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Comprehensive Comparison of Cannabis Cultivars Using Untargeted Analytical Workflows

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Abstract: Terpene characterization is an important aspect of cannabis analysis: they provide distinctive aroma and flavours and influence effects. Plant breeders will often engineer cultivars with specific terpene profiles and particular traits. However, much remains unknown about the diverse odorants of cannabis and cultivar distinctions.

Traditionally, cannabis cultivars have been classified into two broad categories - “sativa” or “indica” – but this is thought to be less precise than a classification founded in the natural product content. For example, the use of diagnostic ratios (such as β -pinene/limonene) has been shown to be indicative of the dominant aroma of cannabis flower, either “Floral” or “Fuel”.

In this study comparing 12 cultivars, we utilise comprehensive two-dimensional gas chromatography with time-of-flight mass spectrometry (GC \times GC–TOF MS) for improved characterisation of natural product content. Multivariate discriminant analysis is then applied in an untargeted manner, to uncover the unique markers that distinguish individual cultivars. This workflow has already enabled the authors to uncover further chemical differences between the “Floral” and “Fuel” classes.

We demonstrate how this approach can accelerate our understanding of cannabis characteristics, enabling the industry to set better standards for consistency and reliability in their plants and products. This knowledge not only enables the industry to better define their products, through superior cultivar selection and improved labelling and categorization strategies, it also empowers consumers to identify their optimal cultivars. Categorization inherent in the untargeted feature discovery approach can also provide parameters for assessing stability and defining appellation and processes.