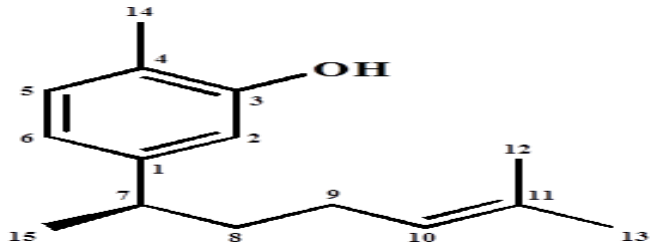
UNIVERSITI PUTRA MALAYSIA

AGRICULTURE • INNOVATION • LIFE

"The Role of Local Wisdom in Maintaining Sustainable Biodiversity Through Science Education"

The importance of scientific research in supporting the role of local wisdom in maintaining sustainable biodiversity



YAYA RUKAYADI

+601112307864 / yaya_rukayadi@upm.edu.my

[1]Department of Food Science, Faculty of Food Science and Technology , Universiti Putra Malaysia
[2]Natural Medicines and Products Research Laboratory (NaturMeds), Institute of Bioscience, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor , Malaysia

Presented at – 1ST IconBiotic International Conference on Biology, Technology, Science and Education
TARBIYAH AND TEACHER TRAINING FACULTY, AR-RANIRY STATE ISLAMIC UNIVERSITY, BANDA ACEH, ACEH PROVINCE, INDONESIA
5 June 2024

MY WAY

1998
MBL Massachusetts, USA
(Microbial Diversity Course)

1999
SAC – Univ. of Edinburgh, Scotland
(Post Doc)

2000-2011
Yonsei Univ. South Korea
(Post Doc and Research Professor)

North America

Europe

Asia

Africa

Latin America

Oceania

1996
UC Berkeley
California, USA
(Research attachment)

1991-1992
State Univ. Medan
(Unimed)

Sep. 19, 2011
Univ. Putra Malaysia
UPM
(Assoc. Professor)

1st PhD student of
Prof. Antonius Suwanto
(IPB University)

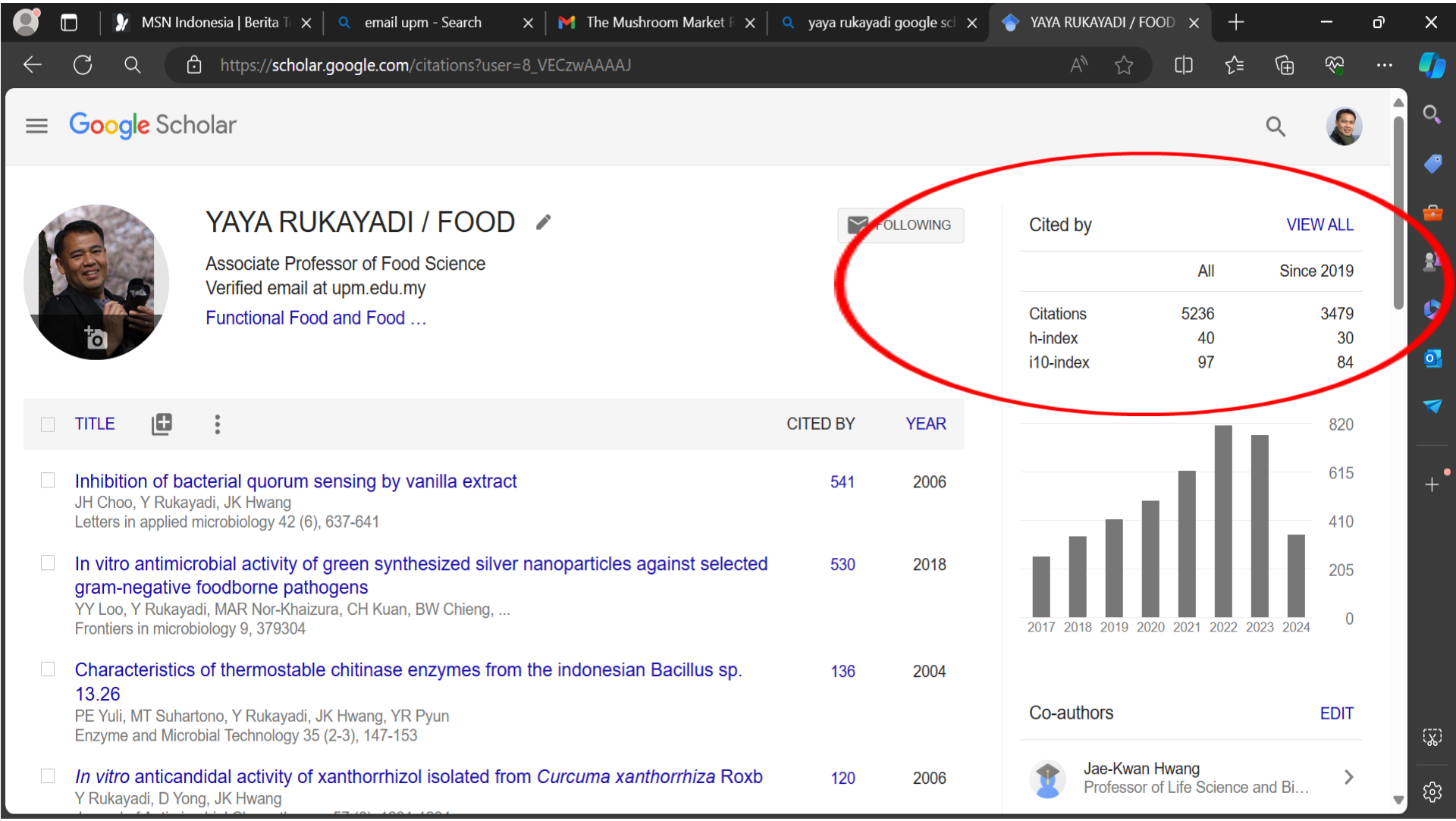
Sumedang - Bandung
West Java, Indonesia

Pharmacy (ITB) – 1983 and
Biology Education – IKIP – 1984
Master – Microbiology – IPB – 1992
PhD – Microbiology – IPB - 1995

Google Scholar

5 June 2024

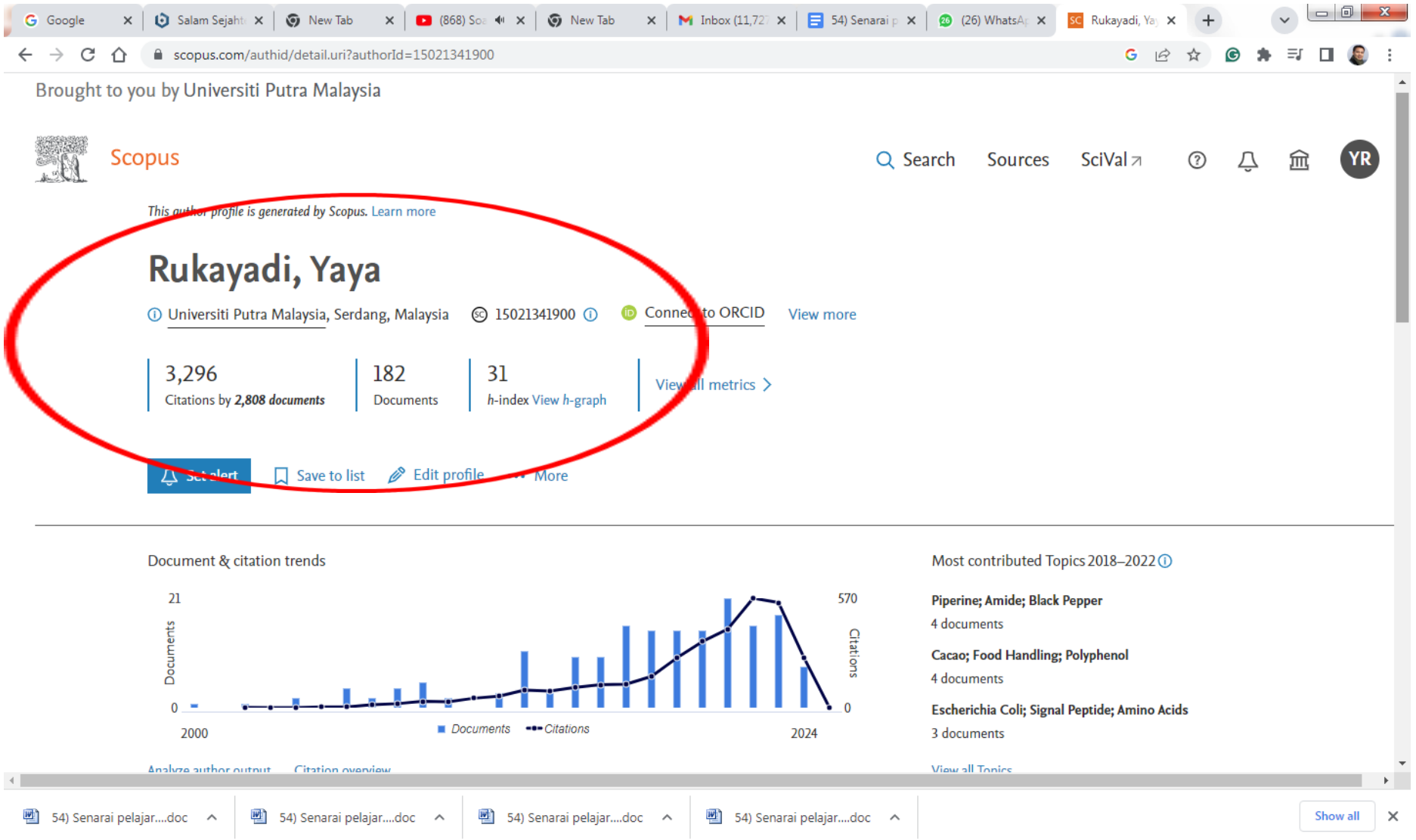
H-Index: 40 ; i10-Index: 97 ; Citations: 5236



Scopus

31 May2024

H-Index: 31 ; Citations: 3296



H. PUBLICATION – 2024

No.	Scientific	Total
1.	Journal	**208**
2.	Book Chapter	**1**
3.	Proceeding	**19**
4.	Oral Presentation	**110**
5.	Poster Presentation	**104**
6.	Thesis	**3**
7.	Patents (see Section Q)	**5**
	Non-Scientific	
1.	Popular Article	**6**
2.	Fiction (short story)	**35**

J. TOTAL SUPERVISION OF STUDENTS (2011-2024) – (While at UPM only)

Status/ Total	*PhD*		*Master*				*Bachelor*	
			By Research		*By Course*			
	Chairman Supervisor	*Member-Supervisor*	*Chairman Supervisor*	*Member-Supervisor*	*Chairman Supervisor*	*Member-Supervisor*	*Chairman Supervisor*	*Member-Supervisor*
Ongoing	3	6	0	4	2	-	9	2
Graduated	17	24	21	29	20	6	71	9
Total	**20**	**30**	**21**	**33**	**22**	**6**	**80**	**11**
	50		**82**				**91**	

Human lifespan and health

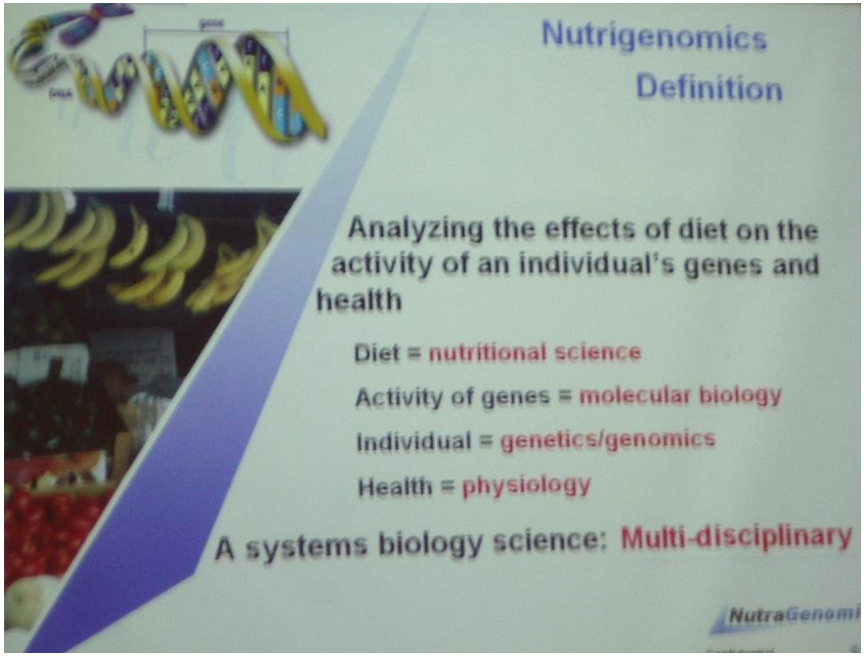
50%
80%

50%
20%

Genetic

- DIET
- environment, -activity level,
- social relationships, Etc.

Prof. Jim Kaput - 2004



If you want to be healthy:

1. Eat the right diet (V)

2. Choose an ancestor (X)

nutrients MDPI

Review

Human Nutrition Research in the Data Era: Results of 11 Reports on the Effects of a Multiple-Micronutrient-Intervention Study

Jim Kaput [1,*] and Jacqueline Pontes Monteiro [2]

[1] Vydiant Inc., Dallas, TX 75201, USA
[2] Faculty of Medicine of Ribeirão Preto, Department of Pediatrics, University of São Paulo, Ribeirão Preto 14049-900, SP, Brazil; jacque160165@gmail.com
* Correspondence: ikaput@vydiant.com

Nutrients 2024, 16, 188. https://doi.org/10.3390/nu16020188

The effects of consuming "local wisdom" on human health

Temulawak (*Curcuma xanthorrhiza* Roxb.)

Ginseng (*Panax ginseng*)

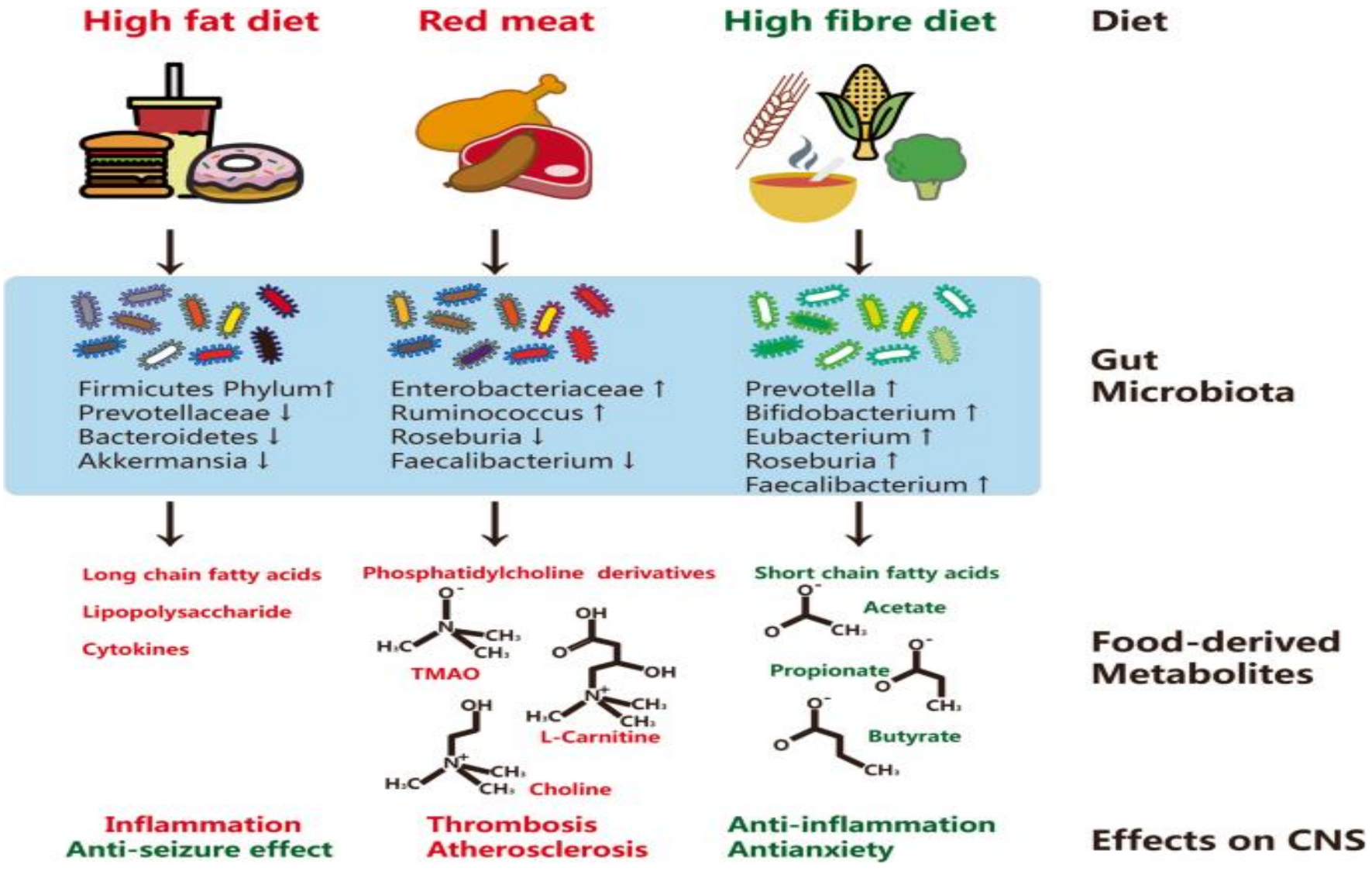
Good effect

Effect

Good effect

Local Wisdom

Local Wisdom



https://jneuroinflammation.biomedcentral.com/articles/10.1186/s12974-020-1705-z

"The Implementation of Local Wisdom to Improve the Health and Immune System"

Don't worry too much, the human immune system is more sophisticated than the latest computer programs. The virus wants to mutate whatever it is, our immune system can record the new molecule and then make antibodies... that's fine. The important thing is, KEEP YOUR DIET, CONSUME HEALTHY FOOD, multiply NATURAL WHOLE FRUITS AND VEGETABLES so that the immune system is always primed. Of course, we must continue to apply SUGGESTED HEALTH PROTOCOL. (Zakaria, 2020)

Examples of Healthy Food:









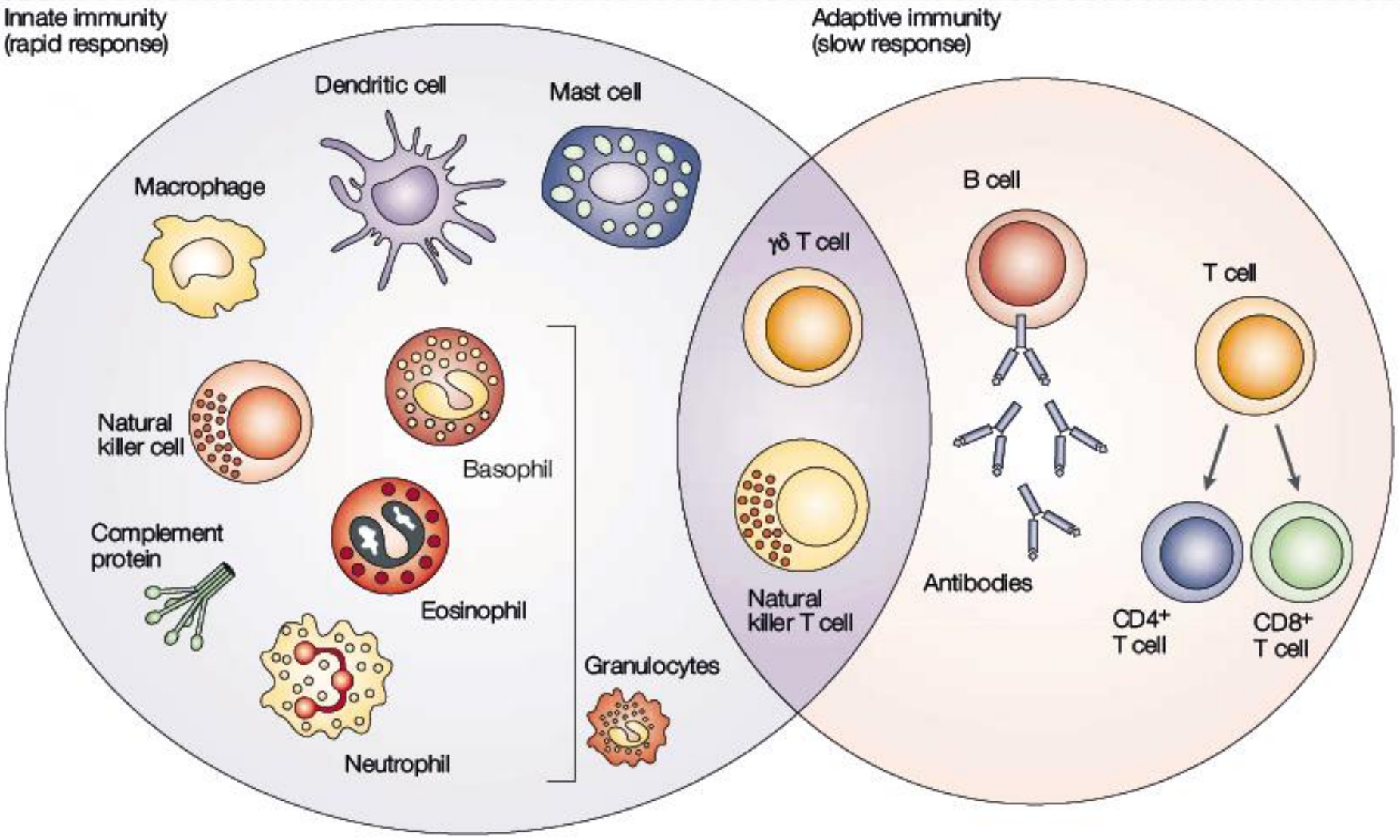


Foods to reduce (avoid):









https://oncologypro.esmo.org/education-library/essentials-for-clinicians/lymphomas/chapter-1-the-immune-system

Carbohydrate:

Protein:

Lipid:

Vitamin, Minerals and Trace elements:

- **Stress**
- **Pollution**
- **Diet:**

- **Reduce immune system**
- **Diabetes**
- **High blood pressure**
- **Cancer**
- **Vertigo**
- **Etc.**

It's not that everyone is turning back to being a farmer and leaving city life !!!
Don't misinterpret

Local wisdom is forgotten, not passed on to the next generation, what are the consequences:

1. Demand for food ingredients originating from local wisdom is decreasing.
2. Cultivation is not carried out.
3. Modernization of planting was not continued.
4. Scientific research was not conducted.
5. Loss of local biodiversity.

Correspondingly:

- World population is expected to reach 900 billion by 2050.
- 30% 0f the people are affected by malnutrition on the planet.
- 159 million children are reported to be stunted with low BMI.
- Two billion people are deficient in one or more micro nutrients.
- Narrow food basket with very few crop derivatives is the main region.
- Widening food basket diversity is imperative to mitigate.
- Neglected fruits and vegetables appear to hold promise to overcome the situation.

What are Neglected Plants

Neglected :
- Underused
- Underexplored
- Underutilized

Plants :
- Crops
- Fruits
- Vegetables

Edible
(Can be eaten)

Crops

Wheat

Guinoa (Bolivia)
Neglected

Fruits

Apple

Buni (huni)
Neglected

Vegetables

Lettuce

Kenikir/ulam raja
Neglected

Neglected Fruits and Vegetables

- Wild edible fruits were the important sources of food for mankind before dawn of civilization.
- The tribal groups inhabit in the forests depend on these fruits.
- They passed on valuable information on utility of fruits from generation to generation.
- 30000 edible plant species are known to mankind.
- 7000 species were reported to be used for food in the history.
- 150 plants are cultivated commercially.
- 103 plants are alone contribute to more than 90% of the world's calorie.
- Several hundreds of species remain underutilized or less utilized in the wild.

S.B. Dandin & N.K. Krishna Kumar
3rd - 5th Dec, 2016
Regional Expert Consultation of NUS, 2016 FAO Regional Office, Bangkok

Local Wisdom





THEY REMAIN UNDERUTILIZED BECAUSE ...

- Under estimation of their potential use.
- Non availability of their complete botanical information.
- Inadequate research on their commercial exploitation.
- Lack of knowledge on their food and nutrition value/potential.
- Promotion and popularization of very few fruit crops.
- Fast disappearance of ecosystem and habitat destruction.
- Stigma attached as "Food of the Poor".

What are the names of these fruits?

Local

Import

"TIDAK TAHU - LUPA"

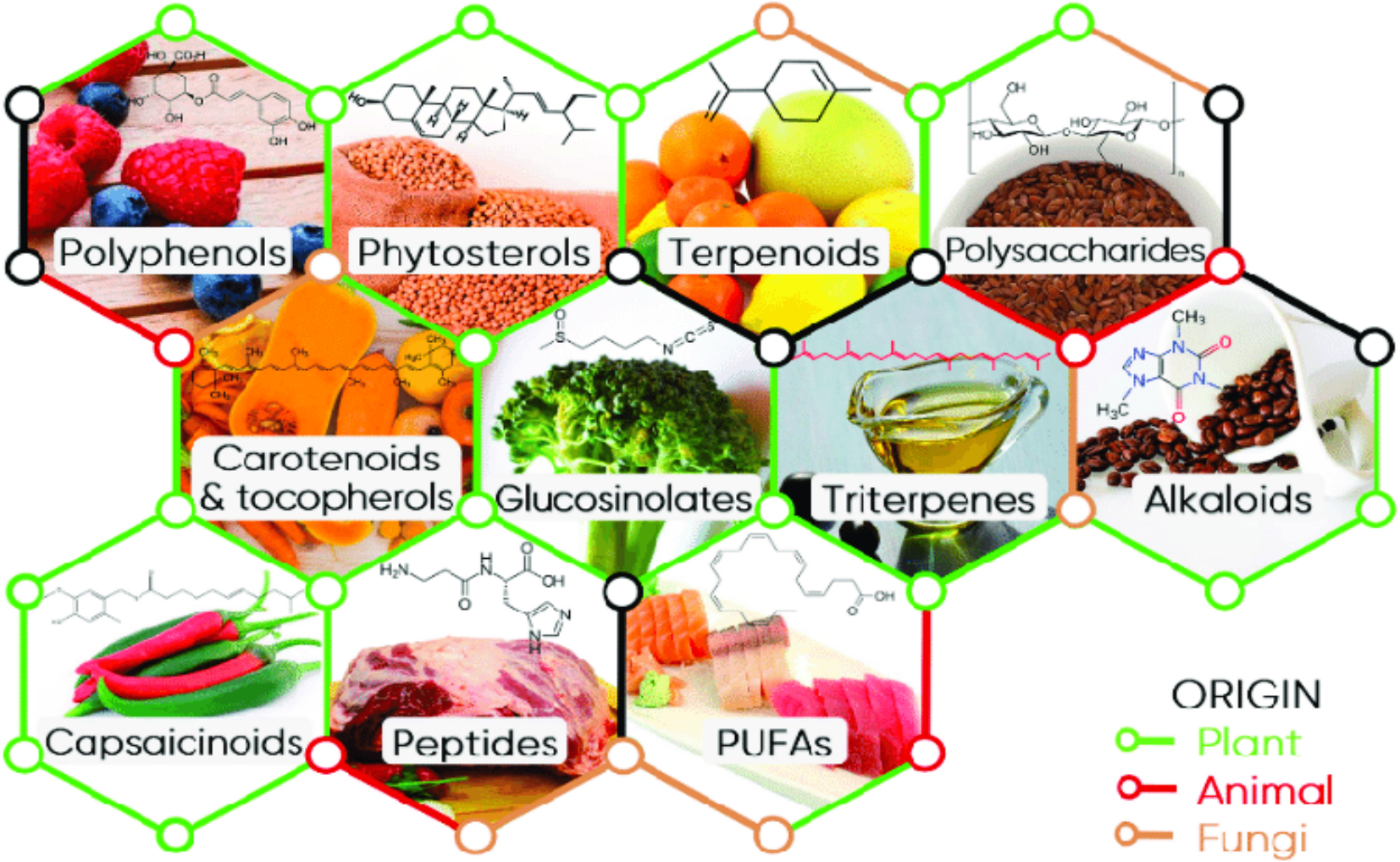
"OF COURSE I KNOW"

Whereas:

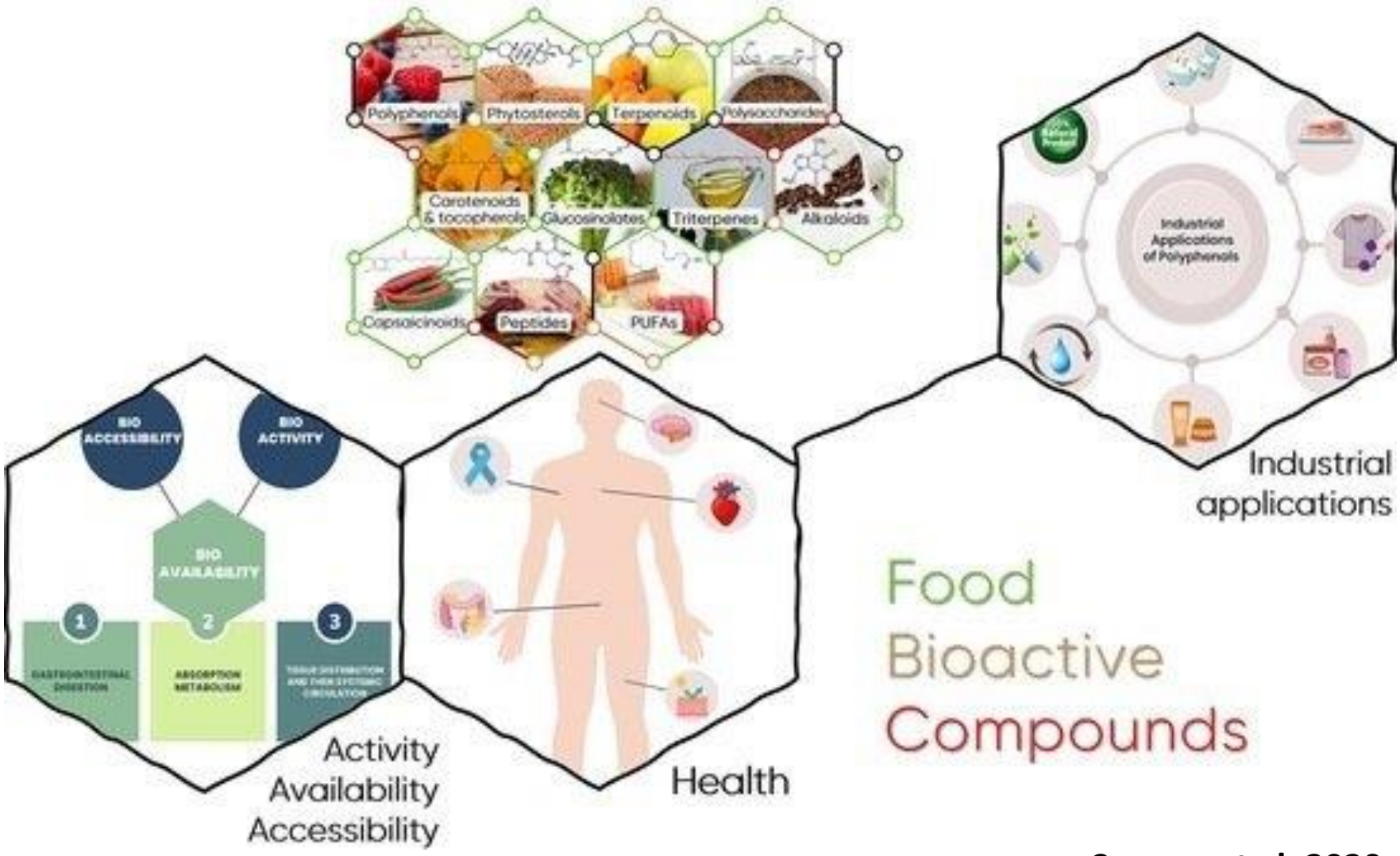
WHY THEY ARE IMPORTANT NOW

- They are found harboring nutritionally rich compounds.
- Due to increased food and nutritional insecurity.
- Their climate resilient nature.
- Resistance to biotic and abiotic stress condition.
- Rich in neutraceutical and medicinal properties.
- Donors of important genes for crop improvement.

Major Food Bioactive Compounds (FBCs) sources and classification



Camara et al. 2020



Camara et al. 2020

Table 3: Comparison of total antioxidant capacity (AEAC value) in selected foods

Variety	AEAC (mg/100 g)	Classification by AEAC
Ciku **(SAWO)**	3396±387.9	Extremely high
Cosmos caudatus	2511.7±285.4	Extremely high
Strawberry	472±92.9	High
Plum	312±23.2	High
Guava	270±18.8	High
Mangosteen	150±23.3	Medium
Orange	142±16.5	Medium
Mango	139±21.5	Medium
Kiwifruit	136±18.2	Medium
Apple	78.9±2.7	Medium
Tomato	38.0±1.7	Low

Reference:[6,14]

Randamidang (*Cosmos caudatus*)

Food Science and Technology

ISSN 010
ISSN 1678-

DOI: https://doi.org/10.1590/fst.61320

Identification of chemical constituents from fruit of *Antidesma bunius* by GC-MS and HPLC-DAD-ESI-MS

Yelliantty YELLIANTTY[1], Rahmana Emran KARTASASMITA[1], Slamet Ibrahim SURANTAATMADJA[1], Yaya RUKAYADI[2]

Abstract

Antidesma bunius is an edible berry fruit with many benefits, such as natural antimicrobials, anticancer, natural dyes, etc. However, data on chemical content in the fruit is still limited. The purpose of this research is to identify volatile compounds of *Antidesma bunius* fruit. We extracted and analyzed the *A. bunius* fruit's chemical content using GC-MS and HPLC–DAD-ESI-MS methods. Forty-nine compounds representing 99.91% of the total chromatogram's relative peak area were detected. *Antidesma bunius* is rich in 5-hydroxymethylfurfural (HMF) and ten other compounds with relative peak area >1%, such as furaldehyde, citric acid and others. We also found 109 compounds tentatively identified through HPLC–DAD-ESI-MS. *Antidesma bunius* contained HMF, several volatile compounds, organic acid, long-chain fatty acid, and photochromic compound.

Keywords: *Antidesma bunius*; berry; bignay, GC-MS; HPLC–DAD-ESI -MS; volatile.

Practical Application: The study results indicate the possible use of the fruit of *A. bunius* for food flavoring, antimicrobial and anticancer agents.

Heliyon 9 (2023) e18749

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

Controlling vegetative cells and spores growth of *Bacillus* spp. using ethanolic *Ketapang* (*Terminalia catappa* L.) leaf extract

Kierrthanah Madhavan [a], Yaya Rukayadi [a,b,*], Noor Azira Abdul-Mutalib [c,d]

[a] *Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, Serdang, 43400 Selangor, Malaysia*
[b] *Natural Medicines and Products Research Laboratory (NaturMeds), Institute of Bioscience, Universiti Putra Malaysia, Serdang, 43400 Selangor, Malaysia*
[c] *Department of Food Service and Management, Faculty of Food Science and Technology, Universiti Putra Malaysia, Serdang, 43400 Selangor, Malaysia*
[d] *Laboratory of Food Safety and Food Integrity, Institute of Tropical Agriculture and Food Security, Universiti Putra Malaysia, Serdang, 43400 Selangor, Malaysia*

ARTICLE INFO

Keywords:
Preservative
Antibacterial
Bacillus spp.
Terminalia catappa L.
Stability
Sporicidal

ABSTRACT

Terminalia catappa L. is a large, spreading type of tree which usually grows in tropical environment, especially at coastal area with sandy stones. The current study evaluated anti-*Bacillus* potential of the ethanolic *ketapang* (*Terminalia catappa* L.) leaf extract (EKLE) as antibacterial and sporicidal agent against vegetative cells and spores of *Bacillus* spp. The antibacterial activity of EKLE against *Bacillus* spp. (*B. cereus* ATCC33019, *B. pumilus* ATCC14884, *B. subtilis* ATCC6633 and *B. megaterium* ATCC14581) vegetative cells were determined by performing well diffusion assay (WDA), minimum inhibition concentration (MIC), minimum bacterial concentration (MBC)

Heliyon 9 (2023) e22771

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

Antibacterial potential of silver nanoparticles (SP-AgNPs) synthesized from *Syzygium polyanthum* (Wight) Walp. against selected foodborne pathogens

Sadeeya Khan [a], Yaya Rukayadi [a,b,*], Ahmad Haniff Jaafar [a], Nurul Hawa Ahmad [a]

[a] Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, Selangor, Malaysia
[b] Laboratory of Natural Products, Institute of Bioscience, Universiti Putra Malaysia, Serdang, Selangor, Malaysia

ARTICLE INFO

Keywords:
Antibacterial activity
Foodborne pathogens
Green synthesis
Silver nanoparticles
Syzygium polyanthum (Wight) Walp

ABSTRACT

Foodborne diseases continue to pose a significant global health concern, causing a considerable number of deaths worldwide. In response to concerns surrounding bacterial resistance and the limitations of traditional antibiotics, there is a growing interest in exploring natural antibacterial agents as potential alternatives for addressing foodborne pathogens. Nowadays efforts are being made on exploring the potential of natural antibacterial agents against foodborne pathogens. In this study, the antibacterial efficacy of silver nanoparticles synthesized using *S. polyanthum* leaves extract (SP-AgNPs) against selected Gram-negative and Gram-positive foodborne pathogens was investigated by using multiple assays, including the well diffusion assay (WDA), minimum

Syzygium polyanthum (Wight) Walp. leaf – *Daun salam* (Natural sanitizer and antispore)

Prime Archives in Biomedical Sciences

Book Chapter

Antibacterial Activity of Ethanolic Extract of *Syzygium polyanthum* L. (*Salam*) Leaves against Foodborne Pathogens and Application as Food Sanitizer

Suzita Ramli[1], Son Radu[1], Khozirah Shaari[2] and Yaya Rukayadi[1,2]*

[1]Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, Malaysia
[2]Laboratory of Natural Products, Institute of Bioscience, Universiti Putra Malaysia, Malaysia

***Corresponding Author**: Yaya Rukayadi, Department of Food Science, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan, Malaysia, Tel: +60-3-8946-8519; Fax: +60-3-8942-3552

Published **August 07, 2020**

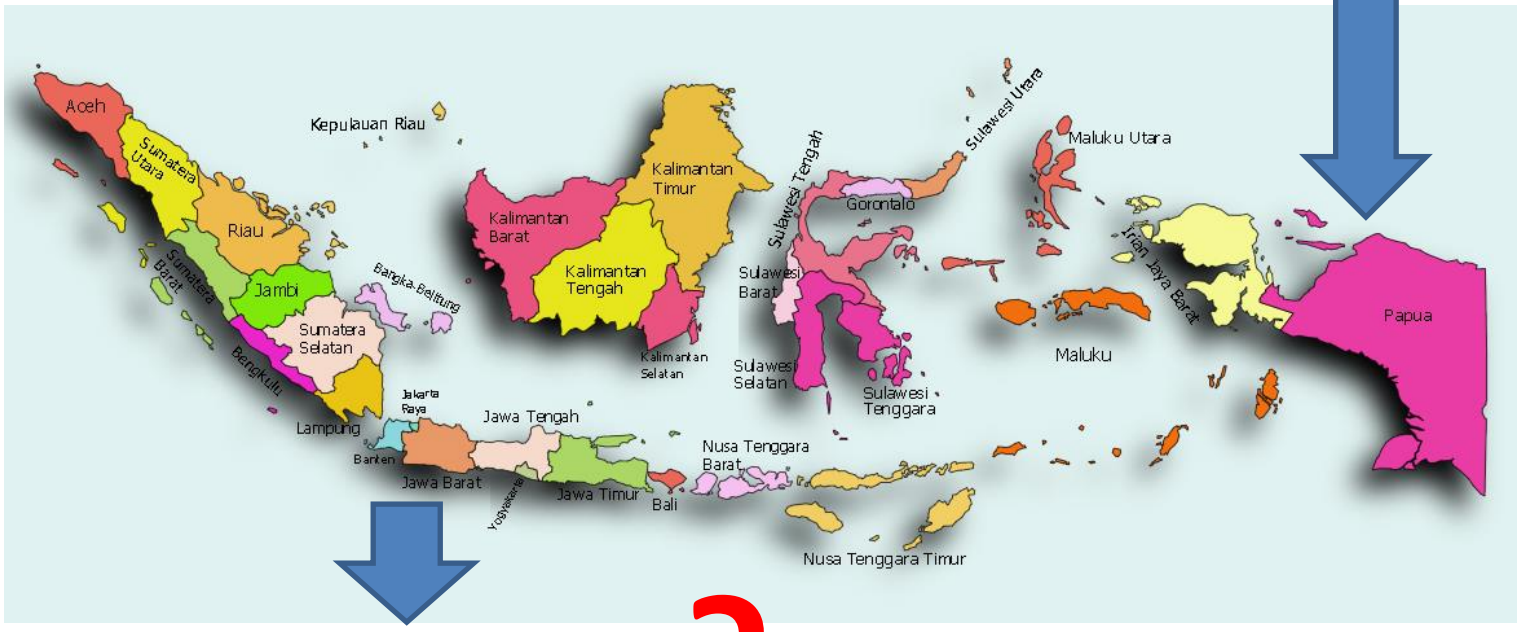





Problems with Quality and Production of Plants

Mahkota Dewa

Original
Anticancer activity stronger



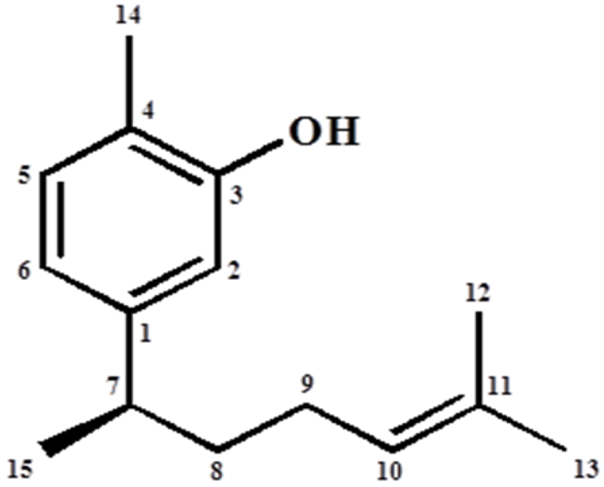
Anticancer activity lower ?

Mahkota Dewa *(Phaleria macrocarpa* (Scheff.) Boerl.

Type of Study		Papua	Java
Molecular	Genetic (genomic)	Same / Similar	
Molecular	Proteomic	Same / Similar	
Metabolomics	Efficacy (ie. Anticancer)	Higher	Lower
Metabolomics	Metabolites (Type and Quantity	Higher	Lower

Temulawak (*Curcuma xanthorrhiza* Roxb.)

Xanthorrhizol



Bioactivity of Xanthorrhizol

Xanthorrhizol has been reported to possess

- antioxidant
- anti-inflammatory
- antihyperglycemic
- antiadhesive
- estrogenic effect
- skin antiaging
- anti-mosquito
- nephroprotective effect
- hepatoprotective effect
- relaxation effect
- anticancer
- Antimicrobial

Letters in Applied Microbiology ISSN 0266-8254

ORIGINAL ARTICLE

***In vitro* activity of xanthorrhizol against *Streptococcus mutans* biofilms**

Y. Rukayadi[1,2] and J.-K. Hwang[1]

1 Department of Biotechnology and Bioproducts Research Center, Yonsei University, Seoul, South Korea

Letters in Applied Microbiology ISSN 0266-8254

ORIGINAL ARTICLE

***In vitro* anti-*Malassezia* activity of xanthorrhizol isolated from *Curcuma xanthorrhiza* Roxb**

Y. Rukayadi[1,2] and J.-K. Hwang[1]

1 Department of Biotechnology & Bioproducts Research Center (BRC), Yonsei University, Seoul, Korea
2 Biopharmaca Research Center and Research Center for Bioresources & Biotechnology, Bogor Agricultural University, Bogor, Indonesia

PHYTOTHERAPY RESEARCH
Phytother. Res. **27**: 1061–1066 (2013)
Published online 12 September 2012 in Wiley Online Library
(wileyonlinelibrary.com) **DOI**: 10.1002/ptr.4834

***In Vitro* Activity of Xanthorrhizol Isolated from the Rhizome of Javanese Turmeric (*Curcuma xanthorrhiza* Roxb.) Against *Candida albicans* Biofilms**

Yaya Rukayadi[1]* and Jae-Kwan Hwang[2]

[1]Department of Food Science, Faculty of Food Science and Technology, and Laboratory of Natural Products (LHS), Institute of Bioscience, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor Darul Ehsan, Malaysia

RESEARCH ARTICLE

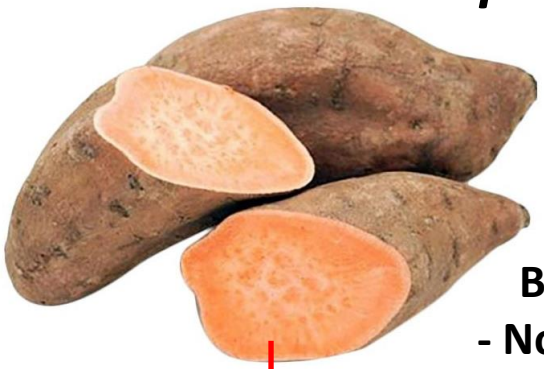
Synergistic anticandidal activity of xanthorrhizol in combination with ketoconazole or amphotericin B

Yaya Rukayadi[1,2], Kwanhyoung Lee[3], Myoung-su Lee[1], Dongeun Yong[4] & Jae-Kwan Hwang[1,3]

[1]Department of Biotechnology, College of Life Science and Biotechnology, Yonsei University, Seoul, Korea; [2]Biopharmaca Research Center and Research

Type of Study		Tembalang	Bogor
Molecular	Genetic (genomic)	Same / Similar	
Molecular	Proteomic	Same / Similar	
Metabolomics	Xanthorrhizol	Higher	Lower
Metabolomics	Metabolites (Type and Quantity)	Different	Different

Ipomoea batatas (L.) Lam.



?

Sumedang
- Sweet

Bogor
- No sweet

Type of Study		Sumedang	Bogor
Molecular	Genetic (genomic)	Same / Similar	
Molecular	Proteomic	Same / Similar	
Metabolomics	Fructose	Higher (Manis)	Lower (Tidak manis)
Metabolomics	Metabolites (Type and Quantity)	Different	Different

Unique local wisdom in the Land of Sunda

Belalang (Sumedang)

Pondegi (Korea)

High Protein

Birthday party cake

- ✓ Spices
- ✓ Natural colouring (curcumin)
- ✓ Protein
- ✓ Minerals and trace element
- ✓ Vitamins

- ✓ No Spices
- ✓ Synthetic colouring
- ✓ Protein
- ✓ No much minerals and trace element
- ✓ No much vitamins

Negotiable cake

Ritual 7 Bulanan

7 macam umbi-umbian

7 macam buah-buahan – RUJAK bebek

MENGINGAT KEMBALI

Rungsing
Begang/peot
Cacingan
dll

- Bura ku panglay (BANGLE)
- Cekok ku koneng gede (TEMU LAWAK)
- Bere angeun kelong sambara kunti

Sehat dengan kearifan lokal !

- Panglay (Bangle) – volatile compounds kill air borne pathogens.
- Koneng gede (temulawak) – increase appetite in infant.

Angeun kelong sambara kunti = sayur daun kelor + kunci (temu kunci)

Kanjut Kundang








Volatile Compounds (antimicrobial)

Saur Indung Beurang

- Jurig nyingkir
- Setan nyingkah
- Lelembut kabur
- Dedemit nyingcid!

Kasat mata, jasad renik
(Virus, bacterial airborne)

Perlu penelitian!
Bukti ilmiah

Salam
[*Syzygium polyanthum* (Wight) Walp.]

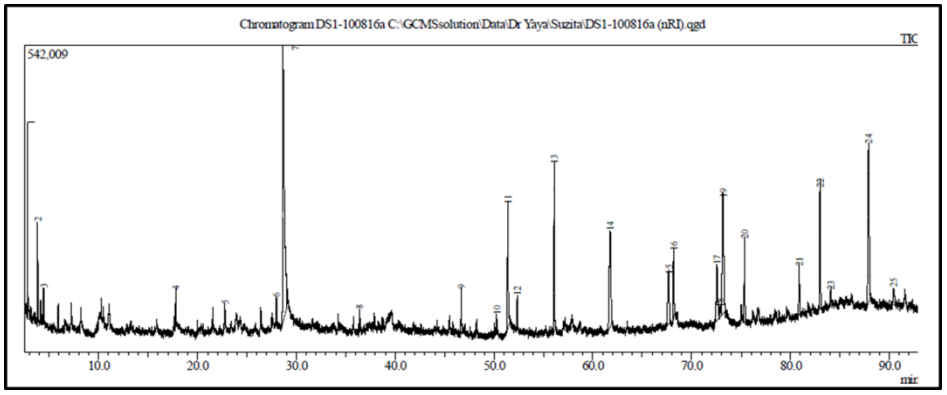
Jambu Mawar
[*Syzygium jambos* (L.) Alston]

Jambu Bol
[*Syzygium malaccense* (L.) Merr. & L.M.Perry]

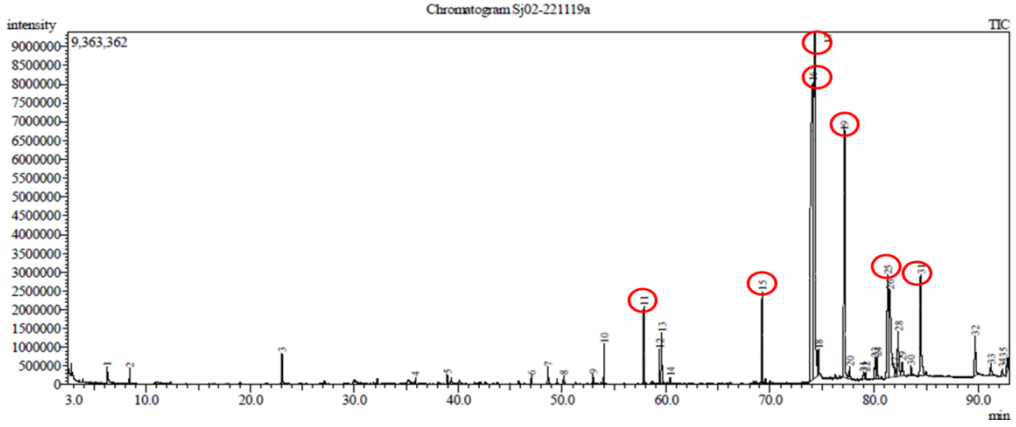
Dr. Suzita Ramli (Malysia)

Dr. Salar Khadum Ali (Iraq)

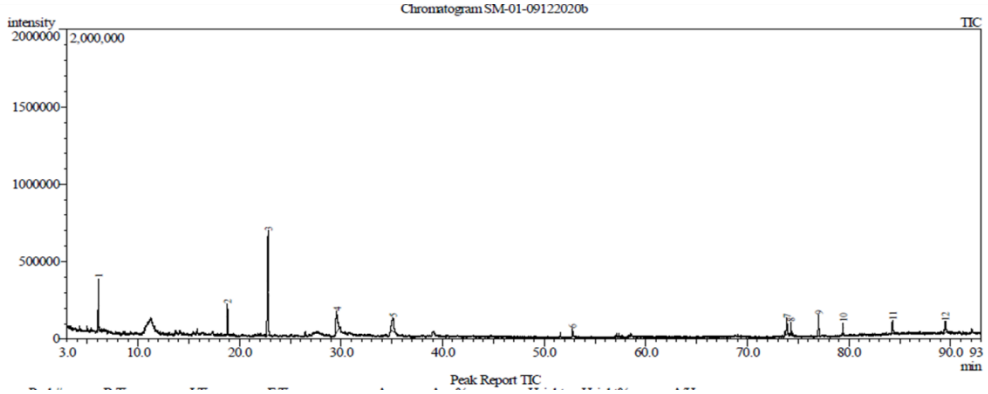
Abdalrachman Al-Zabt (Jordan)



Salam
[*Syzygium polyanthum* (Wight) Walp.]



Jambu Mawar
[*Syzygium jambos* (L.) Alston]



Jambu Bol
[*Syzygium malaccense* (L.)
Merr. & L.M.Perry]

Tewrimong Gasen