

Refractive Index at 20°	1.4784
Acid Number	4.2
Ester Number	13.30
Ester Number after Acetylation	63.13

The oil contained:

carvacrol	<i>l</i> -camphor (large amount)
β -pinene	<i>l</i> -cadinene
cineole	a solid compound m. 109°
<i>l</i> -borneol (free and in ester form)	

In the opinion of these authors, the content of *l*-camphor, quite rare in essential oils, is remarkably high.

An oil of *Lavandula pedunculata* distilled in Portugal years ago, and analyzed by Schimmel & Co.³ had these properties:

Specific Gravity at 15°	0.939
Optical Rotation	-44° 54'
Saponification Number	111.7
Ester Content, Calculated as	
Linalyl Acetate	39%
Solubility	Soluble in equal vol. of 80% alcohol

The odor of this oil was reminiscent of cineole and thujone, not very pleasant.

Oil of *Lavandula pedunculata* Cav. has not attained any commercial importance.

OIL OF LAVANDULA STOECHAS L.

Botany and Origin.—According to Camus¹ *Lavandula stoechas* L. is a xerophilous plant which grows wild in arid coastal sections bordering the Mediterranean, particularly in Spain and Southern France (Esterelle Mountains). In Spain the plant is called "Romero santo" or "Cantueso." *L. stoechas* also occurs in Southern Australia, near Burnside.² Depending upon the condition of the plant material, yields of 0.32 to 0.75 per cent of volatile oil have been obtained (from whole overground plants and from dried flowering tops).

³ Ber. Schimmel & Co., October (1898), 33.

¹ Sci. Ind. Bull. Roure-Bertrand Fils [4], 4 (Oct. 1921), 3.

² Perfumery Essential Oil Record 23 (1932), 411.

Physicochemical Properties.—*L. stoechas* L. possesses a strong camphoraceous, rather harsh odor reminiscent of spike lavender and rosemary. It differs considerably from that of true lavender (*Lavandula vera*).

An oil of *L. stoechas* distilled by Schimmel & Co.³ from dried Spanish flowers (yield 0.755 per cent) had these properties:

Specific Gravity at 15°	0.9620
Optical Rotation	+35° 30'
Refractive Index at 20°	1.47909
Acid Number	5.16
Ester Number	13.1
Ester Number after Acetylation	67.9
Solubility	Soluble in 2 vol. of 70% alcohol; opalescence and separation of paraffins on dilution

The same authors reported the following properties for oils distilled in Spain and Southern France:

Specific Gravity at 15°	0.9420 to 0.9531
Optical Rotation	+32° 6' to +44° 46'
Refractive Index at 20°	1.46842 (one determination)
Acid Number	1.4 to 1.8
Ester Number	12.7 to 24.1
Solubility	Soluble in ca. 2 vol. of 70% alcohol; slight opalescence on dilution

Roure-Bertrand Fils⁴ advanced these properties as representing French oils of good quality:

Specific Gravity at 15°	0.945 to 0.962
Optical Rotation	+35° 30' to +47° 0'
Acid Number	0.93 to 5.16
Ester Number	13.1 to 17.74
Ester Number after Acetylation	47.14
Solubility	Soluble in 5 vol. and more of 60% alcohol

The oils should contain about 80 per cent of ketones (*d*-camphor and *d*-fenchone). Oils also contain fenchyl alcohol, probably terpineol, and a phenolic compound of unknown constitution.

³ Gildemeister and Hoffmann, "Die Ätherischen Öle," 3d Ed., Vol. III, 681. *Ber. Schimmel & Co.*, October (1905), 40.

⁴ Roure-Bertrand Fils. *Sci. Ind. Bull.* [4], 4 (October 1921).

Dorronsoro⁵ examined two oils distilled in Spain:

	Granada	Malaga
Specific Gravity	d_{15} 0.9485	d_{15} 0.9470
Optical Rotation	+36° 10'	+45° 44'
Refractive Index	1.4678	1.4682
Ester Number	20.95	13.43
Ester Content, Calculated as Bornyl Acetate	7.33%	4.72%
Ester Number after Acetylation	32.4	...
Total Alcohol Content, Calculated as Borneol	9.13%	...
Free Alcohol Content, Calculated as Borneol	3.18%	...
Solubility	Soluble in 2.6 vol of 70% alcohol; soluble in 1.5 vol. of 80% alcohol; soluble in 90% alcohol	Soluble in 1.5 vol. of 70% alcohol; soluble in 1 vol. of 80% alcohol; soluble in 90% alcohol

Rovesti⁶ investigated two Italian oils:

	Argentina Valley	San Lazzaro Reale
Specific Gravity at 15°	0.9541	0.9427
Optical Rotation	+21° 41'	+18° 54'
Refractive Index at 20°	1.4794	1.4810
Acid Number	1.4	0.88
Ester Number	28.2	10.3
Ester Content, Calculated as Linalyl Acetate	9.85%	7.1% (?)
Free Alcohol Content	6.53%	6.57%
Total Alcohol Content	14.28%	12.1% (?)
Solubility	Soluble in 2.2 vol. of 70% alcohol	Soluble in 2.1 vol. of 70% alcohol

The oils investigated by Rovesti⁷ contained fenchone and camphor.

Distilling the herb of *Lavandula stoechas* in Sardinia, Puxeddu⁸ obtained two oils (yield 0.4 per cent and 0.32 per cent) which exhibited these properties:

Specific Gravity at 20°	0.9497	0.9450
Optical Rotation at 20°	+12° 46'	+19° 9'
Refractive Index at 20°	1.4676	1.4687
Acid Number	0.8	
Saponification Number	20.9	

⁵ *Mem. acad. cienc. Madrid* 29 (1919). Gildemeister and Hoffmann, "Die Ätherischen Öle," 3d Ed., Vol. III, 681.

⁶ *Profumi italici* 3 (1925), 218.

⁷ *Ibid.*

⁸ *Ann. chim. applicata* 15 (1925), 161, 166.

Ester Content, Calculated as	
Bornyl Acetate.....	7.07%
Saponification Number after	
Acetylation.....	69
Free Alcohol Content.....	13.45%
Total Alcohol Content.....	19%
Solubility in 80% Alcohol...	Soluble in 1 vol.

Chemical Composition.—The above named authors established the presence of the following compounds in the oil of *Lavandula stoechas* L.:

d-Camphor. M. 175°–175.5°; identified by means of its oxime m. 117°–118°, and of its semicarbazone m. 231°. (Schimmel & Co.)

d-Fenchone. Identified by preparation of its oxime m. 165°. (Schimmel & Co.)
The same components were observed by Rovesti, and by Roure-Bertrand Fils.
The chemists of the last named firm expressed the opinion that the oil contains also

Fenchyl Alcohol(?).

Terpineol(?) and a Phenol(?).

Cineole. The presence of cineole was proved by Dorronsoro.

Use.—Oil of *Lavandula stoechas* L. has not attained any commercial importance.

OIL OF *LAVANDULA VIRIDIS*

Distilling the fresh flowering tops of *Lavandula viridis*, which grows wild in Portugal, Costa and do Vale¹ obtained 0.5 to 0.8 per cent of essential oil which had these properties:

Specific Gravity at 14°.....	0.9239
Specific Optical Rotation at 14°.....	+2° 56'
Refractive Index at 13°.....	1.4745

On closer examination the oil was shown to consist of:

	<i>Per Cent</i>
Terpenes (α -Pinene, Camphene, etc.).....	20
Cineole.....	30
Alcohols (Borneol and Geraniol).....	26

¹ *Bol. escola farm. univ. Coimbra Portugal* 5 (1945), 1. *Chem. Abstracts* 42 (1948), 3908.