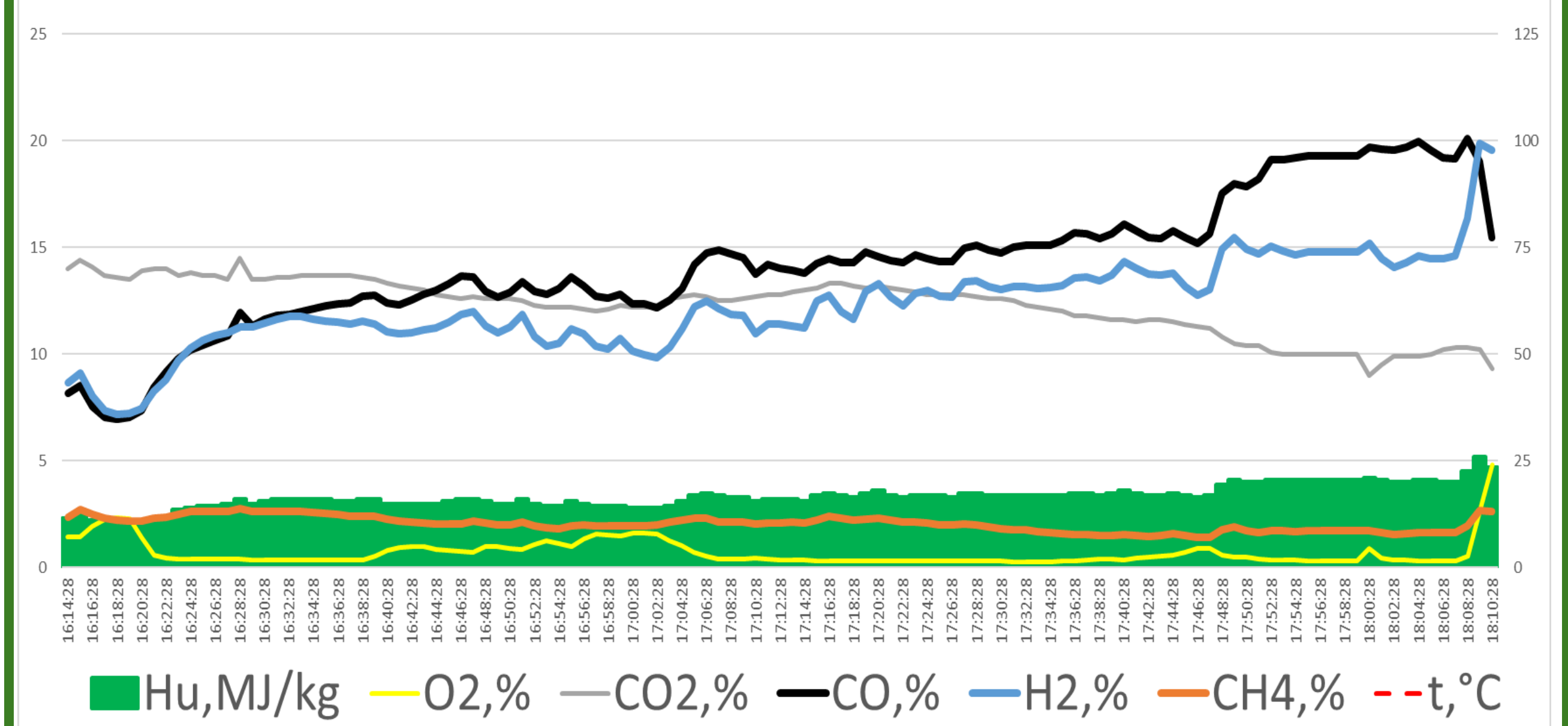
From the production side we prepared some amounts of biochar obtained by processing different biomasses in a (small) industrial up draft reactor 1,5 cubic meters large (3 m tall) fed with 50 kg/h of raw biomasses.

The biomasses have been harvested in Sardinia from pruning olive trees, cutting giant Cane and urban pruning of eucalyptus. The size variability of the raw material provided both stable (olive) and poorly stable processes, even if the biochar obtained was according to the expectations. In addition, some experimental amounts of biochar obtained by processing seeds of corn, which is not at all conceived for ordinary agronomical practices, as below explained.

Trial	O <sub>2</sub> ,%	CO <sub>2</sub> ,%	CO, %	H <sub>2</sub> ,%	CH <sub>4</sub> ,%	Hu, MJ/kg
a	3,91	10,9	16,7	10,6	3,2	3,8
b	4,75	14,5	5,5	6,8	2,1	1,8
c	0,77	13,8	12,7	14,1	2,0	3,3
d	3,06	13,0	14,1	15,0	2,2	3,7
e	2,71	8,0	21,3	10,1	2,1	3,9
Average	3,04	12,05	14,05	11,34	2,32	3,29

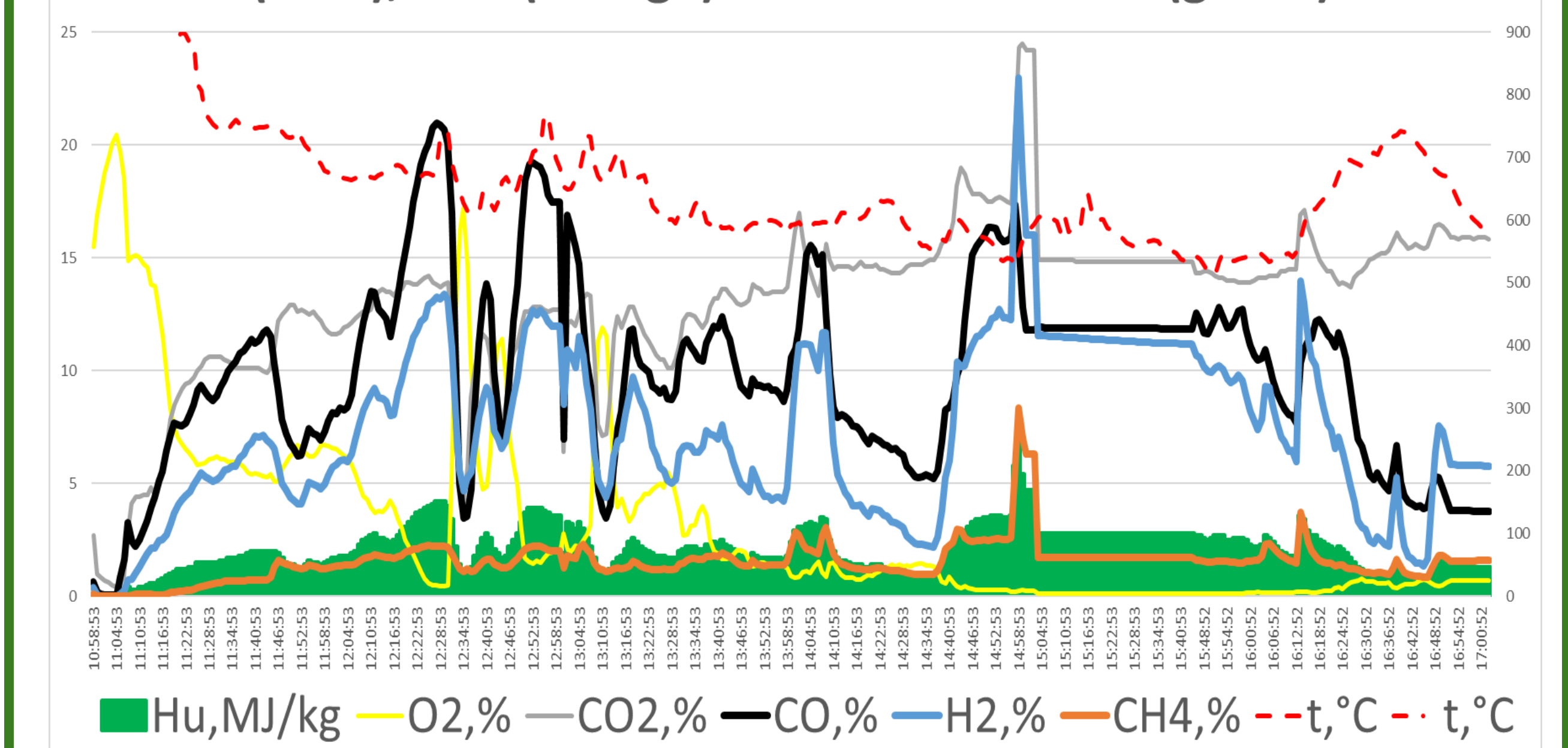
Corn seeds were produced with wood biomasses. The He was higher than the due

### Olive pruning: CO (black), H<sub>2</sub> (blue), CH<sub>4</sub> (orange) and calorific value (green)



Olive pruning provided a stable production process

### Olive and eucalyptus pruning: CO (black), H<sub>2</sub> (blue), CH<sub>4</sub> (orange) and calorific value (green)



Mixing olive, cane and eucalyptus pruning did not allow to process correctly the material

### The potential of biochar to improve soil C-sink

The stability of biochar in field conditions and the effect of arbuscular mycorrhiza fungi. Data Collection Growth parameters Vegetation indices (SPAD, NDVI, NDRE, SC). Biochemical composition of TPCS Soil physicochemical and macronutrient composition, Soil enzymes, Respiration and MBC



Treatments No	Treatments	Treatments Detail
T1	CK	0 g of biochar + 2kg of soil
T2	MBC (maize biochar)	50 g of biochar + 2kg of soil
T3	MBC-Lnd (leonardite)	Composite of 40g of biochar + 10 g of leonardite + 2kg of soil
T4	AMF (arbuscular mycorrhiza fungi)	2 g of AMF + 2kg of soil
T5	MBC-Lnd+AMF	Composite of 40g of biochar + 10 g of leonardite + 2g of AMF + 2kg of soil

### Biochar Long-Term Experiment

3 Field Experiment in Chianti Area started from 2022 and ongoing

1 Long-term experiment started in 2010



A LCA is being carried out regarding vineyard management with and without the use of biochar.

The analysis will allow us to understand the impact of biochar on the grape production cycle from the point of view of the carbon footprint and water footprint

- Effect of biochar on C sequestration
- Effect of Biochar on water retention