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Study No.: KQ/21/A4334
07 September 2021

Mr Karel du Toit,
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Dear Sir,

OIL MARKED PELARGONIUM GRAVEOLENS (DISTILLED 27/08/21)

We received the test sample, packed in an amber glass dropper bottle, on 06 September 2021 and assigned our Lab ID No. KQ/4334/1.

The sample was a mobile liquid, dark green in colour. It was clear, apart from some fine insoluble material.

The chromatographic profile of this sample was determined by non-polar capillary GC-MS. The individual components were identified by comparing the mass spectra with data in the NIST11, W8N05ST and Agilent Flavor2 electronic libraries and by comparing peak retention indices with the data in Adam's Listing 4.1:2017. The relative proportions were obtained by expressing the areas under the individual component peaks as percentages of the sum of the areas under all peaks.

We obtained the following results from the GC-MS, referring only to the main and relevant components:

Component	Retention index	Relative composition (area%)
menthone	1152	1.0
iso-menthone	1163	5.9
citronellol	1229	2.6
geraniol	1255	0.1
citronellic acid	1310	18.0
decanoic acid	1364	19.5
α -copaene	1374	2.3
β -bourbonene	1382	3.3
guaia-6,9-diene	not detected	
germacrene D	1479	15.3
δ -cadinene	1522	2.4

There is, unfortunately, an international confusion regarding the plant referred to as *Pelargonium graveolens*. According to information on SAEOPA's website, a hybrid was made from three indigenous plants: *Pelargonium graveolens*, *Pelargonium capitatum* and *Pelargonium radens*. The resulting variety, referred to as *Pelargonium* var Rose, is sterile and can only be cultivated from cuttings. Although the trade name for the hybrid (*Pelargonium graveolens*) is botanically incorrect, it has become the INCI name.

The oil distilled from *Pelargonium* var Rose is commonly known as rose geranium essential oil. According to the international standard (ISO 4731:2012), citronellol and geraniol are the main components, while menthone and iso-menthone (for example) are important lesser components (up to a total of 12%), Guaia-6,9-diene is a very characteristic component of rose geranium oil. Germacrene D (which is not listed in the Standard) was present in almost all rose geranium samples we've analysed to date, but at levels ranging from trace amounts up to 3.5%.

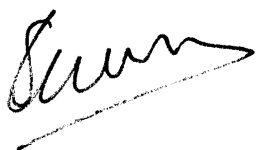
The indigenous plant *Pelargonium graveolens* is, as far as I can establish, not very popular. According to Jacqueline Lalli, Alvaro Viljoen and their coworkers (see Ref 1 below), the main components of its oil are iso-menthone (up to 83%) and decanoic acid (highly variable up to 13%). None of the species they studied contained significant levels of germacrene D, but they found 96% citronellic acid in the oil of *Pelargonium papilionaceum* and 75% in oil from *Pelargonium vitifolium*. It is interesting to read through the author's discussion section, which reveals significant variation among published results.

Unless we have the plant material, from which the test item was distilled, identified morphologically, I can not issue a Certificate of Analysis.

Please let me know if we can be of assistance. Be aware that the essential oil composition of a particular cultivar or species may vary significantly. Many factors are at play, including region, soil, agricultural practices, and season. My company has developed a small distillation unit and techniques that allow us to study the composition of an oil distilled from only a few grams of plant material, typically from pot plants or trays at a nursery. It is important that you decide (preferably in collaboration with a potential buyer) exactly what the oil composition should look like. We can then help you source the correct genetic material before you start planting.

Best wishes!

Yours sincerely,



J J Nieuwenhuis MSc PhD PrSciNat
STUDY DIRECTOR

Reference 1: *The Essential Oil Composition and Chemotaxonomical Appraisal of South African Pelargoniums (Geraniaceae)* in J. Essent. Oil Res., **18**, 89-105 (Special Edition 2006).