Standards for essential and vegetable oils – trade facilitator or barrier?

Karen Swanepoel
SA Essential Oil Producers Association

15 September 2023

SAEOPA
Southern African Essential Oil Producers' Association

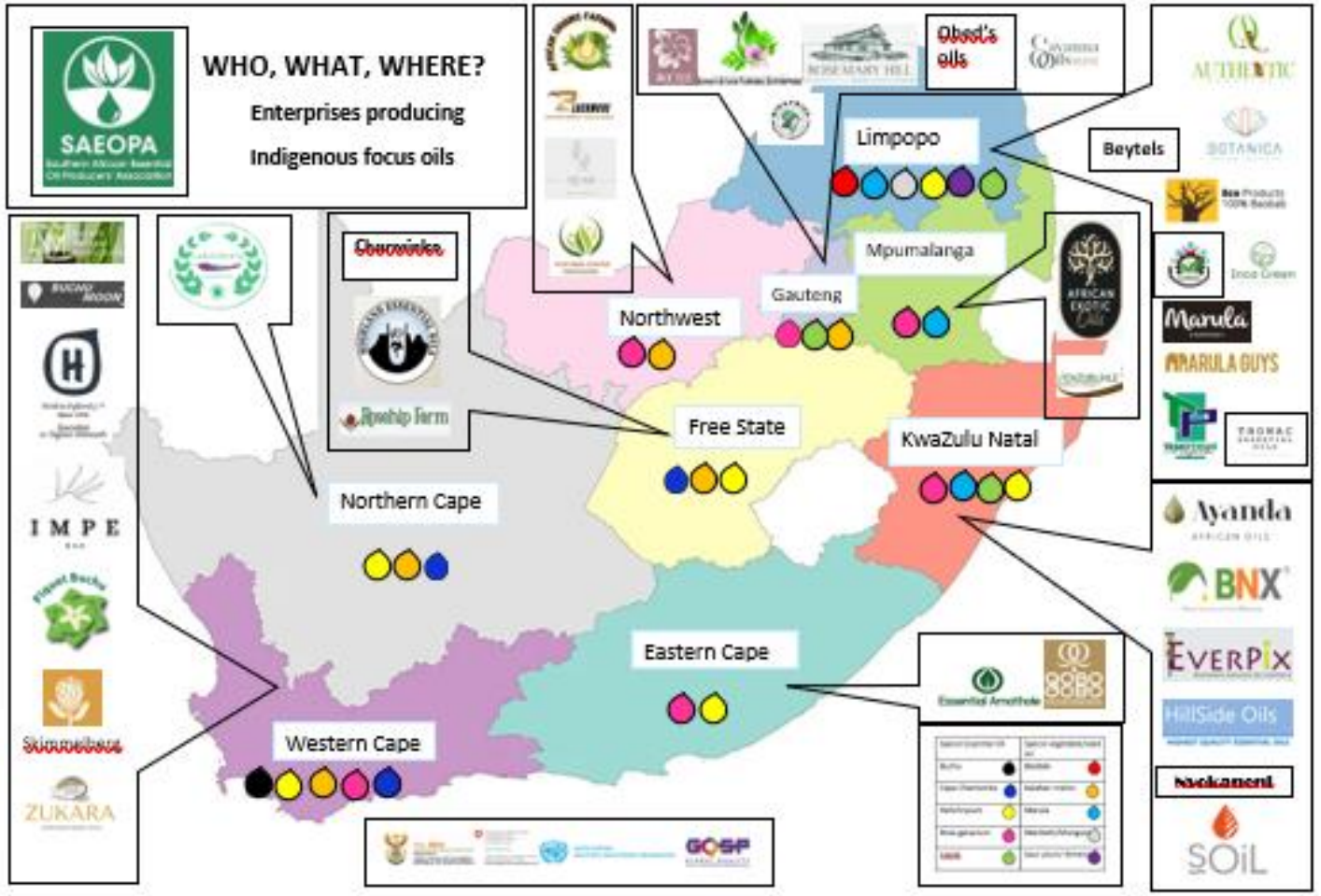
The importance of ISO standards for essential and vegetable oils In South Africa

African Biotrade Festival

KM Swanepoel
2023

Confirming the need of standards

The Department of Trade, Industry and Competition of South Africa (the dtic), the United Nations Industrial Development Organization (UNIDO), and the Swiss State Secretariat for Economic Affairs SECO meeting 24th May 2023



the dtic
Department:
Trade, Industry and Competition
REPUBLIC OF SOUTH AFRICA

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

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STANDARDS IN SA ON THE WAY

Five Species Essential Oil for standards

- *Pelargonium var Rose* / Rose Geranium
- *Eriocephalus punctulatus*/ Cape Camomile
- *Agathosma crenulata and A betulina* /Buchu /Boegoe
- *Helichrysum spp* Imphepho
- *Lippia javanica* -fever tea, lemon bush.

SAEOPA

SABS

Your ref: SANS 4731
Our ref: SABS/TC 0040
Enquiries: SABS/Standards Sales
Telephone: (012) 428-7911
Date: 2021-06-28

TO ALL MEMBERS OF SABS/TC 0040

Dear member

APPROVAL FOR PUBLICATION OF THE STANDARD

It is our pleasure to inform you that **SANS 4731** *Essential Oil of geranium (Pelargonium x ssp.)* has been approved for publication.

The document will be available for sale once the publication process has been finalized. Please contact SABS Standards Sales on 012 428 7911, or visit our website at www.sabs.co.za regarding the purchasing of the document.

Yours faithfully

Colleen Masemene

Committee Administrator | Standards Committee Support
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Vegetable/Seed Oil for standards

- *Sclerocarya birrea* Marula
- *Adansonia digitata* Baobab
- *Citrullus lanatus* Kalahari Melon / t'sama
- *Schinziophyton rautanenii* Manketti /Mongongo Manketti / Mongongo in English
- *Ximenia americana*: Kleinsuurpruim (Afrikaans), sour plum/tallow wood (English), cerise de mer (French), habbuli (Fulani), and mtundakala (Swahili)
- X caffra: large sourplum (Eng.); grootsuurpruim (Afr.); umThunduluka-obmvu (Zulu); Morokologa (Northern Sotho)

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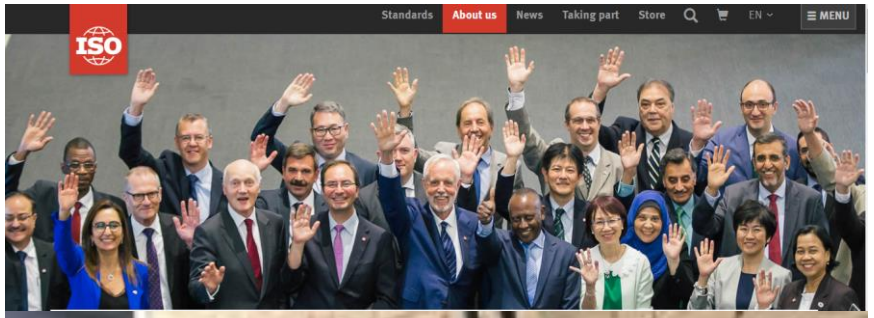
Why, which standards?

- Standards of aromatic and medicinal plants are not very well published and applied in developing countries.
- Prior to 2018, South Africa have published only two ISO standards published for medicinal plants namely Aloe ferox and Moringa oleifera.
- This situation led to exploitation by the buyers of oils from less developing countries.
- The recent increase in demand is observed but the standards are not keeping up with the new development in the industry.
- **In this presentation, the procedure for the writing of standards and the status of ISO standards as submitted to SABS is explained for *Pelargonium var rose* (Rose geranium), *Adansonia digitata* (Baobab), *Sclerocarya birrea* (Marula), and *Lippia javanica*.**



Writing standards with SABS and ISO

- A thorough database of the certificates of analysis of producers throughout South Africa was used to compile a range of expected values.
- This was then used for the ISO amended standard for the essential oil of Rose geranium and it has now been published by the SABS (South African Bureau of Standards).
- **For Baobab and Marula a standard was compiled using test results from the producers through producer's associations.**
- **For *Lippia javanica*, test results of producers and publications were used and publications of research were included.**
- The standards are important to distinguish South African oil from that of other countries as well as to indicate it as authentic and not fake.
- It also allows negotiation for better prices and internal quality control by the industry.

Farmers Weekly

DES 1965

Rose Geranium in SA and Zimbabwe as a crop

MODERN HORTICULTURE AND SMALLHOLDINGS

GERANIUM OIL IS

Rhodesia could well become the biggest producer of geranium oil in the world writes GEORGE NICHOLAS

A RHODESIAN experiment in the production of geranium oil on a field scale for the lucrative overseas perfume market has proved remarkably successful. It has indicated that the climate is ideally suited to the commercial production of this crop and that this country could well become the biggest producer of geranium oil in the world.

The experiment began five years ago when an enterprising Government farmer, Mr J. R. Daines, in search of a profitable cash crop, planted his first geranium cuttings on his farm, Mzuri Sana, some 20 miles south-east of Salisbury.

The cuttings did so well that he decided to grow the crop on a commercial scale, but before doing so he first visited Kenya to study production and management techniques, and then France, to investigate the market supply and demand and the prices offered.

Since then he has made considerable strides with the production of the crop. Today he has no fewer than 92 acres under geraniums, and he plans to extend at the rate of 150 acres a year to a maximum of 450 acres.

VARIETY OF USES

Geranium oil has a remarkable variety of uses in the essential oil industry. It is used mainly to blend the various scents in all types of perfumery, but it is also used extensively as an aromatic element in soaps and detergents.

So far geranium oil has been produced chiefly in the French possessions of North-West Africa and in the French island of Reunion, but in recent years political disturbances in Africa have severely handicapped production, and supplies from these sources have become unreliable.

France has been exploring the possibilities of other sources of supply, and appears to be so pleased with the oil distilled on the Goromonzi farm that it has contracted to take all its output at a guaranteed minimum price of 50s. per lb.

Mr Daines says his progress in the first few years was somewhat slow until he mastered the technique of propagating cuttings on a large scale. This method of propagation is necessary as the species of geranium used, Pelargonium graveolens, does not set seed.

This species has given the best

Pelargonium radula, which has taken a much longer time to acclimatise, is also now being propagated on the farm. Both species have been imported from Kenya.

The field crop is grown under dryland conditions, although it is necessary to keep plants watered in the early stages of establishment. The farm is flat in topography and the soil is almost exclusively a well-drained sandy loam.

The lands on the farm are ploughed in January-February to a depth of about 15 inches, and are then heavily disked to obtain a good tilth. The geranium plant has an economic life of about three years, hence the need for careful land preparation.

...ines shows how the geranium oil is filtered into the ... that take it by air to France. When full this drum will contain 222lb. of oil, worth about £500.

A BIG SUCCESS

Cuttings are rooted in special nursery beds, and it takes about six to eight weeks for the cuttings to strike.

At present there are about 1,200,000 rooted cuttings in these beds — enough to plant some 300 acres. Most of the rooted cuttings are transferred to the lands immediately after ploughing in February-March, but planting continues whenever convenient.

CHECK-ROW PATTERN

Planting is done by hand on the check-row pattern, with rows four feet apart and plantings stations at 18 inches in the row. This gives a density of 3,630 plants an acre.

To develop the root systems of the plant as rapidly as possible, Mr Daines applies a small quantity of superphosphate at planting. After that no fertiliser whatsoever is given. Experience has shown that an unfertilised plant 18 inches high yields as much oil as a fertilised plant 30 inches high.

The soil structure of the lands, however, is improved from time to time by ploughing under the bagasse (plant residue after the oil has been extracted) coming from the distillation plant.

The lands are cultivated mechanically until the plants are big enough to defeat surrounding weed growth.

Harvesting the crop starts some nine months after planting, when the stalk and leaf on the northern ends are removed by hand, followed some three weeks later by the removal of the stalk and leaf on the south side.

If everything is taken off at the same time the plant will die, but if this operation is done in two stages, growth remains prolific.

The harvested material is placed on a trailer and removed by tractor to the distillation plant where it is transferred to cylindrical retorts. Steam is then sent through the material, the oil content is vaporised, and the steam cooled in special condensers.

The water and oil are then separated by specific gravity, and the oil is filtered into small drums holding 222lb. for air-freighting to France.

Mr Daines says he takes three cuts during the harvesting period of November to May, and at present his lands are yielding an average of 13½ lb. of distilled oil per cut per acre.

Being a perennial, the output of the plant in the first and third year will necessarily be lower than in the second year when it is at its peak, but the income per acre, he says, should average about £70 a year. Production costs average £25 to £30 a year.

Mr Daines has evolved a rotation in which geraniums are grown on the land for three years, followed by either Katambora Rhodes grass or

Below: A bed of young rooted slips in the nursery on Mr Daines's farm. The rows are spaced 4ft. and are 25 yards long.

This is how the harvested foliage is loaded into the drum for steam distillation.

Swaziland for two years before reverting to geraniums again.

He combines geranium production with beef production, and runs a herd of slaughter cattle to utilise the established pastures. To date the geranium crops have proved remarkably resistant to all diseases and pests. There has been no nematode damage, no blight and no other leaf disease, and the only trouble experienced has been a small amount of rootrot during the rainy season in pockets of land not well enough drained.

Damage by insects has been confined to an occasional attack on single plants by white ants, but these are relatively easily controlled with dieldrin watered into the soil.

Frost will retard growth and it is therefore best to plant the crop in well aired areas. Geraniums do not require a large labour force. At present Mr Daines manages well with a permanent force of eight males plus casual labour (usually about 15 women) at reaping time.

Mr Daines says that, from the practical point of view, the simplicity of geranium production and management are the greatest assets of this new crop. Added to this is the plant's resistance to disease and pests, and its low fertiliser requirements.

Although the basic price of natural geranium oil is 50s. a lb., the world price in recent years has been between 120s. and 140s., and it is quite possible that Rhodesian oil, once it becomes established and continuity of supply is assured, will command higher prices in the future.

Mr Daines feels there is nothing to prevent Rhodesia from capturing 10 per cent. of the world market for geranium oil in the next year or two and with the continued expansion of world demand, from stepping up this percentage to at least 25 per cent. in the next five or six years. If this is done, Rhodesia may well become the biggest single producer in the world.

He is confident that the crop has great possibilities, not only as a commercial line on European farms, but also as a profitable cash crop for African farmers both in the Purchase Areas and in Tribal Trust Land. In most other countries geranium oil is primarily a peasant crop.

He says it should not be too difficult to develop portable distillation plants for processing African geranium crops on the spot.

The Ministry of Agriculture is also optimistic about the possibilities of the crop. The Chief Government Horticulturist, Mr C. N. Harter, has taken a keen interest in the Mzuri Sana venture right from its inception, and he has reported that the geranium has a promising future in Rhodesia if grown under correct climatic and soil conditions. ●

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Rose geranium - Rwanda, Egypt, Madagascar, Reunion, China & India – without permits

Government Push Helps Geranium Emerge As An Alternate Crop In State | Raipur News - Times of India

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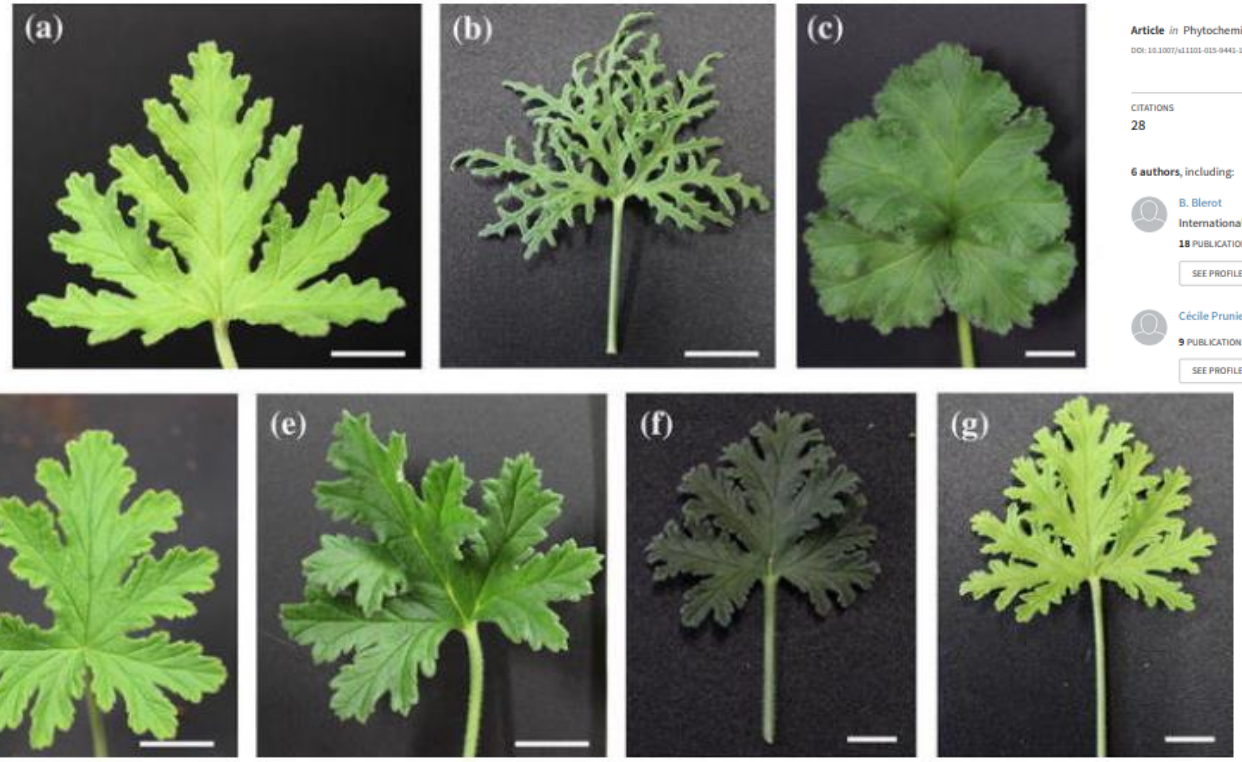
Rose geranium, a misnomer in the trade



Scented Pelargonium species or cultivars leaves aP. graveolens; bP. radens; cP. capitatum;dP. × hybridum cv. 'Rosat Egypt'; eP. × hybridum cv. 'Rosat Bourbon'; fP. × hybridum cv. 'Rosat Chine'; gP. × hybridum cv. 'Rosat Grasse'); Scale bars 10 mm

Botany, agronomy and biotechnology of Pelargonium used for essential oil production

Article *in* Phytochemistry Reviews · October 2016

DOI: 10.1007/s11101-015-9441-1

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Culture de géraniums rosat à La Réunion.

SA production

Pelargonium EOs are most often used to replace Rosa damascena EO

Essential oil of geranium, from the South African hybrid *Pelargonium var Rosé*, now has an officially defined standard based on its unique chemical composition

The South African Bureau of Standards (SABS) formally sets apart South African products in such a way that it can be branded by its country of origin, with the prospect of better exports – at better prices – as the global market recognises its value, according to SABS Executive: Standards Development, Dr Sadhvir Bissoon.

Geranium oil is heavily used in the perfume industry and in perfumed household products of all kinds, and rates as one of the most important essential oils. Much of that oil comes from plants cultivated in China and North Africa, where modern hybrids were developed. According to the new SANS 4731:2021 standard, one can tell by both sight and smell if it originated from South Africa. "South African oils are dark green in colour in contrast to the yellow-green associated with other sources," reads the document. According to the SABS, "South African National Standards, such as SANS 4731, aims to ensure that the unique features of a South African essential oil can be distinguished from other oils produced abroad." The national standard will assist to distinguish locally produced oil and link it to a country-of-origin status.

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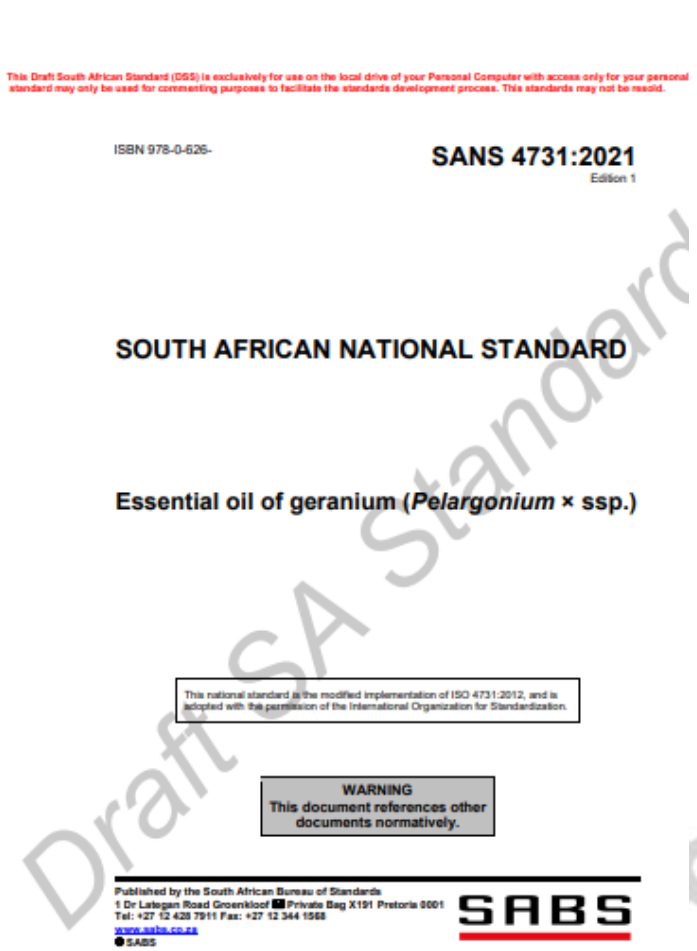
Composés caractéristiques de l'huile essentielle de géranium rosat en % (d'après Lis-Balchin [12] et Boukhatem et als [13])						
Cultivar	**Citronellol**	**Géraniol**	**Formate de citronellyle**	**Guaia-6,9 -diène**	**10-epi-γ-eudesmol**	**C/G**
Bourbon	19,0	21,5	8,5	7,2	-	0,9
Égypte	26-29	9	6	tr	+++	3
Chine	29	6	13	7	++	5
Algérie	33	5	10	9	+	6

- The international misnomer of Geranium oil from Pelargonium graveolens is addressed.
- More DNA studies are needed to improve the yield and confirm chemotype of Pelargonium graveolens, P radens and P capitatum in SA.
- Pelargonium EOs are most often used to replace Rosa damascena EO, which is very expensive
- We are grateful for all the efforts and coordination from the GQSP-SA and UNIDO, Dr Elsie Meintjies, SABS staff, the technical committee and, the oil producers of SAEOPA.

What does a standard look like?



ISBN 978-0-626-

SANS 4731:2021
Edition 1

SOUTH AFRICAN NATIONAL STANDARD

Essential oil of geranium (*Pelargonium* × ssp.)

This national standard is the modified implementation of ISO 4731:2012, and is adopted with the permission of the International Organization for Standardization.

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This document references other documents normatively.

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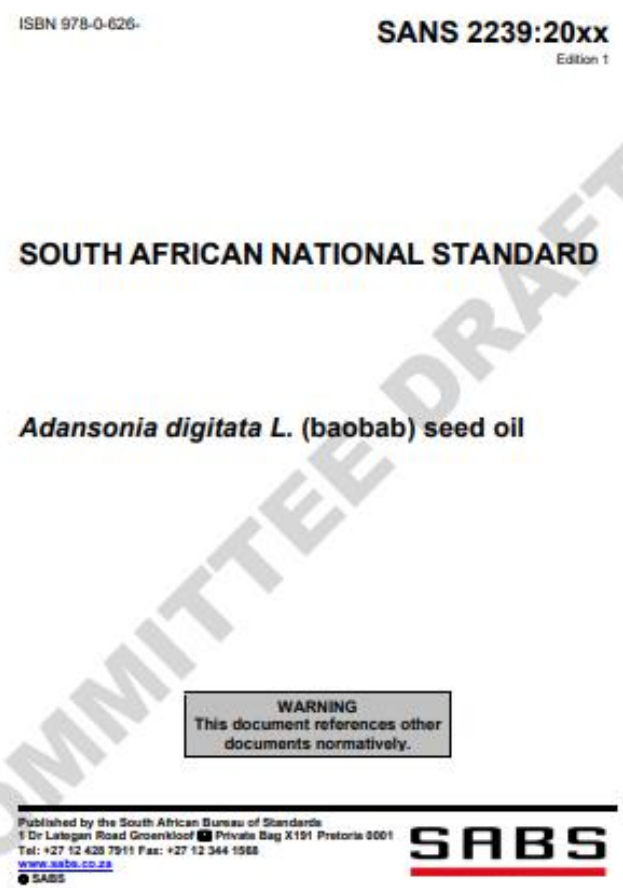

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SOUTH AFRICAN NATIONAL STANDARD

Adansonia digitata L. (baobab) seed oil

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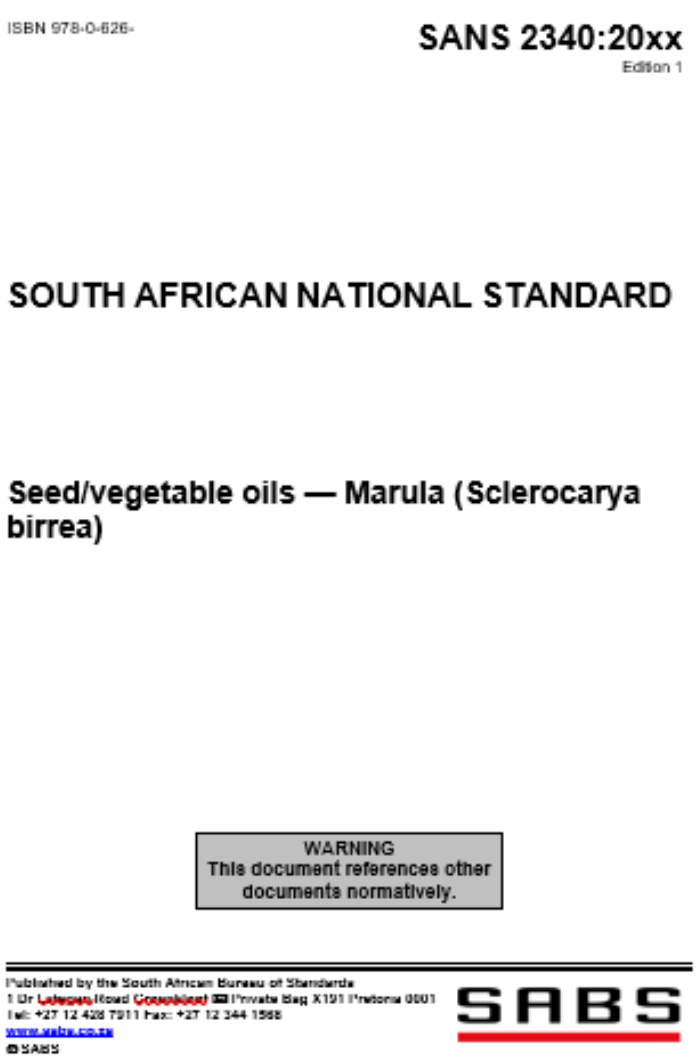

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SOUTH AFRICAN NATIONAL STANDARD

Seed/vegetable oils — Marula (Sclerocarya birrea)

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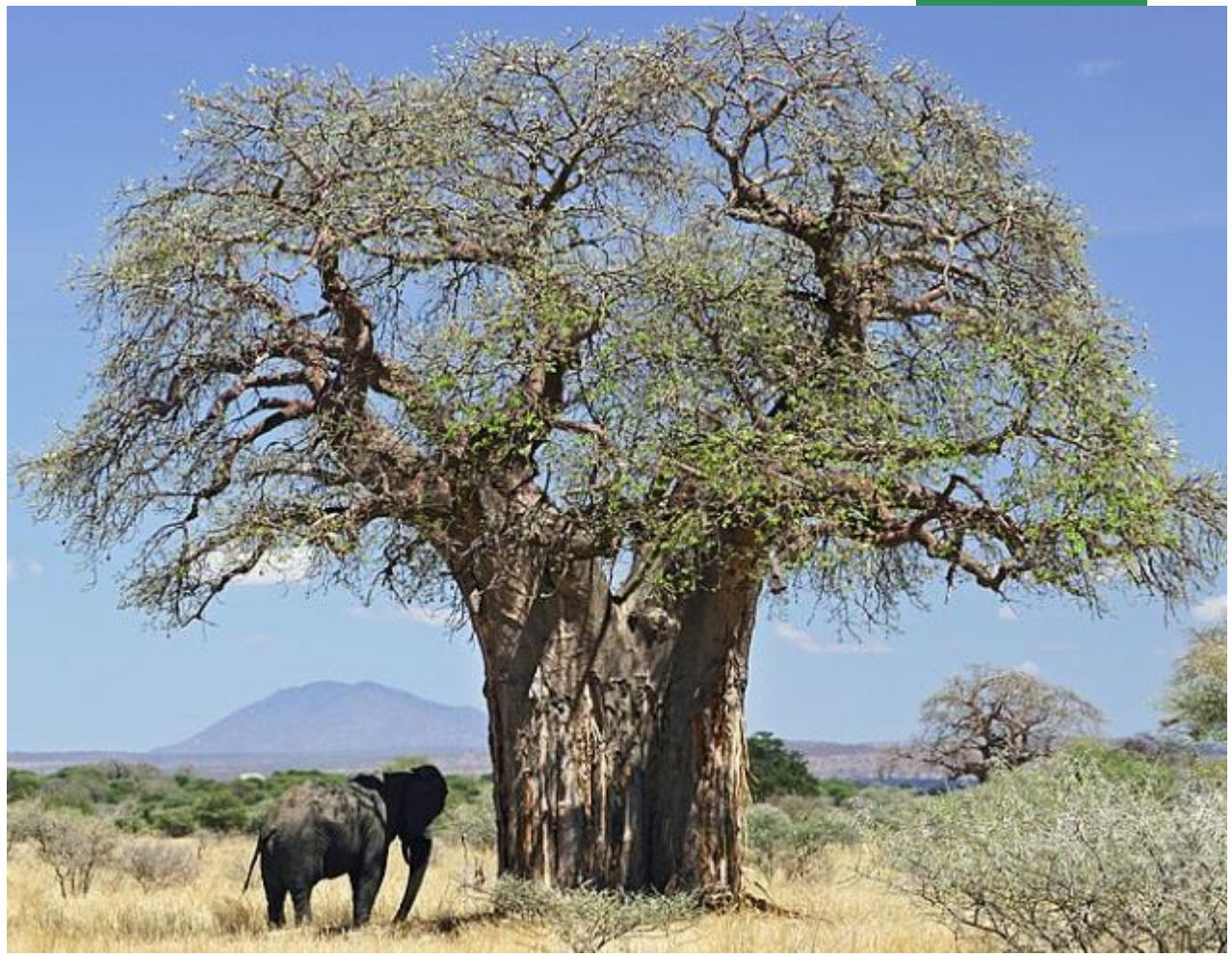
Baobab standard - Published

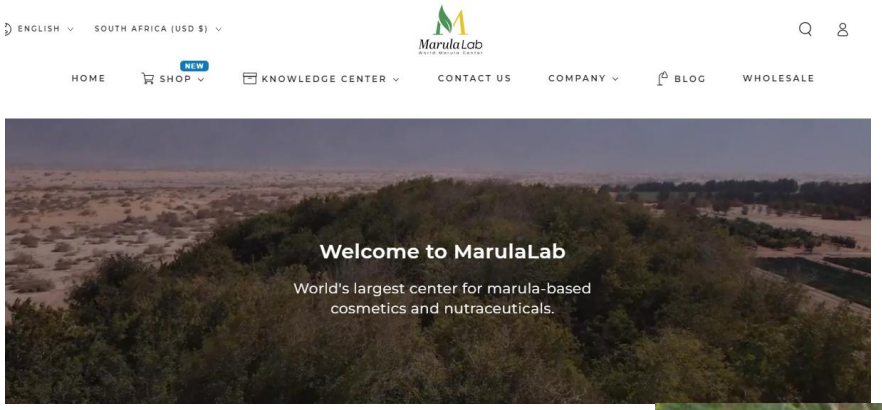
- The Baobab standard for oil has been accepted by the technical committee and included fewer variable as the region for Baobab oil is limited to the northern part of South Africa and its neighbouring countries.
- It was found not to be very different across the border in other producing countries.
- This has been seen as a tremendous help as the buyers themselves are not always informed of the chemical analysis, and by having a standard, pure oil can be distinguished.
- Baobab oil is applied in many cosmetic products as it is assisting in damage repair and health of the skin.
- The national standard for baobab oil is now available as a publication.



Marula standard second round of public comment

- **Marula oil has a clear, light-yellow colour and a nutty aroma. It has a saponification value of approximately 188–199 and a specific gravity of 0.91–0.92 (at 15 °C).**
- Marula oil contains a large proportion of monounsaturated fatty acids which make the oil very stable. The fatty acid composition of marula oil includes:
  - Monounsaturated fatty acids: Oleic acid (70-80%)
  - Polyunsaturated fatty acids: Linoleic acid (4-7%) and Alpha-linolenic acid (0.1-0.7%)
  - Saturated fatty acids of Marula : Palmitic acid (9-12%), Stearic acid (5-8%), and Arachidonic acid (0.3-0.7%)
- The Marula oil standard is also submitted by the technical committee and was available for public comment. The draft national standard for marula oil was developed by an expert working group and available for public comment 2nd round.
- **The standards are important to distinguish South African oil from that of other countries as well as to indicate it as authentic and not fake. It also allows negotiation for better prices and internal quality control by the industry which mostly involves impoverished communities**.
- Marula oil is used in hair and skin products and becoming increasingly popular as a carrier oil in aromatherapy.

Marula in Israel



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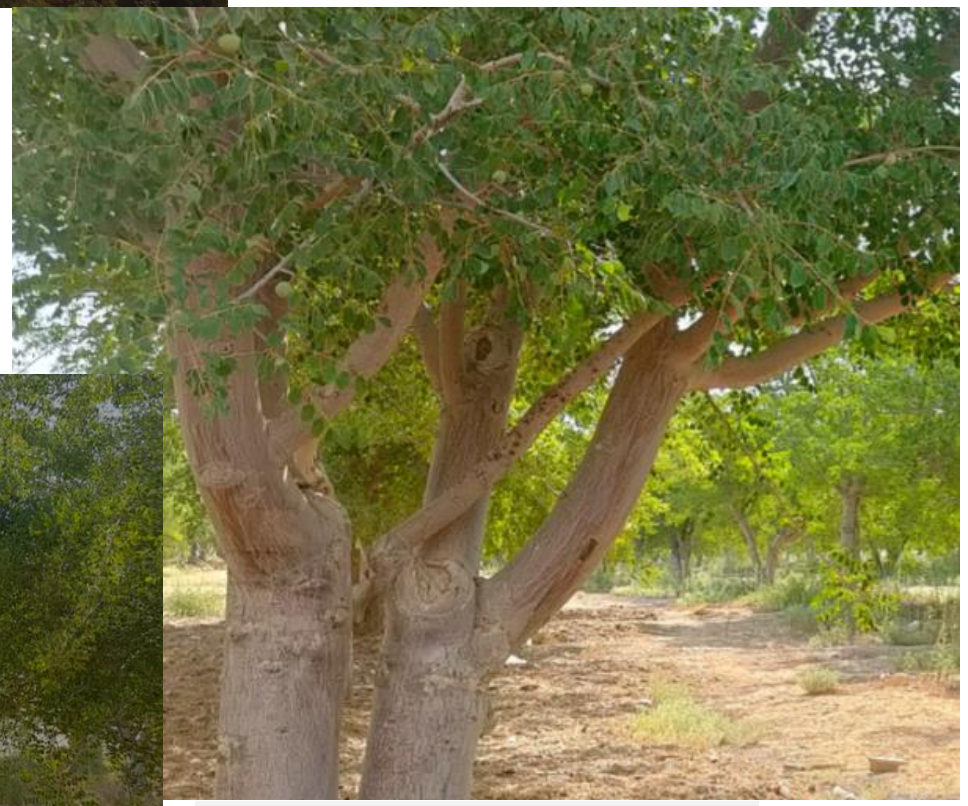
Orchard planted

Full fatty acid analysis-

- Lauric acid (C12:0): 0.4%
  - Palmitoleic acid (C16:1, Omega-7): 0.3%
  - Oleic acid (C18:1n9c, Omega-9): 72.1%
  - Linoleic acid (C18:2n6c, Omega-6): 4.51%
  - α-Linoleic acid (C18:3, Omega-3): 0.6%
  - Behenic acid (22:0): 0.2%
  - Lignoceric acid (C24:0): 0.2%

No permits needed



Source
World's purest organic Marula oil – MarulaLab

- https://marulalab.org/

150 g consumer pack

2 L & 4 L oil

Lippia javanica – next standard by working group and Technical committee formed, first meeting

- Drought and flood survivor
- Most provinces wild, rural areas
- Insect repellent - candles
- Tea, gins, and other beverages
- Steaming for chest problems
- Future for black spot, on export fruit
- Permits needed

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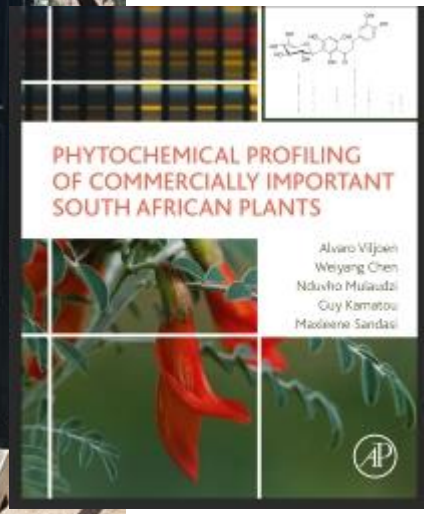
ACADEMIA
Input MUCH appreciated!



What information is in a standard?

SABS

SANS 2340:20xx
Edition 1

Contents

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Requirements according to ISO

- Appearance
- Colour
- Odour
- Relative density
- Refractive index
- Acid value
- Optical rotation
- Miscibility in alcohol
- Chromatographic profile
- Flashpoint
- Packaging, labelling and marketing

SUSTAINABLE DEVELOPMENT GOALS

This committee contributes with 8 standards to the following Sustainable Development Goals:

3 4 8 9 12

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137	5	16	32
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ISO is an independent, non-governmental international organization with a membership of 167 national standards bodies.

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VISITING ISO [PDF, 1.29 MB]

What values are used for the standards?

Annex A
(normative)

A.1 Validity of this Standard to other African regions

The reference values in Table 1 of this standard have been tested against marula oil originating in Southern regions of continental Africa. Statistical analysis showed no significant differences between oils originating from the different regions and therefore this standard is applicable to marula oils originating from the above mentioned region.

A.2 Functional claims

A.3 Description of species

The marula tree (S. birrea (A. Rich.) [illegible] subsp. [illegible] ([illegible]) [illegible] ([illegible]) is an important food, commercial, cultural, and ethnomedicinal plant in Africa ([illegible] et al., 2010). This medium-sized deciduous tree can grow up to 18 m in height. It is leafless for several months (winter) of the year, flowers from September to November, and bears fruits from January to March. It produces edible yellow oblong-shaped fruits (3–4 cm in diameter) with tough skin and juicy mucilaginous flesh. The seed encloses 2–3 soft white edible kernels, which are rich in oil and protein.

This tree is distributed throughout Africa with its southernmost location in the lowlands of KwaZulu-Natal (South Africa) from where it extends northwards through tropical Africa into Ethiopia and Sudan. In southern Africa, the tree is also found in Eswatini, Botswana, Angola, Zimbabwe and Namibia, and Malawi.

A.4 Best practice of preserving marula oil

Preservation of vegetable oil, such as marula oil is best done by:

- Storage in ambient or below ambient temperature.
- Out of direct light or sunlight
- Nitrogen capping storage containers

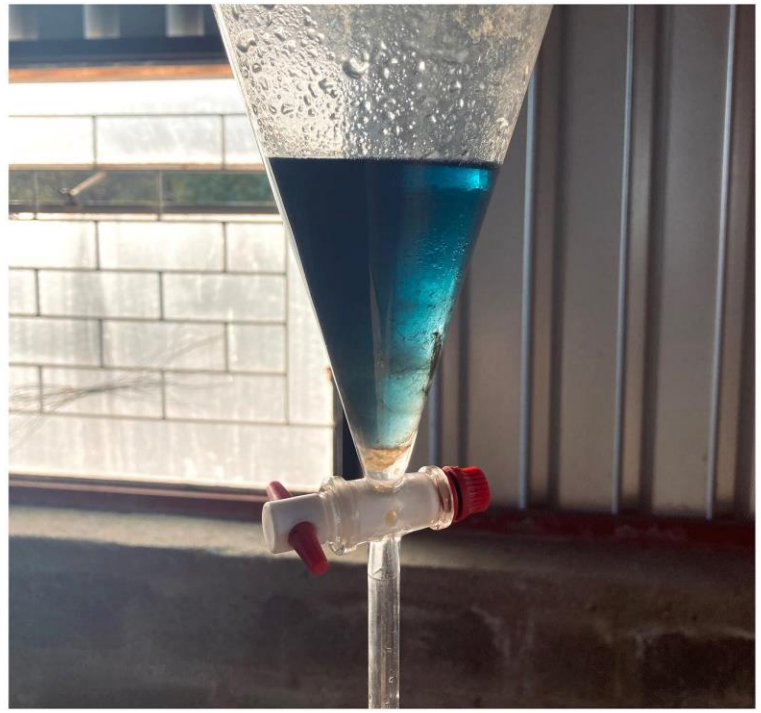
Addition of 180ppm tocopherol (e.g. Vitamin E).

SANS 2340:20xx
Edition 1

Table 1: Marula Oil Reference Values

FA* = Fatty acids. ND = Not detected. Reference values are determined from laboratory results (n=10) and **Codex. Fatty acids ND ≤ 0.09, Peroxide value ND ≤ 0.81, Acid value ND ≤ 0.112, Anisidine value ND ≤ 0.52, Unsaponifiable material ND ≤ 0.24

Fatty Acids	Unit	Reference Values	
		Minimum	Maximum
C14:0 Myristic acid	g FA*/100g FA*	ND	0.5
C15:0 Pentadecanoic acid	g FA*/100g FA*	ND	0.1
C16.0 Palmitic acid	g FA*/100g FA*	9.9	13.7
C16:1 Palmitoleic acid	g FA*/100g FA*	ND	0.3
C17:0 Margaric acid	g FA*/100g FA*	ND	0.4
C17:1 [illegible] acid	g FA*/100g FA*	ND	0.3
C18:0 Stearic acid	g FA*/100g FA*	5.7	9.8
C18:1 cis Oleic acid	g FA*/100g FA*	69.5	80.9
C18:2 trans Linoleic acid	g FA*/100g FA*	ND	0.0
C18.2 cis Linoleic acid	g FA*/100g FA*	3.7	9.0
C18:3 n6 Linolenic acid	g FA*/100g FA*	ND	0.3
C18:3 n3 Linolenic acid	g FA*/100g FA*	ND	1.4
C20:0 Arachidic acid	g FA*/100g FA*	ND	1.4
C20:1 [illegible] acid	g FA*/100g FA*	ND	0.5
C20:2 [illegible] acid	g FA*/100g FA*	ND	ND
C21:0 [illegible] acid	g FA*/100g FA*	ND	ND
C22:0 Behenic acid	g FA*/100g FA*	ND	0.72
C22:1 Erucic acid	g FA*/100g FA*	ND	ND
C24:0 Lignoceric acid	g FA*/100g FA*	ND	0.31
C24:1 Nervonic acid	g FA*/100g FA*	ND	ND
Iodine Value		70	78
Saponification Value	mg KOH/g	187	198.5
Peroxide Value	[illegible]/kg	ND	4
Acid Value	mg KOH/g	ND	4
Anisidine Value	mmol/kg	ND	2.0
Unsaponifiable Material	g/100g	0.4	2
Relative Density	At 20°C	0.908	0.911
Refractive Index	At 20°C	1.460	1.470
Insoluble impurities	g/100g	0.0	1.0
Moisture	g/100g	0.0	0.2



Colour of the oil included in the standard

Voluntary standards and certifications

- Germany has its own standard. Fair production, a small niche market in terms of certified cosmetic ingredients – Fairtrade, and FairWild (for The ISO 16128 standard covers definitions and criteria for natural and organic cosmetic ingredients and products.
- The ISO 9001 standard is the globally recognized and most widely used quality management system standard.
- It sets the minimum requirements for a quality management system that companies must comply with to meet the expectations of internal and external stakeholders (such as employees, customers, and government agencies).
- The European Federation for Cosmetic Ingredients (EFfCI) has developed a specific Good Manufacturing Practice (GMP) standard for cosmetic ingredients, based on ISO 9001.
- **In the case of marula oil production, certification of ISO 9001 can be a competitive marketing advantage.**
- From the Perfumer and Flavourist September 2021 “HPTLC (High-Performance Thin-Layer Chromatography) Fingerprinting for Essential Oil Authenticity” Monika Baeumle, Product Manager TLC, MilliporeSigma
- The use of essential oils is showing no signs of slowing down, with an expected growth at a compound annual growth rate (CAGR) of 7.5% from 2020 to 2027 in the global market.

SAEOPA
Southern African Essential Oil Producers' Association

ISO

TECHNICAL COMMITTEES
ISO/TC 54
Essential oils

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