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Solar drying of olive oil by-products for the production of solid biofuels

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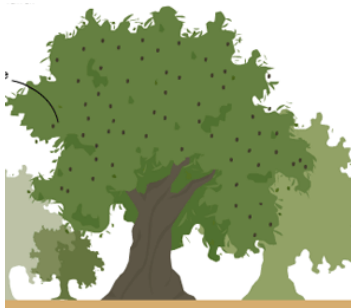
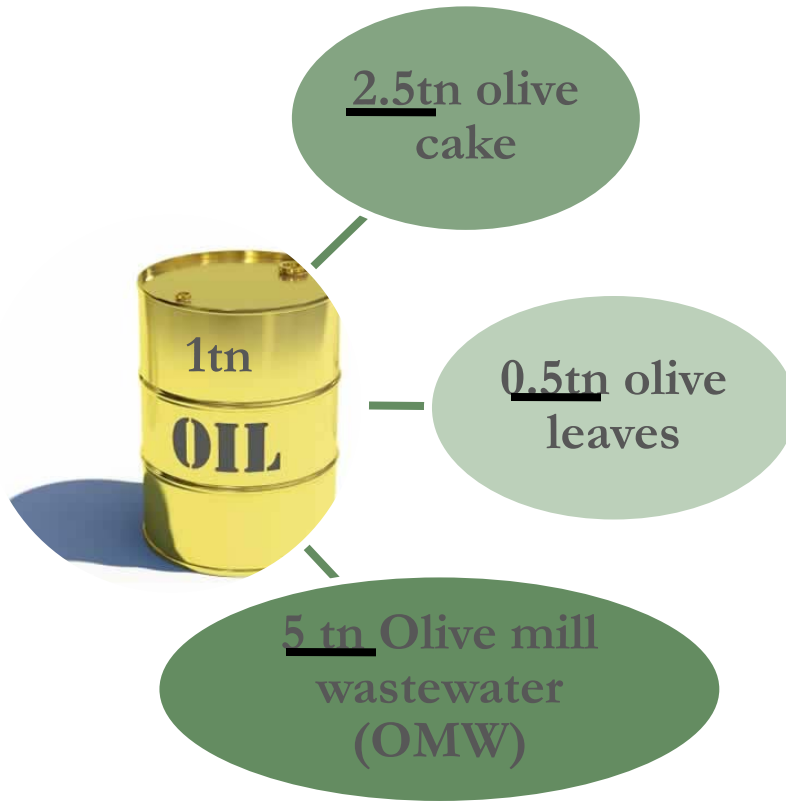
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Tinos, July 2015

Three – phase process



Environmental problem

- High degree organic pollution
- High content of polyphenols
- High content of solid matter



Solid Biofuels

Materials

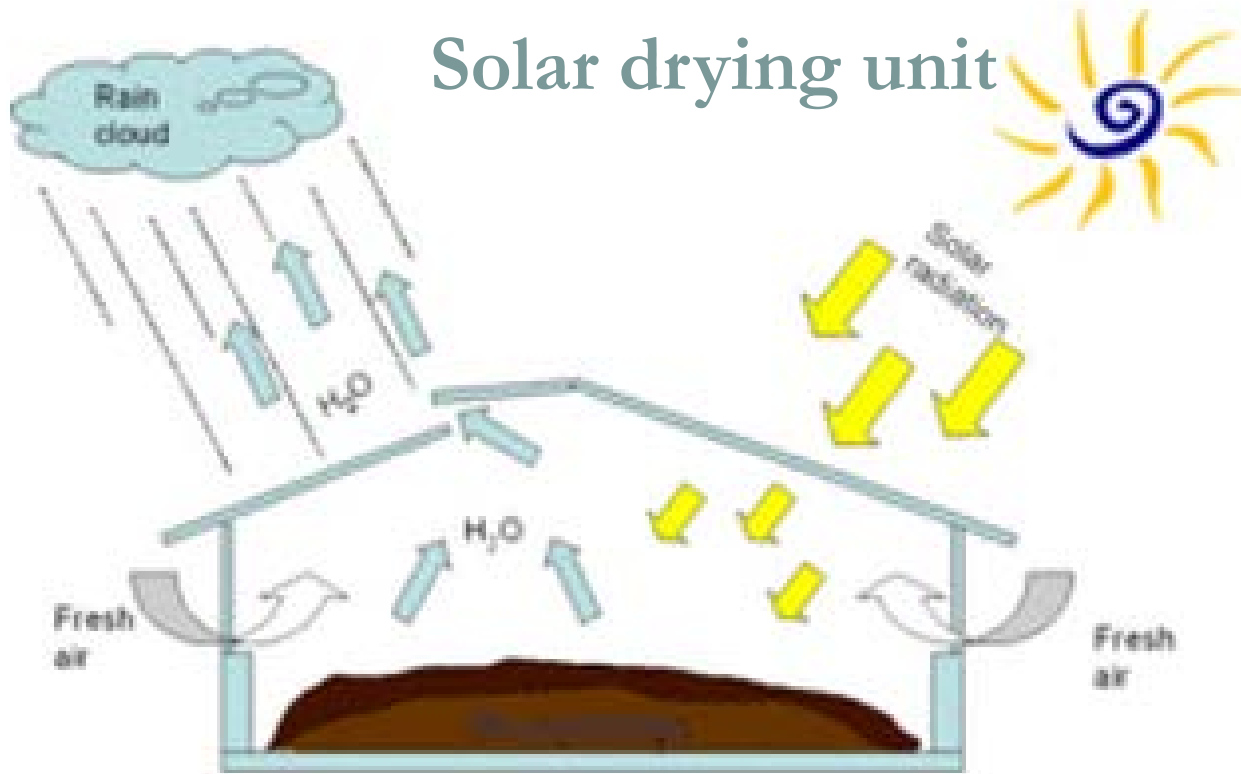


1. Olive Pomace (POM)
2. Pomace (80%) & Leaves (20%) (PL)
3. Pomace (60%), Leaves (20%) & biomass from pruning (PLP) (20%)

Characteristics of experimental materials

Parameters	POM	PL	PLP
Moisture (%)	47.3 ± 0.2	52.1 ± 0.2	44.9 ± 2.7
TOC (g/kg)	667 ± 6.4	658 ± 28	634 ± 2.0

Solar drying unit



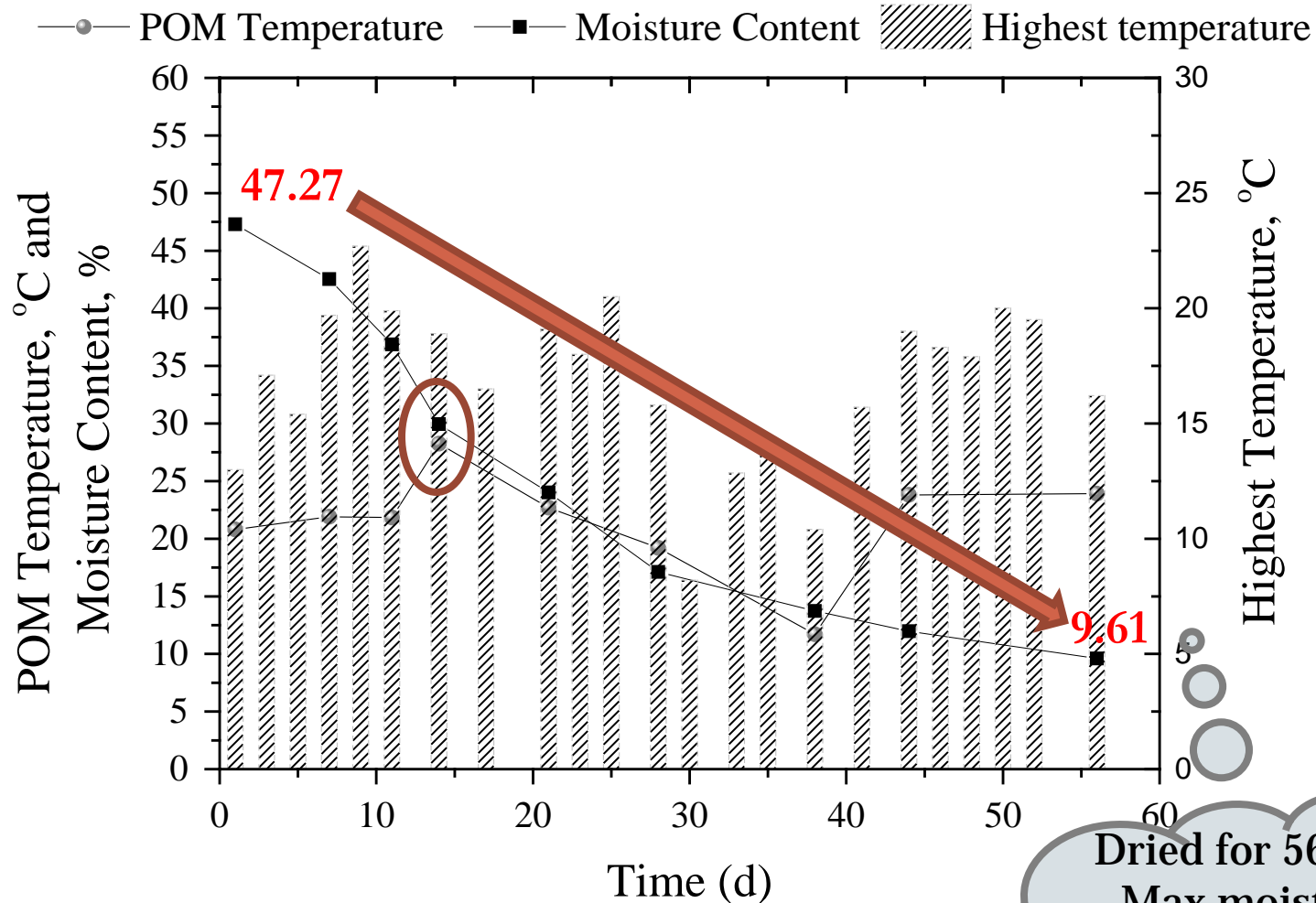
Experimental procedure

- ✓ Materials dried in 3.0x1.5x0.20m concrete tank
- ✓ Aeration of the surface of the materials is effectuated by side windows
- ✓ Greenhouse effect provides effective usage of the solar energy
- ✓ POM and PL dried for 56 days
- ✓ PLP dried for 67 days
- ✓ 10cm thickness of the POM, PL and PLP
- ✓ Mixed manually twice a day
- ✓ Experiments till the moisture content → reduced to 10% (w/w).

Solar drying unit

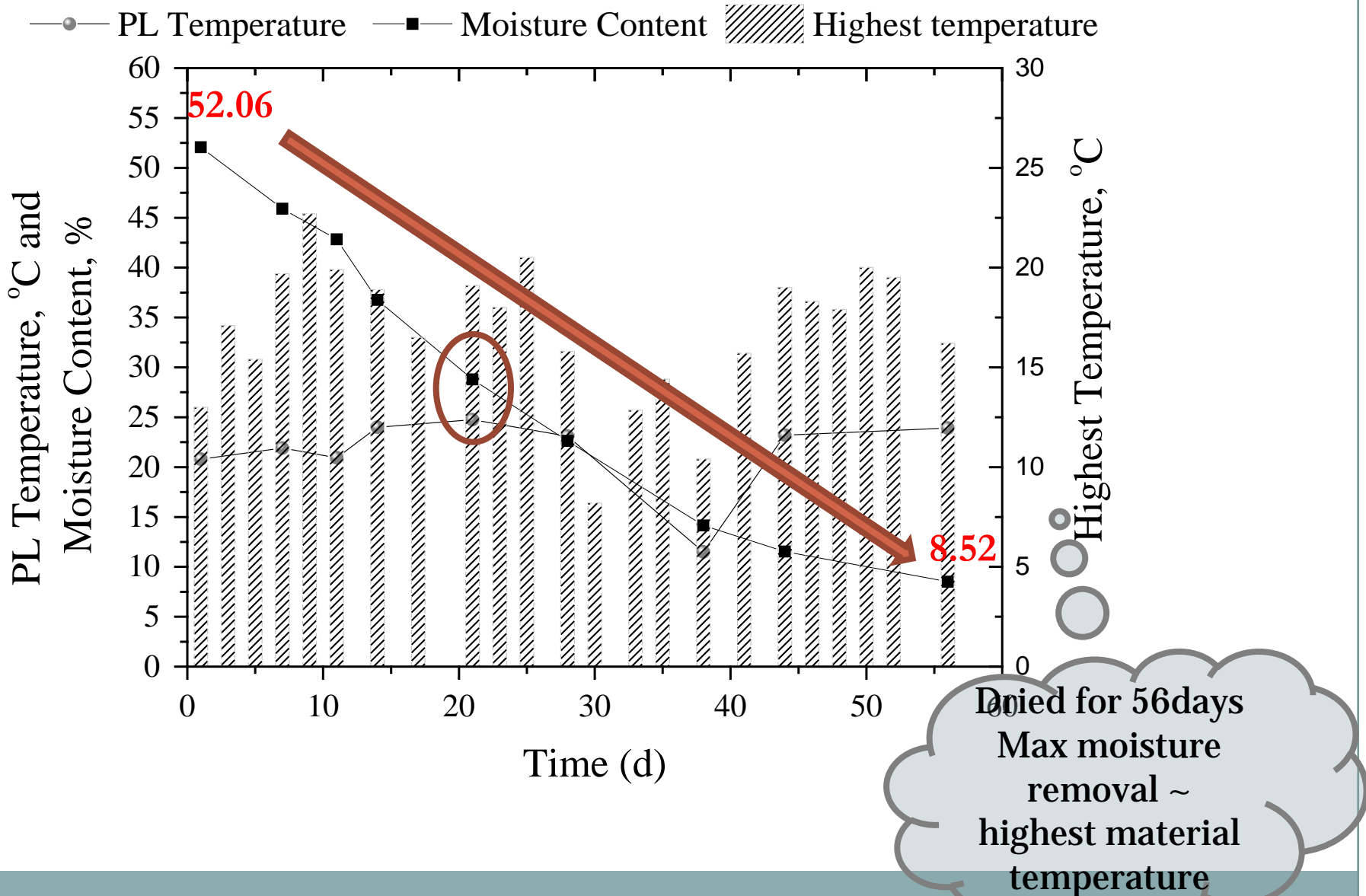


Results

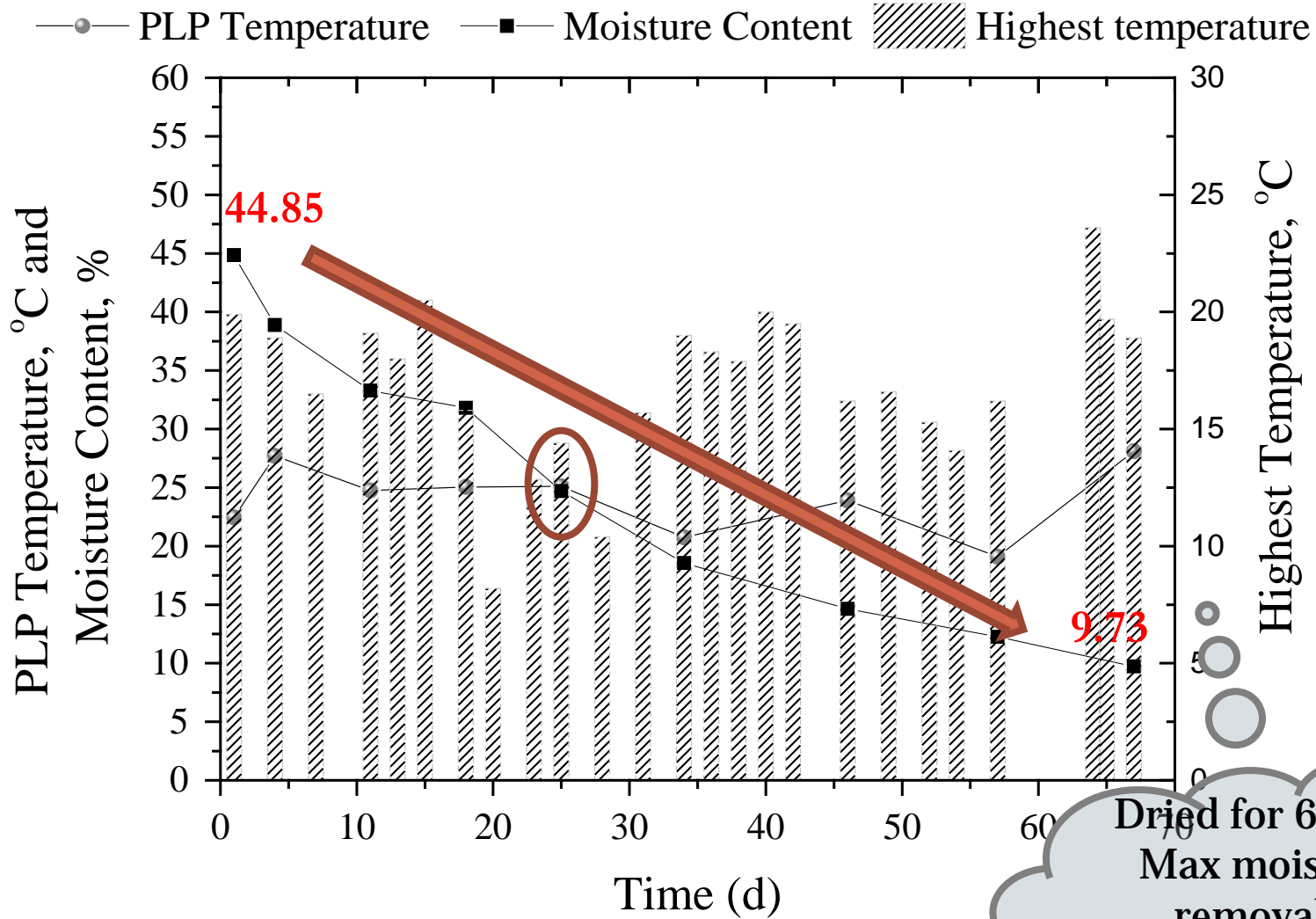


Dried for 56 days
Max moisture
removal ~
highest material
temperature

Results

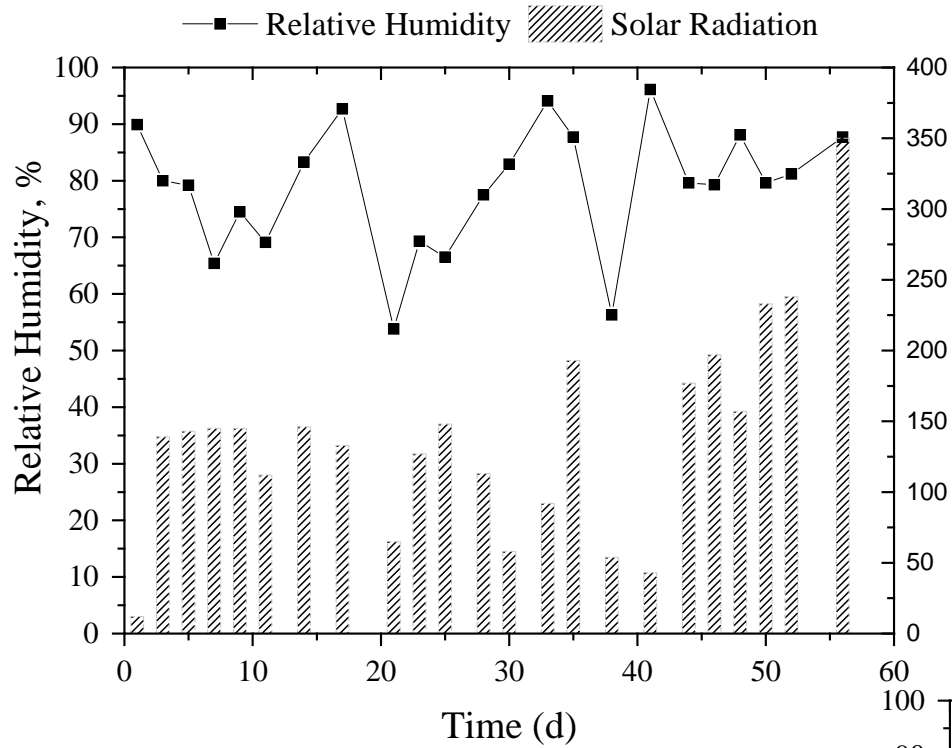


Results

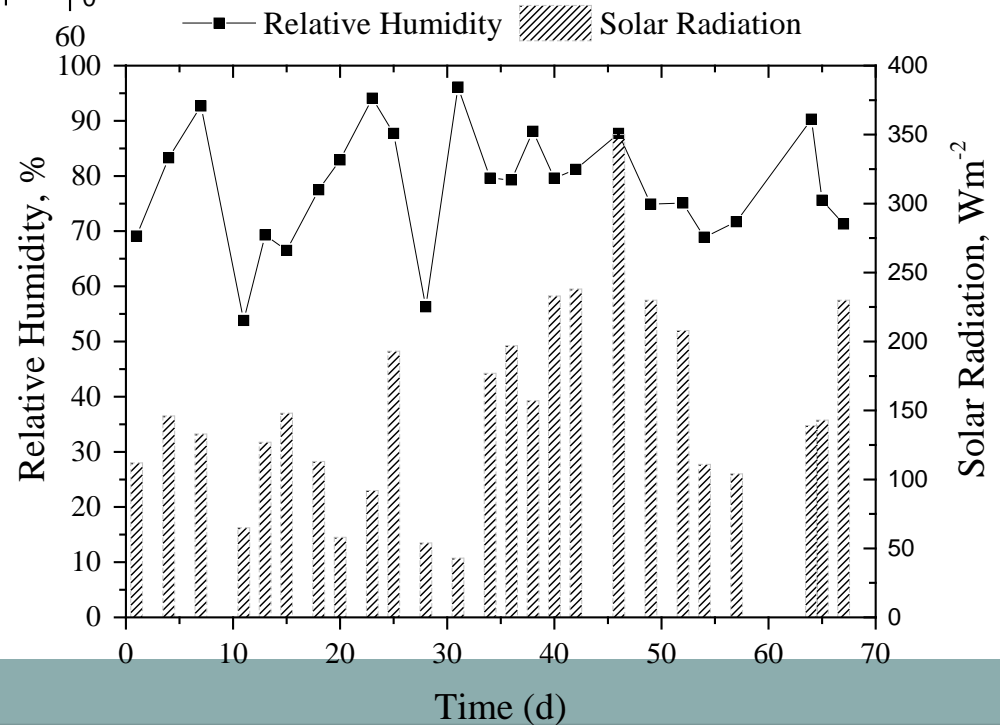


Dried for 67 days
Max moisture
removal ~
highest material
temperature

Results



Max moisture removal ~
Min relative humidity & stable solar radiation



Conclusions

- Moisture 47% → 9.6% (POM) after 56 days
- Moisture 52% → 8.52% (PL) after 56 days
- Moisture 45% → 9.32% (PLP) after 64 days
- No correction was observed between TOC and moisture removal
- Rate of moisture was positively related to minimum relative humidity and with the highest material temperature
- Solar drying was applied as an economical and efficient further–dewatering and drying method in three different substrates thus allowing its actual use as a fuel



Thank You