

Impact of hemp inflorescences on soil microbiology : a first approach

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J.-M. Romnee^a, S. Zeine^b, V. Ninane^a
^a CRAW – Valorisation of Agricultural Products Department – B-5030 Gembloux (BE)
j.romnee@cra.wallonie.be – <http://cra.wallonie.be>

^b Université du Littoral – Côte d'Opale – F-59375 Dunkerque (F)

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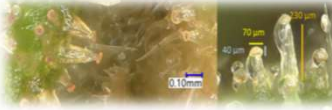
INTRODUCTION

Presently, agriculture is looking for new ways to restore soils that have been badly damaged by too many years of intensive farming. At the same time, old crops are making a comeback. This is particularly true of hemp, which is being used in a growing number of technological, food and medicinal applications.

The study of the bioactive compounds present in the inflorescences is developing in various directions : optimization of extraction conditions, relaxing effects, pain relief, protective activity against various pathogens (fungicide, bactericide, etc.).

When the fibers are harvested, the inflorescences can be exploited for the bioactive compounds they contain or simply left in the field. This second option is the subject of the experiments carried out in this study : what impact can inflorescences have on soil microbiology ? How can the metabolism of soil micro-organisms be influenced by the presence of compounds from inflorescences ?

Some answers are provided by studying the consumption of carbonaceous substrates by bacterial populations extracted from soil after incubation in the presence of inflorescences or hemp extract.



SAMPLES/MATERIALS

Hemp samples : Autopower (Seeding : 16 May 2024 - Greenhouse transplantation : 6–12 June 2024 – Sampling : 7 August 2024)

COMPO SANA as soil

Biolog EcoPlate™ (31 carbon sources repeated 3 times by plate)

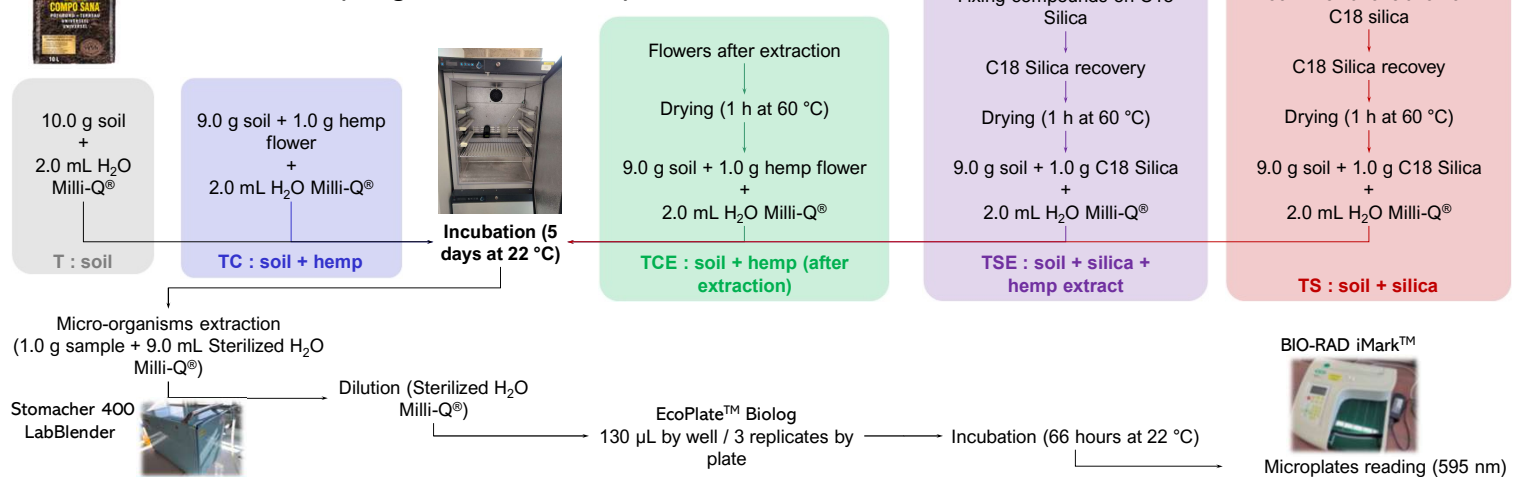
Substrate groups (EcoPlate™ Biolog)

	1	2	3	4
A	Water	β -Methyl D-Glucoside	D-Galactonic Acid γ -Lactone	L-Arginine
B	Piruvic Acid Methyl Ester	D-Xylose	D-Galacturonic Acid	L-Asparagine
C	Tween 40	D-Erythritol	2-Hydroxy Benzoic Acid	L-Phenylalanine
D	Tween 80	D-Mannitol	4-Hydroxy Benzoic Acid	L-Serine
E	α -Cyclodextrin	N-Acetyl-D-Glucosamine	γ -Amino Butyric Acid	L-Threonine
F	Glycogen	D-Glucosaminic Acid	Itaconic Acid	β -Hydroxy Glycyl-L-Glutamic Acid
G	D-Cellobiose	Glucose 1-Phosphate	α -Keto Butyric Acid	Phenylethyl-amine
H	α -D-Lactose	D,L- α -Glycerol Phosphate	D-Malic Acid	Putrescine



EXPERIMENT

The entire procedure was carried out **twice** (using new inflorescences).



DATA TREATMENT

- A_i : individual well absorbance
- A_0 : minimum absorbance (A1: H4)

$$AWCD_{Well\ Index} = \frac{A_i - A_0}{31}$$

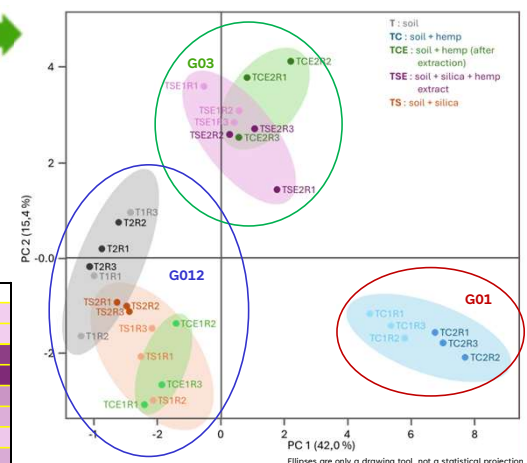
Absorbance data
(595 nm)

$$AWCD = \sum_{i=1}^{31} \frac{A_i - A_0}{31}$$

Average Well Color Development (AWCD)

RESULTS

Principal component analysis (PCA)



AWCD of each plate (3 replicates)

	R01	R02	R03
T1	0,427	0,476	0,401
T2	0,424	0,430	0,400
TC1	0,883	0,873	0,875
TC2	0,969	0,967	0,940
TCE1	0,527	0,480	0,589
TCE2	0,488	0,534	0,505
TSE1	0,441	0,486	0,421
TSE2	0,596	0,507	0,516
TS1	0,547	0,568	0,539
TS2	0,526	0,444	0,470

CONCLUSIONS

The experiments demonstrate that the presence of hemp inflorescences in the soil affects its microbiology. The AWCD, which is representative of the consumption of different carbon substrates, is significantly higher for soil mixed with inflorescences than for soil alone. Furthermore, principal component analysis of the data identifies three distinct groups: soil, soil and extract, and soil and inflorescence. This evidence suggests that hemp impacts soil microbial activity through both its components and the organic matter added.

Combinations of different soil types and hemp varieties now need to be investigated, relating extract composition to soil microbiological response (impacted strain profile). It will be important to translate these results to growing conditions to assess the impact of this effect on the subsequent crop.

PERSPECTIVES

Thanks to C. Aerts (Labo microbio) and O. Mbalo (Labo chromato) for their technical support.