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Short communication

Cannabis extractum crudum from Macedonian wild-growing Cannabis: yield and cannabinoid composition

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Introduction

Cannabis sativa L. is a versatile plant species cultivated for industrial, medicinal, and recreational purposes (Stefkov et al., 2022). The composition of *Cannabis extractum crudum* (CEC) is influenced by plant genotype and extraction procedure, making these critical for obtaining cannabinoid-rich extracts. In addition to commercial cultivars, wild-growing Cannabis may represent valuable genetic resource due to their unique cannabinoid profiles. Previous investigations of Macedonian wild-growing cannabis have demonstrated the predominance of CBD-dominant chemotypes and highlighted their potential for further utilization (Stoilkovska Gjorgievska et al. 2025). Therefore, the aim of this study was to evaluate the influence of sample preparation on CEC yield and cannabinoid composition of selected Macedonian wild-growing cannabis samples in comparison with commercial cultivars.

Materials and methods

Plant material

Outdoor-cultivated commercial cannabis cultivars (*Charlotte's Angel* and *Bubba Kush* × *OG Kush*) and wild-growing Macedonian Cannabis samples originating from the Kochani region (Gorni and Dolni Podlog, Dolni Balvan) and the Strumica region (Prosenikovo and Saraj, Bosilovo) were used in this study (Stoilkovska Gjorgievska et al., 2025).

Extraction procedures

To evaluate the influence of solvent type and volume on extraction efficiency and cannabinoid enrichment, a preliminary extraction screening was performed. Ground Cannabis inflorescence (1.0 g) was extracted with *n*-hexane (Carlo Erba, France), petroleum ether (Fisher Chemicals, UK), ethanol (Alkaloid AD, North Macedonia) and methanol (Fisher Chemicals, UK). Based on the balance between extraction yield and total cannabinoid content, n-hexane (2 × 25 mL) was selected as the optimal extraction procedure and subsequently applied to all commercial cultivars and wild-growing cannabis samples. After centrifugation, the supernatants were combined and evaporated to dryness under reduced pressure using a Rotavapor R-300 (Büchi, Switzerland) to obtain *Cannabis extractum crudum*.

Extraction yield and cannabinoid composition

Extraction yield was determined gravimetrically as the percentage ratio between the mass of CEC and the initial dry mass of plant material. Cannabinoid composition was determined using a previously

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validated *in-house* HPLC method for quantification of cannabinoids in *Cannabis extractum spissum*, described by Stoilkovska Gjorgievska et al. 2026.

Results and discussion

Extraction yield and total CBD concentration varied considerably depending on the solvent used. The highest yield of CEC was obtained with ethanol (28.13%), followed by methanol (23.40%), petroleum ether (19.65%), and *n*-hexane (16.21–18.32%). However, the highest total CBD concentrations were observed in the *n*-hexane CEC (451.4–468.5 mg/g), whereas ethanol yielded the lowest total CBD enrichment (314.0 mg/g). Petroleum ether and methanol exhibited intermediate values of 417.6 and 367.6 mg/g, respectively.

The inverse relationship between extraction yield and CBD concentration reflects differences in solvent selectivity. Higher CEC yields were obtained with polar solvents, particularly ethanol, indicate co-extraction of non-cannabinoid constituents, resulting in lower cannabinoid enrichment. In contrast, *n*-hexane produced lower yields but higher CBD concentrations, demonstrating greater selectivity towards lipophilic cannabinoids. Among the tested systems, *n*-hexane (50 mL) provided the most cannabinoid-enriched extract. The highest CEC mass (23.11%) was yielded from THC-dominant cultivar Bubba Kush × OG Kush, followed by the CBD-dominant cultivar Charlotte's Angel (18.32%), whereas the wild-growing samples from Kochani and Strumica yielded between 10.04% and 11.63%.

Charlotte's Angel exhibited the highest total CBD content (468.5 mg/g extract). Among the wild-growing samples, the highest total CBD concentration was recorded in the Kochani sample from Gorni and Dolni Podlog (407.1 mg/g extract), followed by the Strumica samples from Bosilovo (397.6 mg/g extract) and Prosenikovo and Saraj (390.4 mg/g extract), while the lowest value was observed in the Kochani sample from Dolni Balvan (328.9 mg/g extract). Bubba Kush × OG Kush was characterized by a high total THC concentration (387.8 mg/g extract).

These results indicate that commercial cultivars generally provide higher extraction yields than wild-growing Cannabis samples. However, despite their lower CEC yields, the wild-growing samples still exhibited sober CBD concentrations. These findings support the potential of Macedonian wild-growing cannabis as a valuable source of CBD-rich CEC and provide a basis for further research on its industrial applications.

Conclusion

Extraction efficiency and cannabinoid enrichment were strongly dependent on solvent polarity, highlighting the importance of solvent selection for obtaining CBD-rich CEC. Although the wild-growing samples exhibited lower extraction yields than commercial cultivars, their sober CBD concentrations confirm their CBD-dominant chemotype and support their potential for cultivar registration and further utilization. These findings further highlight the value of Macedonian wild-growing Cannabis as a genetic resource for industrial hemp breeding and cannabinoid-oriented research.

References

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