Progress and challenges in valorisation of biomass waste from ornamental trees pruning through pyrolysis processes. Prospects in the bioenergy sector

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Recovery of lignocellulosic waste from the forest sector

Aesculus hippocastanum (CI) *Robinia pseudoacacia (FA)*

Objetives

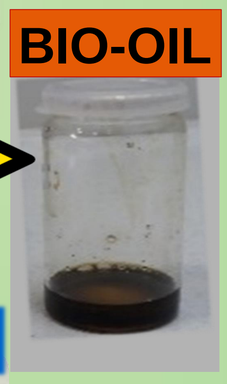
MAIN OBJECTIVE: Valorisation of biomass wastes from the sector forest from ornamental trees pruning (Horse Chestnut, **CI**, and False Acacia, **FA**) using **conventional and flash pyrolysis technologies (PC and PF).**

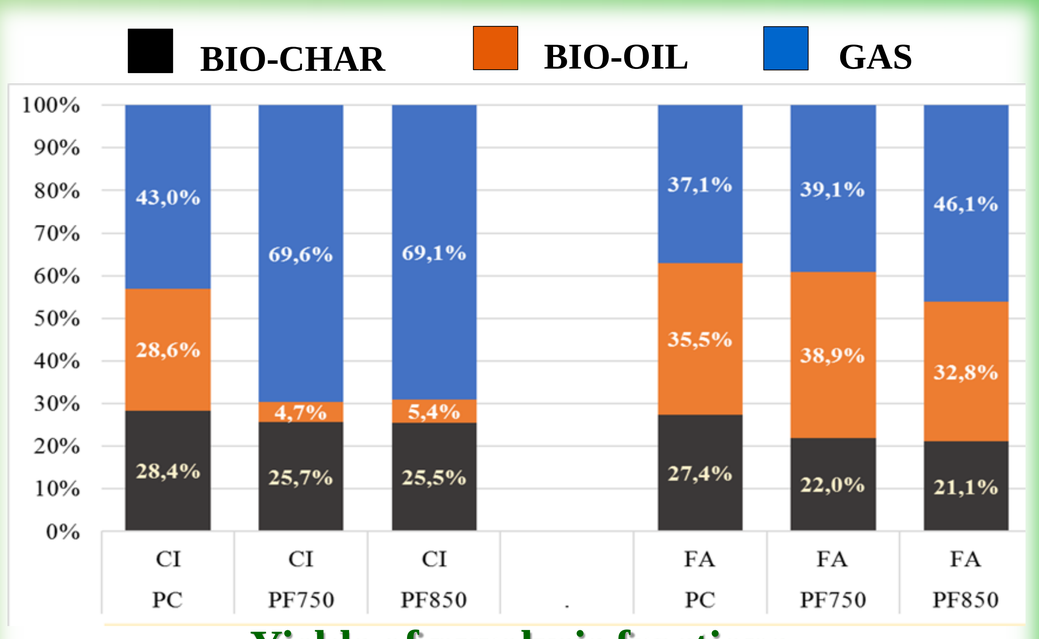
FINAL OBJECTIVE: To obtain biofuels. adsorbents and/or chemical products precursors from lignocellulosic wastes in a scenario of circular economy.

Results & Discussion

CONVENTIONAL PYROLYSIS (PC)
25 °C /min, 750 °C

FLASH PYROLYSIS (PF)
750 °C – 850 °C





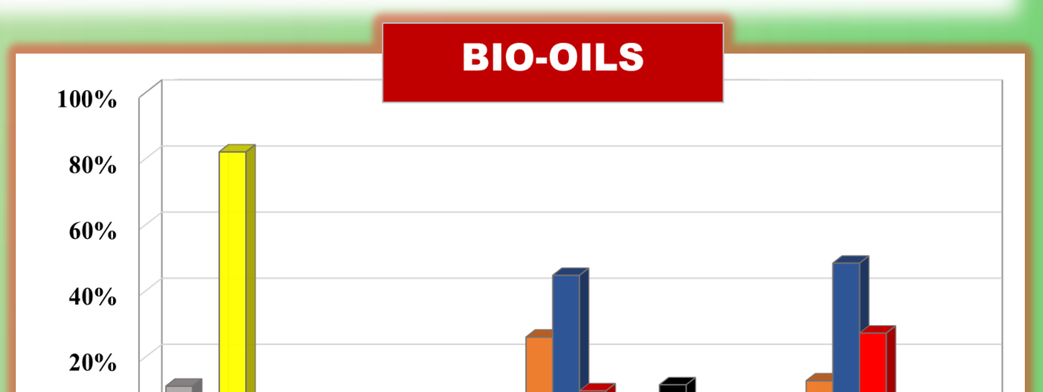
Yields of pyrolysis fractions

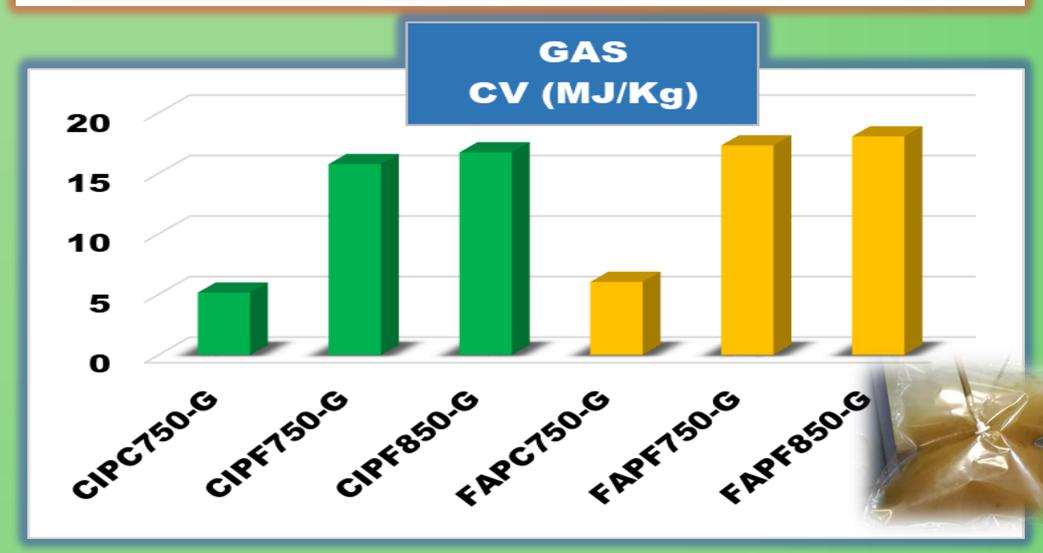
BIO-WASTES

Waste	Ash %	C %	CV MJ/kg
CI	2.8	49.1	19.5
FA	1.8	49.1	19.3

BIO-CHARS

BIO-CHAR	Ash %	C %	CV MJ/kg
CIPC750-S	8.2	82.7	28.4
CIPF750-S	9.5	83.1	29.5
CIPF850-S	9.4	82.7	28.6
FAPC750-S	6.3	85.3	29.4
FAPF750-S	9.1	83.0	29.2
FAPF850-S	8.3	85.2	29.8





Conclusions

1) The chemical characterization of pruning wastes showed that they are appropriate to be used in pyrolysis processes.
2) The gaseous fraction was always the majority (up to 70%); HHV of flash pyrolysis gases reached values up to 18 MJ/kg.
3) The biochars can be used as fuels or as adsorbent precursors.
4) In PC bio-oils highlighted phenols (≥ 60%) and in PF bio-oils PAHs (up to 95%); bio-oils are suitable for synthesis of compounds.
5) Pyrolysis of tree pruning residues is a sustainable process to obtain biofuels and biomaterials.

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