

Oil from the Flowers and Leaves of *Lavandula Burmanni*.

(by *Darab Dinsha Kanga, M. A., F. C. S.*)

Lavandula Burmanni belongs to the natural order "Labiatae"; it is found in great abundance in Poona and the Deccan, India.

The vernacular names of the plant are significant;

1. (Sarpno Charo); sarp means serpent; in the places where the plant grows serpents abound; it is supposed to act as an antidote against poison; the roots are rubbed with water and the solution or the paste is applied over the sting of wild animals; the powdered leaves are given for inhalation to the person who has been stung by a serpent in order to prevent him from falling into sleep.

2. (Aasmani Qalgot), from the sky blue (Aasmani) colour of its flowers.

3. (Wild Lavender) from its belonging to the same genus to which "*Lavandula Vera*", English Lavender, belongs.

Mr. Indrajī, the author of "*Vanaspati Shastra*," a book containing valuable information on the flora of the Western Presidency, India, writes that it is not known whether anybody else has made use of the plant except that the villagers and shepherds of the Barda Hills in Kathiawar have used it as a medicine.

In the months of July and August during the monsoons the air in the neighbourhood of the fields where this plant grows becomes richly laden with a fine perfume. The plant flowers in the months of October and November.

279 lbs. of air-dried flowers were kindly sent to us in December 1912 by Mr. Burns, the Economic Botanist, Poona. We also received 42 lbs. of the plant without the flowers from Mr. Viccajee, Bombay, in the month of February 1913 for investigation.

It was noticed from the experiments made that the oil obtained from the flowers was quite different in all respects from that obtained from the leaves; it differed both physically and chemically; the yield of oil was greater from the leaves than from the flowers.

The following table will give some idea as to the differences in the physical properties and chemical composition of the two oils :—

	Oil from flowers	Oil from leaves.
Colour	Red	Yellow
Odour	Pleasant, somewhat peppermint like.	Very pleasant, resembling lemon-grass.
Specific gravity	$D_{15}^{24.5}$ 0.923	$D_{15}^{26.75}$ 0.895
Optical Rotation	Colour too deep to allow of determination.	$[\alpha]_D$ —0.37°
Refractive Index	n_D^{25} 1.4683	$n_D^{28.5}$ 1.4822
Solubility in 70% alcohol	1 part in 28 parts	1 part in 2 parts
Saponification value	149.5	44.25
Acetyl value	199	111.4

Oil from the Flowers of Lavandula Burmanni.

The oil from the flowers was subjected to fractional distillation and the following fractions collected :—

Fractions	B. P.	Pressure (m m)	D	n_D	$[\alpha]_D$
1.	85°-105°	29	$D_{15}^{24.15}$ 0.888	n_D^{25} 1.4469	+10.5°
2.	105°-133°	29	D_{15}^{23} 0.926	$n_D^{25.2}$ 1.4662	—0.98°
3.	133°-155°	29	$D_{15}^{23.5}$ 0.959	$n_D^{24.8}$ 1.4958	—5.03°

Further examination of the first and second fractions of the oil from the flowers, boiling between 85°-105° and 105°-133° respectively at 29 mm. pressure was made.

81 c. c. and of 50 c. c. of the two fractions respectively were separately treated with excess of alcoholic potash from 6 to 9 hours on the water bath with a reflux condenser; ethyl alcohol was then removed by distillation; the contents left in the flask were diluted with water and then steam-distilled as long as the oil passed over; the fractions were treated three to four times with ether; the ethereal solutions dried over anhydrous sodium sulphate, filtered and ether separated by distillation.

The following fractions were obtained from the three distillates of the first fraction after saponification and steam-distillation, the physical constants of some of them being also given:—

	I	I	II	II	III	III	First fraction
	a	b	a	b	a	b	before saponi-
	*	*	*		*		fication.
B. P. at	150.5°	175°	173°	186°	174°	195°	85° to 105°
normal	to	to	to	to	to	to	at 29 mm
pressure	175°	187°	181°	205°	184°	210°	
D	0.864		0.865				0.888
	(24°)		(27°)				(24.5°)
	(15°)		(15°)				(15°)
n_D	1.4441	1.4568	1.4473	1.466	1.4547	1.4763	1.4469
	(27.6°)	(27.5°)	(26°)	(28.8°)	(27.9°)	(27.5°)	(25°)

*These four fractions were mixed together and distilled with a fractional column: the following fractions were obtained:—

1st fraction	B. P.	160°—169°	(normal pressure)
2nd fraction	B. P.	169°—172°	"
3rd fraction	B. P.	172°—175°	"

The fraction boiling between 169°-172° was acetylated; the acetylated oil was very pleasant in odour.

Saponification value of the acetylated portion (B. P. 169°-172°); 2.0218 gms. of the acetylated oil required 0.45496 gms. of KOH for saponification; saponification value 225.

If we suppose the ester to have the formula $C_{10}H_{17}O.OCC_3H_7$, and calculate the percentage upon that, it would come to $\frac{M \times A}{560} = \frac{190 \times 225}{560} = 78.75\%$ ester, where M is the mol. wt. of the ester and A the ester number; so far as it is ascertained there is no alcohol known to boil between 169°—172° at the ordinary pressure; it may be a new alcohol peculiar to the oil; we have not been able to identify it on account of the very small quantity of the fraction but we intend doing so as soon as a sufficiently large quantity of the oil has been obtained.

The distillate obtained after saponification and steam-distillation of the 2nd fraction b. p. 105°-133° (29 mm) was fractionally distilled; three fractions boiling between 155° and 238° were obtained; as the quantity of each fraction was very little, they were kept over, till a large quantity of the oil was obtained.

After saponification and steam-distillation of the first fraction of the oil (b. p. 85° - 105° , at 29 mm), the alkaline liquid remaining in the distilling flask was made strongly acid with H_2SO_4 and the acids so set free were steam-distilled; in the distillate there was obtained a very small quantity of a scarlet-red precipitate which was filtered off; the red substance was an organic acid for it left no ash on ignition and dissolved in sodium carbonate yielding a purple coloured solution. It was insoluble in water and decomposed at about 200° but no sharp m. p. was obtained. The quantity was too small for further examination.

The filtrate obtained after removing the scarlet-red precipitate was neutralized with Na_2CO_3 and the last solution concentrated; on cooling after a few days a sodium salt in beautiful crystals separated; this was converted into a silver salt which crystallized in long beautiful needles; the analysis gave the following results, showing it to be silver acetate.

Exp. 1. 0.1202 grms. of the salt gave 0.2689 grms. Ag Ag=63.9%

Exp. 2. 0.3516 grms. of the salt gave 0.2267 grms. Ag Ag=63.9%

(CH_3COOAg contains 64.67% Ag.)

The mother liquor, from which the sodium acetate was separated, was acidified and taken up with ether; the ethereal solution was dried over anhydrous $CaCl_2$ and the ether distilled off; the quantity of acids was too small for further investigation; qualitatively it gave tests for formic acid.

I desire to express my thanks to Lt.-Col. K. R. Kirtikar, Bombay, for drawing my attention to the investigation of this subject, to Prof. W. Burns, Economic Botanist, Poona, and to Mr. F. K. Viccajee of Bombay for supplying the flowers and the leaves of the plant respectively and to my Professor, Dr. J. J. Sudborough for his valuable help during the course of the work.