



Will Marula be the next superfruit from Africa?

Cyril Lombard
GIZ ABioSA

14 September 2023





Will Marula be the next superfruit from Africa?

An overview of science supporting new product ideas and what the Marula sector can learn from Baobab industry growth

14th September 2023
Cyril Lombard



**forestry, fisheries
& the environment**

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

THE **ABS**
CAPACITY
DEVELOPMENT
INITIATIVE



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
State Secretariat for Economic Affairs SECO

What is a superfruit?

Chat GTP3.5



The term "superfruit" is not a scientifically recognized classification, but it is often used in marketing and popular culture to describe certain fruits that are perceived as having exceptionally high nutritional benefits or health-promoting properties. Superfruits are typically characterized by their rich content of vitamins, minerals, antioxidants, and other bioactive compounds that are believed to confer health advantages when consumed.

While there is no strict definition of what qualifies a fruit as a superfruit, some fruits that have been commonly referred to as superfruits due to their perceived health benefits include:



1. **Blueberries:** Blueberries are known for their high levels of antioxidants, particularly anthocyanins, which have been associated with various health benefits, including cognitive function and heart health.
 2. **Acai Berry:** Acai berries are native to the Amazon rainforest and are rich in antioxidants, fiber, and healthy fats. They have been promoted for their potential to boost energy and support overall health.
 3. **Goji Berry:** Goji berries, also known as wolfberries, are often touted for their antioxidant content and potential benefits for eye health and the immune system.
 4. **Pomegranate:** Pomegranates are prized for their abundance of antioxidants, particularly punicalagins and anthocyanins. They are associated with heart health and may have anti-inflammatory properties.
 5. **Camu Camu:** This fruit, native to the Amazon rainforest, is exceptionally high in vitamin C, which is important for immune function and skin health.
 6. **Noni Fruit:** Noni fruit is known for its potential antioxidant and anti-inflammatory properties, and it has been used traditionally for various health purposes.
 7. **Mangosteen:** Mangosteen is rich in xanthones, a type of antioxidant, and has been promoted for its potential to support immune health and reduce inflammation.
 8. **Dragon Fruit:** Dragon fruit is lauded for its striking appearance and high content of vitamins, minerals, and fiber.
- It's important to note that while these fruits are indeed nutritious and offer health benefits, they are not a magical solution to all health problems. A balanced diet that includes a variety of fruits and vegetables is generally recommended for overall health and well-being. Additionally, the term "superfruit" is often used for marketing purposes, so it's important to critically evaluate health claims and consult with healthcare professionals for personalized dietary recommendations.

Marula fruit, pectin and dietary fibre

TABLE 3.2. NUTRIENT AND PROXIMATE COMPOSITION OF MARULA FRUIT (OR PARTS THEREOF) FROM DIFFERENT REGIONS IN SOUTHERN AFRICA

	Zimbabwe ¹	Botswana ²	Sibasa ³	SWA-Namibia ⁴		SWA-Namibia ⁵	
	Fruit	Fruit	Fruit	Flesh	Skin	Flesh	Skin
	g/100 g						
Moisture	87	91.7	86.4	85.2	80.7	85.5	78.8
Protein		0.5	0.3	0.5	0.8	0.6	0.6
Fat		0.1	0.1	0.4	0.6	0.4	0.4
Ash		0.2	0.4	0.9	1.0	1.3	1.0
Crude fiber		0.5	0.8	1.2	2.4	2.0	2.6
Carbohydrate		7.0*		12.0	14.4		
Fructose	2.3*			0.97 (Juice)			
Glucose				0.75 (Juice)			
Sucrose	5.9			5.95 (Juice)			

2 % pectin, considered high

Selection and Processing of Marula Fruit (*Sclerocarya birrea* subsp. *caffra*)

1988

F. Gous, I. A. G. Weinert* and P. J. van Wyk†

Division of Food Science and Technology, CSIR, P.O. Box 395, 0001 Pretoria (South Africa)
(Received March 16, 1988; Accepted May 9, 1988)

Marula fruit from seven selected wild trees were processed into puree, turbid and depectinized juices during three consecutive years. Physical and chemical characteristics such as yield, moisture, total soluble solids, total titratable acidity, apparent viscosity, individual saccharides and organic acids, vitamin C, pectins, amino acids and minerals were determined. Complete results for turbid juices are given and compared with the other products. The data was used to aid in the selection of trees suitable for propagation for the establishment of a marula fruit industry in South Africa.

The puree had a total pectin content of about thrice the concentration present in either the turbid or depectinized juices. Accordingly, the ap-

Fruits of tropical and subtropical 3
origin: Composition, properties and uses.

Nagy S.; Shaw P.E.; Wardowski W.F.

1990 xi, 319 pp

Marula

Florida Science Source
Lake Alfred, Fla.

Ingrid A. G. Weinert
Pieter J. van Wyk
Lucas C. Holtzhausen

0-944961-00-2

PRELIMINARY NUTRITIONAL ANALYSIS OF MARULA (*SCLEROCARYA BIRREA*) FRUITS FROM TWO KENYAN PROVENANCES

Hannah Jaenicke and Margaret K. Thiong'o
International Centre for Research in Agroforestry
P.O. Box 30677
Nairobi
Kenya

2000

Nutritional factor	Units	Kibwezi		Kitui		Arnold <i>et al.</i> , 1985	
		flesh	nut	flesh	nut	flesh	nut
moisture content (flesh n=3; nut n=1)	%	N/A	N/A	86.4 (1.14)	4.6	85	4
vitamin C (n=4 Kibwezi; n=3 Kitui)	mg/100 g fresh matter	188 (1.2)	N/A	236 (4.7)	N/A	194	
total sol. sugars (n=4)	%	27.3 (1.8)	3.9 (1.9)	25.0 (0.9)	4.5 (0.8)		
glucose (n=4)	%	11.5 (0.2)	<0.1	10.7 (0.7)	0		
starch (Kibwezi n=6; Kitui n=4)	%	1.09 (0.14)	0.33 (0.09)	1.29 (0.20)	0.31 (0.06)		
carbohydrates	%					12.0	3.7
crude fibre (n=2)	%	10.2 (0.8)	N/A	N/A	N/A	1.2	2.9

- Unpublished reports suggest pectins and fibres are abundant, but requires confirmation
- Newer studies don't seem to be interested in these "old fashioned" compounds...

10%?

Pectin and health claims

SCIENTIFIC OPINION

Scientific Opinion on the substantiation of health claims related to pectins and reduction of post-prandial glycaemic responses (ID 786), maintenance of normal blood cholesterol concentrations (ID 818) and increase in satiety leading to a reduction in energy intake (ID 4692) pursuant to Article 13(1) of Regulation (EC) No 1924/2006¹

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)^{2, 3}

European Food Safety Authority (EFSA), Parma, Italy

Reduction of post-prandial glycaemic responses

On the basis of the data presented, the Panel concludes that a cause and effect relationship has been established between the consumption of pectins and a reduction of post-prandial glycaemic responses.

Maintenance of normal blood cholesterol concentrations

On the basis of the data presented, the Panel concludes that a cause and effect relationship has been established between the consumption of pectins and maintenance of normal blood cholesterol concentrations.

Dietary fibre and nutrition claims



Permitted nutrition claims

SOURCE OF FIBRE

A claim that a food is a source of fibre, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least 3 g of fibre per 100 g or at least 1,5 g of fibre per 100 kcal.

1. **Blood Sugar Control:** Soluble fiber, in particular, can help slow the absorption of sugar and improve blood sugar control. This can be beneficial for individuals with insulin resistance or prediabetes, both of which are common components of metabolic syndrome.
2. **Weight Management:** High-fiber foods are often lower in calories and can promote a feeling of fullness and satiety. This can help with weight management and obesity, a key factor in metabolic syndrome.
3. **Blood Pressure:** A diet rich in fiber, especially from fruits, vegetables, and whole grains, has been associated with lower blood pressure. High blood pressure is another component of metabolic syndrome.
4. **Lipid Profile:** Dietary fiber, especially soluble fiber, can help reduce levels of total cholesterol and LDL (low-density lipoprotein) cholesterol in the blood. It may also have a modest effect in increasing HDL (high-density lipoprotein) cholesterol, which is considered "good" cholesterol.
5. **Inflammation:** Dietary fiber has anti-inflammatory properties and can help reduce systemic inflammation, which is associated with various metabolic syndrome components.

Chat GTP3.5

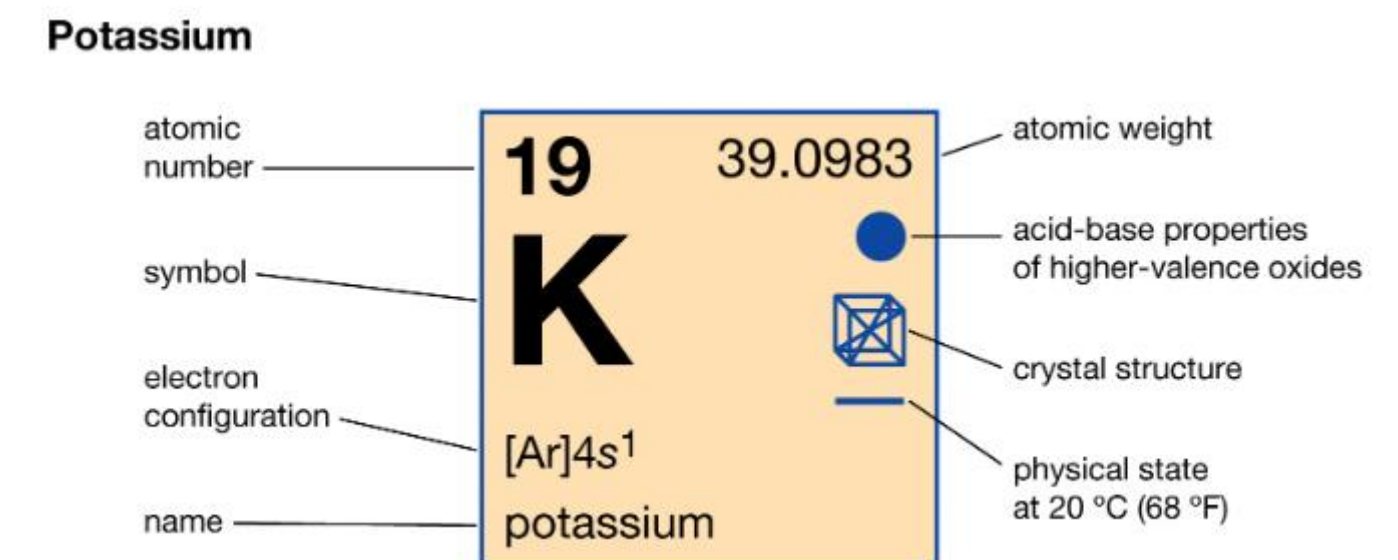
Is dietary fibre positively associated with the Metabolic Syndrome?

Also opens up opportunities for products beneficial to the gut microbiome,, prebiotics

Potassium in Marula fruit

Table 2. Potassium content of Marula and other commonly consumed fruits

Fruit	K content (mg)	Fruit weight (g)
Marula flesh	1250	50
Marula Peel	900	50
Apricots (dried)	814	70
Banana	467	118
Dates	542	83
Kiwi	252	76
Melon, cantaloupe	494	160
Orange	237	131



Also called Kalium
hence symbol “K”

Health benefits

Potassium has been linked with health benefits ranging from its impact on blood pressure to muscular function and digestion. Several other more specific health benefits have also been identified and are highlighted below.

Bone Health A link has been seen between a potassium rich diet and bone health, particularly in elderly women. This suggests a link to osteoporosis prevention.

Hypokalemia Potassium is used to symptoms of hypokalemia (low potassium) which includes weakness, lack of energy, muscle cramps, stomach upsets, irregular heartbeat. It is a result of the body losing too much potassium in the urine or intestines.

High Blood Pressure There is some evidence to suggest potassium causes a slight drop in blood pressure and can reduce the risk of cardiovascular disease. However, there are some contradictory studies and further research is required.

Stroke People with potassium rich diets have been shown to have a lower risk of stroke.

Inflammatory Bowel Disease People suffering from IBD are less able to absorb nutrients and may be required to take a potassium supplement to ensure they are receiving enough.

RDIs by age groups, USA:

- Infants birth - 6 months: 400 mg/day
- Infants 7 months - 12 months: 700 mg/day
- Children 1 -3 years: 3 grams (3,000 mg)/day
- Children 4 - 8 years: 3.8 grams (3,800 mg)/day
- Children 9 - 13 years: 4.5 grams (4,500 mg)/day
- Adults 19 years and older: 4.7 grams (4,700 mg)/day
- Pregnant women: 4.7 grams (4,700 mg)/day
- Breastfeeding women: 5.1 grams (5,100 mg)/day

Potassium health claims, EU

SCIENTIFIC OPINION

Scientific Opinion on the substantiation of health claims related to potassium and maintenance of normal muscular and neurological function (ID 320, 386) and maintenance of normal blood pressure (ID 321) pursuant to Article 13(1) of Regulation (EC) No 1924/2006¹

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)^{2, 3}

BOX 1: European Food Safety Authority (EFSA) Claims

Scientific Opinion on the substantiation of health claims related to potassium and maintenance of normal muscular and neurological function (ID 320, 386) and maintenance of normal blood pressure (ID 321) pursuant to Article 13(1) of Regulation (EC) No 1924/2006

Muscular and neurological function

The claimed effects are “signal transduction and muscle contraction” and “nerve function”. The target population is assumed to be the general population. The Panel considers that maintenance of normal muscular and neurological function is a beneficial physiological effect. On the basis of the data presented, the Panel concludes that a cause and effect relationship has been established between the dietary intake of potassium and normal muscular and neurological function.

Blood Pressure

The claimed effect is “blood pressure”. The target population is assumed to be the general population. The Panel considers that maintenance of normal blood pressure is a beneficial physiological effect. On the basis of the data presented, the Panel concludes that a cause and effect relationship has been established between the dietary intake of potassium and the maintenance of a normal blood pressure.

Opens up possibility
of marketing as
“high in Kalium” /
“high in Potassium”

Potassium health claims, USA

Table 4. Health claims authorised based on an authoritative statement by Federal scientific bodies (FDA).

Approved Claims	Food Requirements	Claim Requirements
Potassium and the Risk of High Blood Pressure and Stroke (Docket No. 2000Q-1582)	Good source of potassium Low sodium Low total fat Low saturated fat Low cholesterol	Required wording for the claim: “Diets containing foods that are a good source of potassium and that are low in sodium may reduce the risk of high blood pressure and stroke”.

Nutrition Facts	
2 servings per container	
Serving size	1 cup (140g)
Amount per serving	
Calories	160
% Daily Value*	
Total Fat 8g	10%
Saturated Fat 3g	15%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 60mg	3%
Total Carbohydrate 21g	8%
Dietary Fiber 3g	11%
Total Sugars 15g	
Includes 5g Added Sugars	10%
Protein 3g	
Vitamin D 5mcg	25%
Calcium 20mg	2%
Iron 1mg	6%
Potassium 230mg	4%
*The % Daily Value tells you how much a nutrient in a serving of food contributes to a daily diet. 2000 calories a day is used for general nutrition advice.	

New Nutrition Facts Panel to Highlight Potassium



In an effort to recognize the value of increasing potassium in American diets, the Food and Drug Administration (FDA) will require potassium amounts to be listed on the Nutrition Facts Panel as well as benchmarks to identify products as a “good source” or “excellent source” of potassium.

Publications on Marula fruit, health, nutrition

Thesis

Submitted in fulfilment of the requirements for the degree of doctor
at Wageningen University
by the authority of the Rector Magnificus
Prof. dr. M. J. Kropff,
in the presence of the
Thesis committee appointed by the Academic Board
to be defended in public
on Friday 25 October 2013
at 11 a.m. in the Aula

Penny Hiwilepo-van Hal

Processing of marula

(*Sclerocarya birrea subsp. Caffra*) fruits:

**A case study on health-promoting
compounds in marula pulp**

This is supported by a
body of grey and
confidential literature

Food Reviews International, 28:375–388, 2012
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ISSN: 8755-9129 print / 1525-6103 online
DOI: 10.1080/87559129.2012.660716



***Sclerocarya birrea* (Marula), An African Tree of Nutritional and Medicinal Uses: A Review**

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Lumpur, Malaysia

Convincing array of publications
supporting a health positioning
around the metabolic syndrome.
Molecules and compounds such
as phenols, polyphenols,
catechins, epigallocatechins,
flavonoids, seem to be
responsible

Marula fruit chemistry, health, nutrition

INTERNATIONAL JOURNAL OF FOOD PROPERTIES
2022, VOL. 25, NO. 1, 1549–1575
<https://doi.org/10.1080/10942912.2022.2064491>



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Nutritional composition, polyphenolic compounds and biological activities of marula fruit (*Sclerocarya birrea*) with its potential food applications: a review

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Table 5. The distribution of bioactive substances in marula fruit.

Bioactive substances	Plant part	References
Vitamin C	Pulp	[27]
Total phenolics	Pulp, peel, oil cake, stem, leaf	[29,103–105]
Flavonoids	Pulp, peel, stem	[29,103]
Proanthocyanidins	Stem	[103]
Condensed tannin	Pulp, peel	[103]
Catechol tannins	Oil cake	[106]
Gallotannins	Stem, leaf	[103]
p-hydroxybenzaldehyde	Peel	[29]
p-hydroxybenzoic acid	Peel	[29]
p-coumaric acid	Peel, pulp	[29]
Ferulic acid	Peel, pulp	[29]
Vanillic acid	Peel	[29]
Caffeic acid	Peel, pulp	[29]

Table 1. Proximate analysis of edible marula pulp and nut (g/100 g).

Parameters	Pulp	Nut	Functions	FDA	WHO	References
Moisture	85.84	4.00–4.17	Serves as essential body part structure, weight, removes food waste while maintaining a body temperature.	2.7–3.7	2.1–2.6	[63,64,69]
Ash	6.37	2.47–4.63	Control hyperglycemia condition in the and maintain acid-alkaline balance blood stream.	NA	5.0	[69,70]
Carbohydrates	61.69	6.38–7.29	Dietary energy contribution of many physiologically active compounds and stimulate insulin resistance and inflammation.	275	301	[46,71]
Fiber	4.25	2.47	Reduce glucose absorption and amounts of plasma cholesterol to reduce the risk of colon cancer, constipation, hyperglycemia and cardiovascular disease.	28	18–35	[69]
Protein	12.48	26.50–28.36	Promote growth and repair of body cells in immune system. Play an important role in molecular scaffolding to memory as beneficial biological functions.	50	28–65	[71,72]
Lipids	9.68	53.04–57.25	Energy provider, synthesis and repair of vital cell parts to regulate blood pressure.	78	44–77	[71]

FDA: Food and Drug Administration; WHO: World Health Organization. NA: not available

Marula fruit, phytochemicals and health



Available online at www.sciencedirect.com



Food Chemistry 103 (2007) 82–87

Food
Chemistry

www.elsevier.com/locate/foodchem

Phenolic composition of *Flacourtia indica*, *Opuntia megacantha* and *Sclerocarya birrea*

A.R. Ndhlala, A. Kasiyamhuru, C. Mupure, K. Chitindingu, M.A. Benhura, M. Muchuweti *

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Received 16 January 2006; accepted 26 June 2006

Food Reviews International, 28:375–388, 2012

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ISSN: 8755-9129 print / 1525-6103 online

DOI: 10.1080/87559129.2012.660716



Vol. 15(8), pp. 164–173, August, 2021
DOI: 10.5897/AJPP2021.5251
Article Number: xxx
ISSN: 1996-0816
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<http://www.academicjournals.org/AJPP>



African Journal of Pharmacy and
Pharmacology

Full Length Research Paper

***Sclerocarya birrea*: Review of the pharmacology of its antidiabetic effects and toxicity**

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Received 11 May, 2021; Accepted 17 August, 2021

***Sclerocarya birrea* (Marula), An African Tree of Nutritional and Medicinal Uses: A Review**

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²Department of Pharmacy, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia

Keywords Antidiabetic, Anti-inflammatory, Antimicrobial, Antioxidant, Phenolic compounds, Protein, Oil, *Sclerocarya birrea*



Relevant *in vivo* study with Marula fruit extract

Phenolic Antioxidants and Antiatherogenic Effects of Marula (*Sclerocarrya birrea* Subsp. *caffra*) Fruit Juice in Healthy Humans

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BIANCA FUHRMAN,[§] JUDITH ATTIAS,[§] NINA VOLKOVA,[§] TONY HAYEK,[§] AND
MICHAEL AVIRAM[§]

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Rappaport Faculty of Medicine, Technion—Israel Institute of Technology, Haifa 32000, Israel

Antioxidant activity and composition of Israeli-grown marula (*Sclerocarrya birrea* subsp. *caffra*) fruit juice and health-promoting aspects of juice consumption on serum lipids and lipoproteins pattern in healthy volunteers were studied. Marula juice was found to contain high vitamin C and potassium levels and low sugar concentration (267 mg dL⁻¹, 328 mg dL⁻¹, and 7.3 g dL⁻¹, respectively). The juice contains a significant level of phenolics (56 mg of pyrogallol equiv dL⁻¹) and was found to be a potent antioxidant (382 mg of vitamin C equiv dL⁻¹). The antioxidant activity was resistant to pasteurization regimens and long-term freezing and slowly decreased during refrigeration, losing up to 14% of its capacity after 4 weeks. Three-week administration of the juice as a food supplement to healthy subjects significantly reduced their serum total cholesterol (by 8%), LDL-cholesterol concentration (by 17%), and triglyceride level (by 7%), increased their serum HDL-cholesterol level (by 10%), and attenuated serum oxidative stress. Upon a 4 week “washout” period, most of these parameters returned toward baseline values. Separation of the juice soluble phenolics by HPLC produced potent antioxidant fractions, tentatively containing hydrolyzable tannins, catechins, and hydroxycinnamic acid derivatives, which could be responsible for the observed protection against atherosclerosis risk factors following marula fruit juice consumption.

JOURNAL OF
AGRICULTURAL AND
FOOD CHEMISTRY

2009

KEYWORDS: Marula; *Sclerocarrya birrea* subsp. *caffra*; antioxidants; radical scavenging; atherosclerosis; lipids; lipoproteins; triglycerides; cholesterol; phenolics

Relevant patent

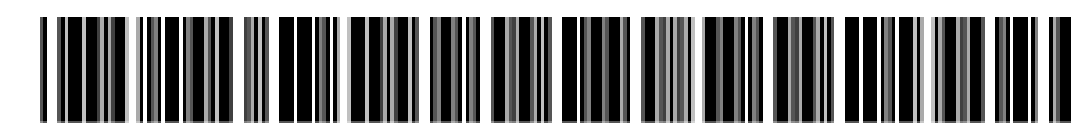
(57)

ABSTRACT

Provided are extracts obtained from the marula fruit (*Sclerocarya Birrea*) and uses thereof in a great variety of applications, e.g., use in food supplements for engendering an anti-atherogenic effect in healthy and non-healthy subjects (humans and non-human animals) and as agents for treating or preventing various diseases and disorders.

Associated with the science in the
Borochoy-Neori study and publication

Marula fruit grown in Israel



US008445040B2

(12) **United States Patent**
Borochoy-Neori et al.

(10) **Patent No.:** US 8,445,040 B2
(45) **Date of Patent:** May 21, 2013

(54) **EXTRACTS OF *SCLEROCARYA BIRREA***

(75) **Inventors:** Hamutal Borochoy-Neori, Eilat (IL);
Amnon Grinberg, Kibbutz Yotvata (IL)

(73) **Assignee:** Management and Holdings—Ardom,
D.N. Eilat (IL)

(*) **Notice:** Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) **Appl. No.:** 12/867,756

(22) **PCT Filed:** Feb. 19, 2009

(86) **PCT No.:** PCT/IL2009/000192

§ 371 (c)(1),
(2), (4) **Date:** Aug. 16, 2010

(87) **PCT Pub. No.:** WO2009/104184

PCT Pub. Date: Aug. 27, 2009

(65) **Prior Publication Data**

US 2010/0311828 A1 Dec. 9, 2010

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Ojewole, John, A. O., "Evaluation of the Analgesic, Anti-inflammatory and Anti-diabetic Properties of *Sclerocarya birrea* (A. Rich.) Hochst. Stem-Bark Aqueous Extract in Mice and Rats," Phytotherapy Research, (2004) pp. 601-608, vol. 18.
International Search Report, International Publication No. WO 2009/104184 A3, International Application No. PCT/IL2009/000192, mailed on Oct. 28, 2009, 6 pages.

- EP: Withdrawn with legal effect as of April 2017, no divisionals
- US: Granted, claims limited to treatment of atherosclerosis, no divisionals
- IL: Granted
- RSA: Granted as filed with PCT

Clinical study with Marula bark extract



Received: 10 May 2021

Accepted: 4 June 2021

Published: 6 June 2021

Article

Effect of Dietary Supplementation with a Natural Extract of *Sclerocarya birrea* on Glycemic Metabolism in Subjects with Prediabetes: A Randomized Double-Blind Placebo-Controlled Study

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Citation: Victoria-Montesinos, D.;

Study conducted on a bark extract. However, there is some commonality in molecules found in the bark and fruits and this contributes to a narrative for future products from the fruit

5. Conclusions

This exploratory clinical trial confirms the antidiabetic activity of a nutraceutical supplement based on a natural extract of *Sclerocarya birrea* in subjects with confirmed prediabetes, which is a clinically relevant finding in the prevention of type 2 diabetes. Further studies using better measurements of beta-cell function are needed to clarify the underlying mechanisms of the hypoglycemic effect of this natural compound.

SCLEROBIGINOL



Relevant study on Marula leaf extract



Received: 12 October 2022

Accepted: 12 November 2022

Published: 21 November 2022



Article

Identification of Antidiabetic Compounds from the Aqueous Extract of *Sclerocarya birrea* Leaves

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Abstract: Diabetes, a prevalent metabolic condition with a wide range of complications, is fast becoming a global health crisis. Herbal medicine and enhanced extracts are some of the therapeutic options used in the management of diabetes mellitus. The plant-derived molecules and their suitable structure modification have given many leads or drugs to the world such as metformin used as an antidiabetic drug. The stem extract of *Sclerocarya birrea* has been reported as a potent antidiabetic (glucose uptake) agent. However, the bioactive compounds have not been reported from *S. birrea* for treatment of diabetes. In this study, the spray-dried aqueous leaf extracts of *S. birrea* were investigated as an antidiabetic agent using a 2-deoxy-glucose (2DG) technique showing good stimulatory effect on glucose uptake in differentiated C2C12 myocytes with % 2DG uptake ranging from 110–180% that was comparable to the positive control insulin. Three compounds were isolated and identified using bioassay-guided fractionation of the spray-dried aqueous extract of *S. birrea* leaves: myricetin (1), myricetin-3-O- β -D-glucuronide (2) and quercetin-3-O- β -D-glucuronide (3). Their chemical structures were determined using NMR and mass spectrometric analyses, as well as a comparison of experimentally obtained data to those reported in the literature. The isolated compounds (1–3) were studied for their stimulatory actions on glucose uptake in differentiated C2C12 myocytes. The three compounds (1, 2 and 3) showed stimulatory effects on the uptake of 2DG in C2C12 myocytes with % 2DG uptake ranging from 43.9–109.1% that was better compared to the positive control insulin. Additionally, this is the first report of the flavonoid glycosides (myricetin-3-O- β -D-glucuronide) for antidiabetic activity and they are the main bioactive compound in the extract responsible for the antidiabetic activity. This result suggests that the *S. birrea* leaves have the potential to be developed for treatment of diabetes.

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Study conducted on a leaf extract. However, there is some commonality in molecules found in the leaves and fruits and this contributes to a narrative for future products from the fruit

Keywords: *Sclerocarya birrea*; flavonoid glycosides; glucose uptake activity; antidiabetic



Rich history of traditional use of Marula fruit

Food Reviews International, 28:375–388, 2012
Copyright © Taylor & Francis Group, LLC
ISSN: 8755-9129 print / 1525-6103 online
DOI: 10.1080/87559129.2012.660716



The ethnobotany of marula (*Sclerocarya birrea*, Anacardiaceae) in South Africa

Sclerocarya birrea (Marula), An African Tree of Nutritional and Medicinal Uses: A Review

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Sclerocarya birrea (Anacardiaceae) is a popular African wild tree distributed in many African countries where the leaves, stem bark, root, and fruits are used in food and traditional medicine; the fruit is rich in ascorbic acid. The fruit juice contains sesquiterpene hydrocarbon, which are terpenes found in plants that are reported to have bacteriostatic properties. The fruit contains a hard brown seed. The seed encloses a soft white kernel rich in oil and protein. The oil contains oleic, palmitic, myristic, and stearic acids; the kernel protein contains amino acids, with a predominance of glutamic acid and arginine. The extracts from different parts showed high total phenolic compounds and radical-scavenging capacities and antioxidant activities. *Sclerocarya birrea* is widely studied with regard to its antidiabetic, anti-inflammatory, analgesic, antiparasitic, antimicrobial, and antihypertensive activities.

Keywords Antidiabetic, Anti-inflammatory, Antimicrobial, Antioxidant, Phenolic compounds, Protein, Oil, *Sclerocarya birrea*

Bark and roots include: “hypertension” and diabetes mellitus” as well as “anti-inflammatory conditions” (Ojewole, 2003) and “type 2 diabetes mellitus” (Ojewole, 2004)

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DISSERTATION

submitted in fulfilment of the requirement for the degree

MASTER OF SCIENCE

in

BOTANY

in the

FACULTY OF SCIENCE

at the

UNIVERSITY OF JOHANNESBURG

SUPERVISOR: PROF BEN-ERIK VAN WYK

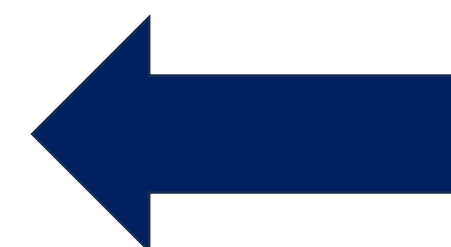
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31 JANUARY 2021

Metabolic Syndrome

A cluster of conditions that increases the risk of:

- Heart disease
- Stroke
- Type 2 diabetes



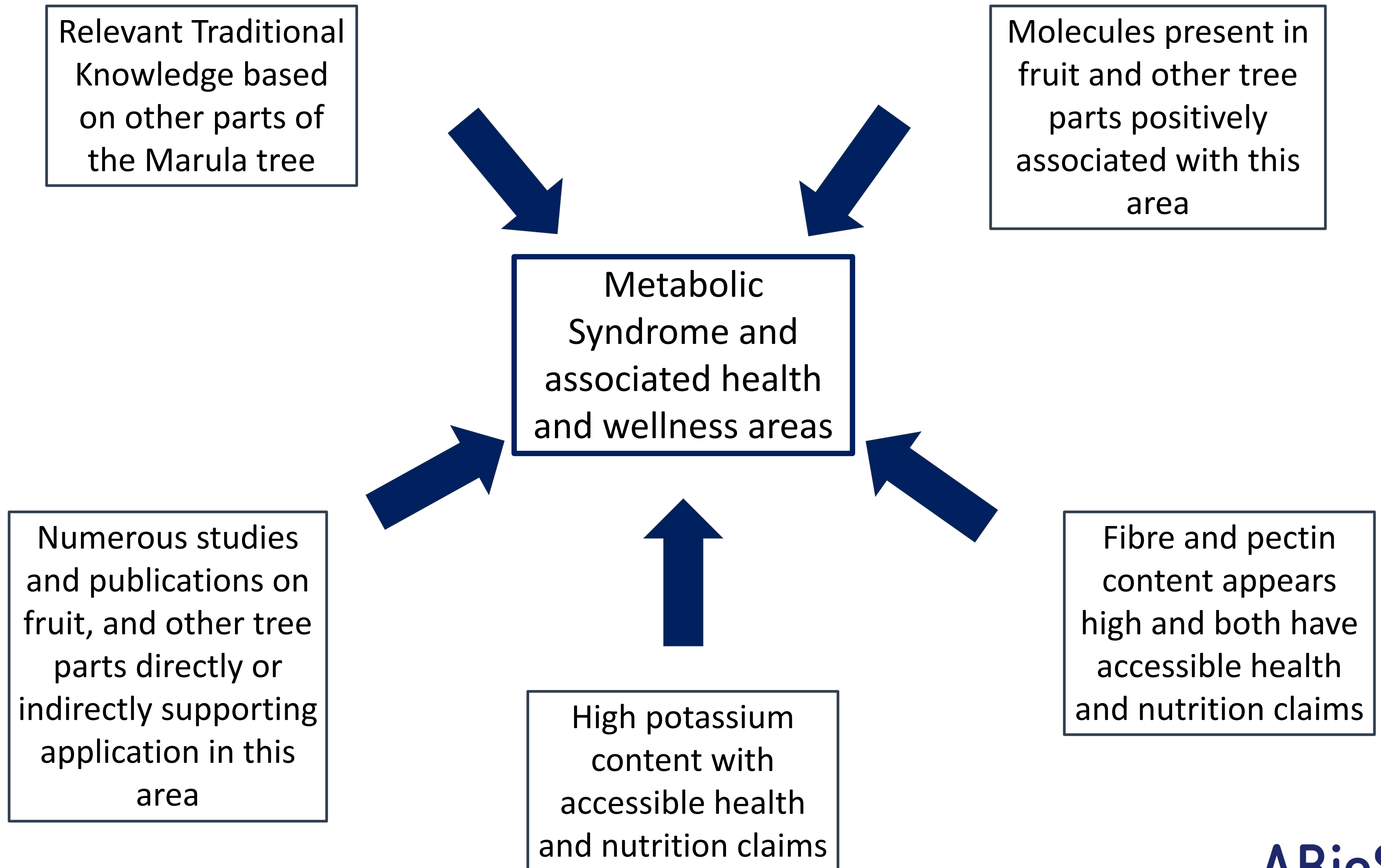
You will have noticed mention of these areas of health concerns in the literature

These conditions include:

- Abdominal obesity
- High blood pressure (hypertension)
- High blood sugar (insulin resistance or prediabetes)
- High triglyceride levels
- Low HDL (high-density lipoprotein) cholesterol levels

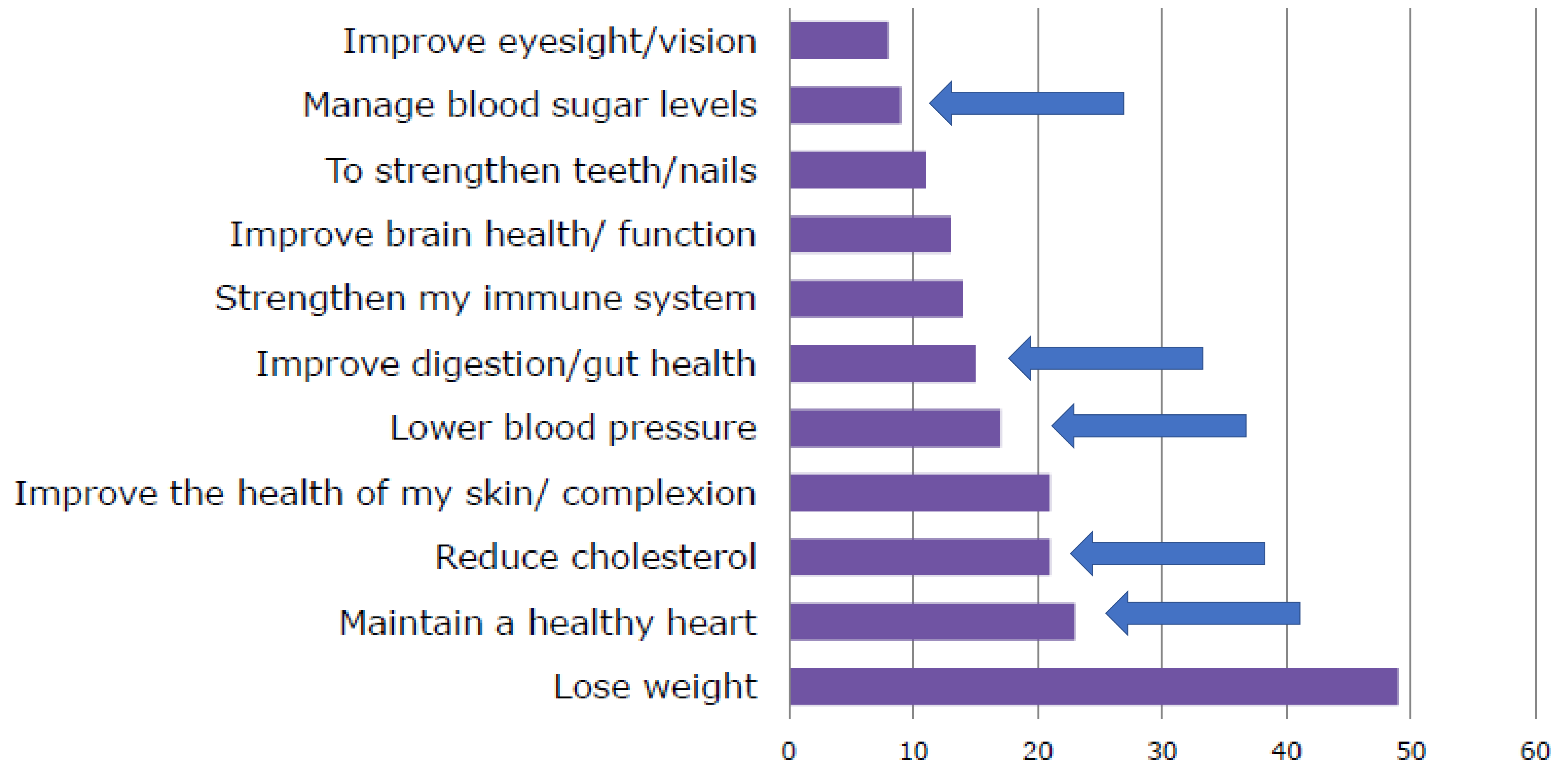
The molecules and compounds found in Marula fruit, bark, leaves, roots, are positively associated with treatment of these conditions

Possible Marula superfruit orientation



More options for positioning Marula fruit

Consumer health targets, UK, in percent



12

Strong health and wellness positioning seems possible in the area of metabolic syndrome

[mintel.com](https://www.mintel.com)

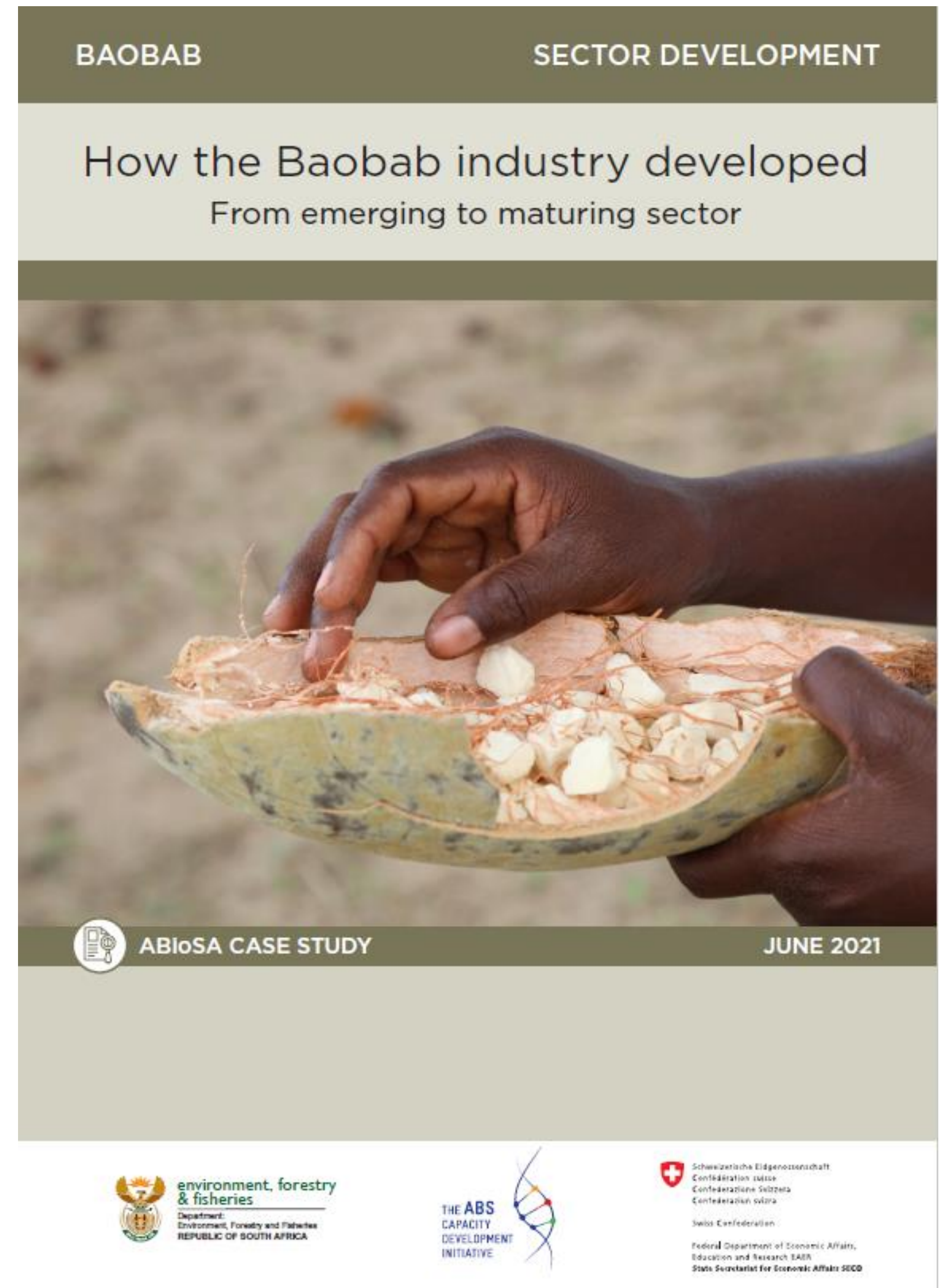
To answer the question....

The title of the presentation is not “**Can** Marula be the next superfruit from Africa?”

I believe the answer would be, “Yes, it can”

But the title is “**Will** Marula be the next superfruit from Africa?”

And, what can we learn from the Baobab experience?



More science, better focussed

- We have a strong body of science to work with; however, there are gaps from the perspective of commercialisation; for example we have interesting results but on laboratory samples extracted with solvents which are not allowed for food ingredient production; how about a water extract?
- There appears to be a trend towards looking for new molecules (not a bad thing) but we must not lose sight of nutritional compounds
- More realistic; it is unlikely that Marula provides a cure for diabetes, more likely that it can become a product that supports healthy living
- Focus on science useful to determine safety, lack of toxicity

Market access

- Marula fruit is currently not accepted as a food in export markets; we need to change this
- Focus of SDP is Novel Foods approval in the EU
- We will need to have a plan for the USA, China and eventually other territories
- Local market is important, but carrying capacity for a value-added, science-backed product is limited
- However, building on local and officially recognised approvals can support global access; an important discussion to be had with SAHPRA, and others

Product development and innovation

- We have many examples of jams, jellies, fruit leathers; however, consumers now demand products in different forms:
 - Gummies
 - Capsules
 - Nutrient-enriched snack bars
 - Powder-form for smoothies
 - Nutrient-enriched drinks including “shots”
- Support local industry to solve these product development issues from the raw materials (juice, pulp) through to a usable ingredients from which the above can be manufactured
- Taste, stability, demonstrate the positive science on actual product, not only laboratory samples
- Intellectual property; not always patents; trademarks



Pioneering Marula fruit products



- Made in Israel
- Builds on the science in Borochoy-Neroi 2008
- Owns the “Ardom” patents

ABS and IKS

- The traditional knowledge on Marula is widely dispersed across Africa and identifying the holders for benefit-sharing purposes is going to be challenging; a truly transboundary resource
- If Marula is to become a commercially successful superfruit we will need hundreds of companies (many of them small) in different parts of the world and in different parts of the value chain to become involved and invested; effective and simple agreements will be required – sector level agreement?
- The Marula SDP speaks to an organisation representing holders of traditional knowledge; can this work?

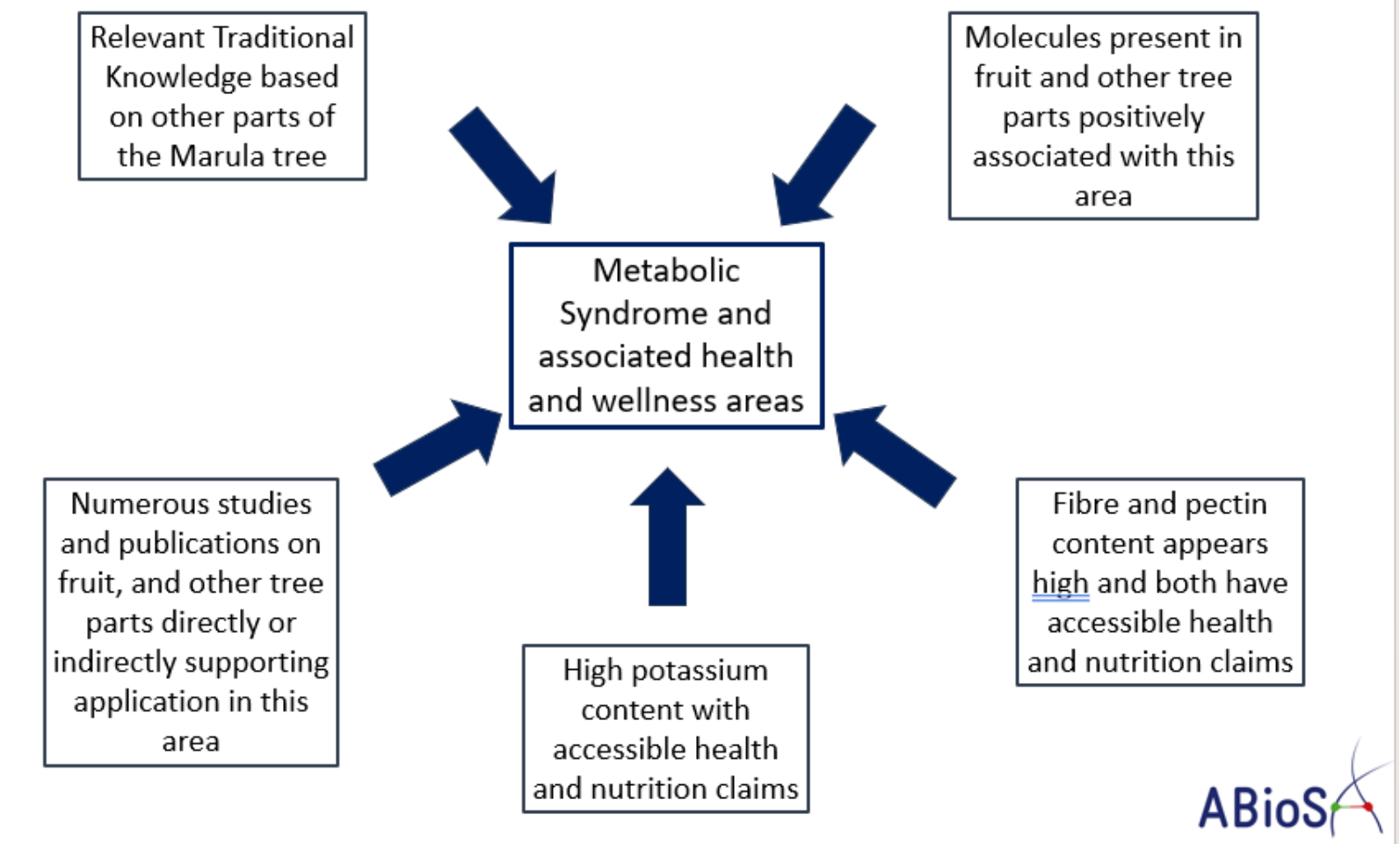
Regulatory and marketing “positioning”

- There is no legal or regulated category for “superfruits” or “nutraceuticals”
- The products will be basic food and food ingredients
- In some cases it might be possible to be a “dietary supplement” (in the USA)
- The sector will need to be supported with technical and legal guidance to market Marula fruit products as a food but also how to make the best use of health and nutrition claims or acceptable ways to promote the health and nutrition benefits within the law of each target market

To summarise

- We seem to have material bases for positioning Marula fruit in an important health and wellness area
- Turning potential into reality will take concerted, collective action – a sector development approach
- If that can be resourced and actioned, yes, Marula will be the next superfruit from Africa

Possible Marula superfruit orientation



Objective	Targets
Increased market access	Marula food products exported to Europe as food from a third country
	GI or other IP protection registered for Southern African marula
	50% increase in research published in trade and popular press on Marula
	Raise R1m through various funding streams for research channelled through the sector association
	Marula sector has updated information on target markets trends in the market, the size of the market and the target market
	Marula oil exports out of SADC increase by 20%
Sustainable management of marula	Biotrade businesses create 10% more employment opportunities by 2025
	Resource assessment conducted in 2 countries
Improve the quality of marula products	20% increase in sustainably managed and utilized area of marula
	Standard on Marula oil used by 60% of the industry
Improve marula producers' compliance with regulatory requirements	Training of 80% of MA members through the roll out of the GQSP-SA standards and quality training syllabus by end 2022
	The TK holders in the Marula sector are identified and represented by an association
	Sector association and 60% value chain actors have a clear understanding on all aspects of ABS requirements
	60% of supply chain actors in compliance with ABS regulation

Thank You; Contact details

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