Health-promoting bioactive compounds in dried food products

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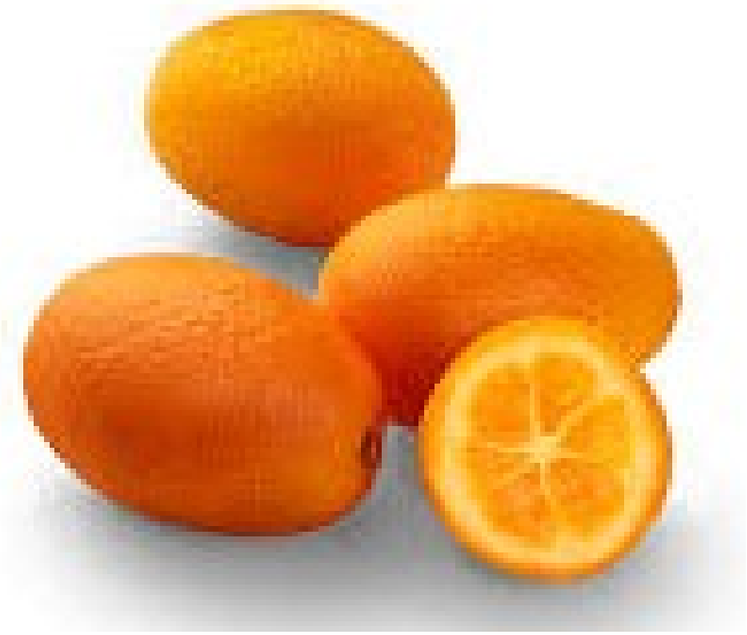
Santé-Sénégal.com



Compositions of foods

Vegetables

- Water (moisture) 90-95%
- Protein 1-2%
- Fat < 1%
- Ash (mineral) < 1%
- Carbohydrate 5%

Fruits

- Water (moisture) 80-95%
- Protein 1%
- Fat < 1%
- Ash (mineral) < 1%
- Carbohydrate 5-15%

Energy, moisture and macronutrient content of selected African leafy vegetables (values per 100 g edible portion, fresh weight basis).

Table 1
Energy, moisture and macronutrient content of selected African leafy vegetables (values per 100 g edible portion, fresh weight basis).

African leafy vegetables	Energy kJ (kcal)	Moisture (g)	Protein (g)	Fibre (g)	Fat (g)	Carbohydrates (g)
Adansonia digitata	289 (69)[a]	77[a]	4[a]	3§[a]	0.3[a]	16†[a]
Amaranthus sp.	113–222 (27–53)[b]	83–91[b]	4–6[b]	3§[b]	0.2–0.6[b]	4–8†[b]
Arachis hypogea	297 (71)[c]	82[c]	4[c]	8§[c]	0.5[c]	13†[c]
Bidens pilosa	163–222 (39–53)[a,b,d]	85–88[a,b,d]	3–5[a,b,d]	3–6§[a,b,d]	0.4–0.6[a,b,d]	2‡[d], 8†[a,b]
Brassica sp.	100–142 (24–34)[c]	92–94[c]	1–2[c]	2–4§[c]	0.1–0.3[b]	5–6†[c]
Ceratotheca triloba	259 (62)[b]	85[b]	2[b]	2§[b]	2.1[b]	8†[b]
Chenopodium album	212–247 (44–59)[b,d]	83–85[b,d]	4–5[b,d]	2§[b,d]	0.8[b]	2‡[d], 8†[b]
Cleome sp.	142–218 (34–52)[a,b,d]	85–88[a,b,d]	5[a,b,d]	1–5§[a,b,d]	0.3–0.9[a,b,d]	2‡[d], 5†[a,b]
Cucurbita pepo	109 (26)[d]	93[d]	3[d]	2§[d]	0.7[d]	0.4‡[d]
Emex australis	151 (36)[b]	89[b]	5[b]	2§[b]	0.6[b]	3†[b]
Galinsoga parviflora	171 (41)[b]	89[b]	4[b]	1§[b]	0.5[b]	5†[b]
Ipomoea batatas	188–276 (45–66)[a,c,d]	83–88[a,c,d]	4–5[a,c,d]	2–5§[a,c,d]	0.2–1.1[a,c,d]	4‡[d], 10†[c]
Justicia flava	213 (51)[b]	84[b]	3[b]	1§[b]	0.4[b]	9†[b]
Lesianthera africana	305 (73)[e]	77[e]	3[e]	4**[e]	1.1[e]	–
Manihot esculenta	381 (91)[b]	72[b]	7[b]	4§[b]	1.0[a]	18†[b]
Momordica sp.	222 (53)[a]	85[a]	5[a]	3§[a]	5.0[b]	7†[a]
Portulaca oleracea	96 (23)[b]	93[b]	3[b]	1§[b]	0.3[b]	3†[b]
Senna occidentalis	351 (84)[b]	77[b]	7[b]	3§[b]	2.2[b]	9†[b]
Solanum sp.	228–241 (55–58)[b,d,g]	83–90[b,d,g]	3–5[b,d,g]	1**[g], 2–6§[b,d]	0.6[b]	2‡[d], 9†[b]
Spinacea oleracea	125 (30)[d]	92[d]	3[d]	3§[d]	0.4[d]	1‡[d]
Vernonia sp.	167–343 (40–82)[a,f]	79–89[a,f]	3–5[a,f]	2–5§[a,f]	–	–
Vigna unguiculata	180 (43)[d]	86[d]	5[d]	4§[d]	0.4[d]	2‡[d]

'§' represent dietary fibre, '**' represent crude fibre, '†' represent carbohydrate value by difference, '‡' represent available carbohydrate, '–' represent not determined.

https://doi.org/10.1016/j.jfca.2010.05.002

Fiber

- Fiber→ not digested/absorbed by human gut
- Increase fecal bulk, absorb fat and cholesterol from diet
- Fiber is stable during drying
- Dried fruit and vegetables increase fiber intake

Fresh pineapple

Dried pineapple

Vegetable, fruit and nuts are sources of fiber which is a good selling point of dried products

KALE
เคล

Healthiest vegetable on earth

- ล้างสารพิษ และ ปรับสมดุลกรดด่างในร่างกาย ช่วยให้นอนหลับสนิท
- ดีต่อระบบขับถ่าย มีวิตามิน A, C, K สูงมาก
- ช่วยลดคลอเรสเตอรอล

ปริมาณที่แนะนำต่อ1หน่วยบริโภค: 1 ช้อนชา (5 กรัม)

เมนู: ใส่ในเครื่องดื่ม เช่น น้ำผัก, น้ำปั่น หรือ โรยในอาหาร เช่น ผัดผัก

Remarks: ผู้ป่วยโรคไทรอยด์ไม่ควรบริโภค

Gluten Free | Milk Free | Eggs Free | Soy beans Free | Peanut Free

/ LINE @ORGANIC_SEEDS 086-322-4038

Rice seasoning powder from vegetables

Sunchoke is a source of “inulin”, a soluble fiber which promotes growth of good bacteria in human gut (prebiotics)

BioKing

Organic Jerusalem Artichoke Powder

Made from Jerusalem artichoke juice

- Pleasantly nutty taste
- Ideal beverage additive

Dried sunchoke

Vitamins and minerals

- Vegetable and fruit are good sources of important vitamins e.g. vitamin C and vitamin A
- Minerals e.g. ferric, phosphorus, calcium, potassium are stable during drying

Recommended daily nutrient intakes (RNI) of selected micronutrients for different age groups as released by the FAO/WHO (2001).

Table 2
Recommended daily nutrient intakes (RNI) of selected micronutrients for different age groups as released by the FAO/WHO (2001).

Age (yrs)	Sex	Vitamin A (μg RE)	Vitamin C (mg)	Riboflavin (mg)	Folate (μg)	Iron[a] (mg)	Zinc[b] (mg)	Calcium (mg)	Magnesium (mg)
1–3		400	30	0.5	150	5.8	8.3	500	60
4–6		450	30	0.6	200	6.3	9.6	600	76
7–9		500	35	0.9	300	8.9	11.2	700	100
10–18	Male	600	40	1.3	400	14.6 (10–14 yrs) 18.8 (15–18 yrs)	17.1	1300	230
	Female	600	40	1.0	400	32.7 (10–14 yrs) 31.0 (15–18 yrs)	14.4	1300	220
19–65	Male	600	45	1.3	400	13.7	14.0	1 000	260
	Female	500	45	1.1	400	29.4	9.8	1 000	220

[a] Based on a diet with 10% iron bioavailability.
[b] Based on a diet with low zinc bioavailability.

https://doi.org/10.1016/j.jfca.2010.05.002

Vitamin content of selected African leafy vegetables (values per 100 g edible portion, fresh weight basis).

Table 3
Vitamin content of selected African leafy vegetables (values per 100 g edible portion, fresh weight basis).

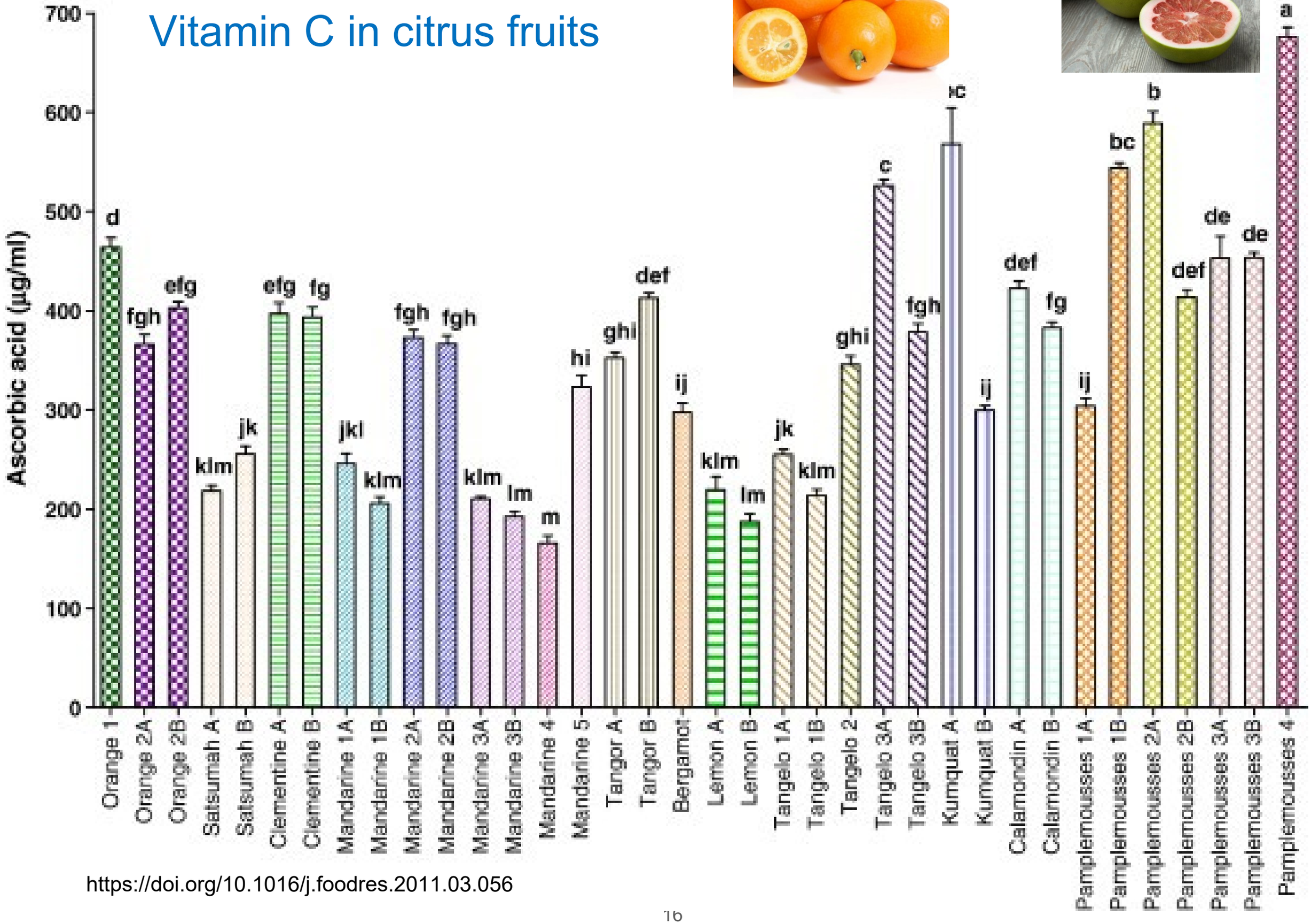
African leafy vegetables	Vitamin A (μg RE)	Ascorbic acid (mg)	Riboflavin (mg)	Folate (μg)
Adansonia digitata	–	52[b]	–	–
Amaranthus sp.	327[a]	46–126[a,c]	0.1–0.4[a,b]	64[a]
A. hypogea	–	87[d]	–	–
B. pilosa	301–985[a,b]	23[a,c]	0.2[a]	351[a]
Brassica sp.	–	30–113[a,d]	0.0–0.2[a,d]	16[a]
C. album	917[a]	31[a]	0.3[a]	30[a]
Cleome sp.	1200[a]	13–50[a,b]	0.1[a]	346[a]
Cucurbita pepo	194[a]	11[a]	0.1[a]	36[a]
I. batatas	103–980[a,b]	11–70[a,b,d]	0.3–0.4[a,d]	80[a]
M. esculenta	1970[b]	311[b]	0.6[b]	–
Momordica sp.	–	4[c]	–	–
Solanum nigrum	1070[a]	2[a]	0.3[a]	404[a]
Sonchus oleraceus	985[a]	25[a]	–	–
S. oleracea	669[a]	28[a]	0.2[a]	194[a]
Vernonia sp.	–	51–198[b,e]	0.3[a]	457[a]
V. unguiculata	99[a]	50[a]	0.2[a]	141[a]

https://doi.org/10.1016/j.jfca.2010.05.002

Vitamin C

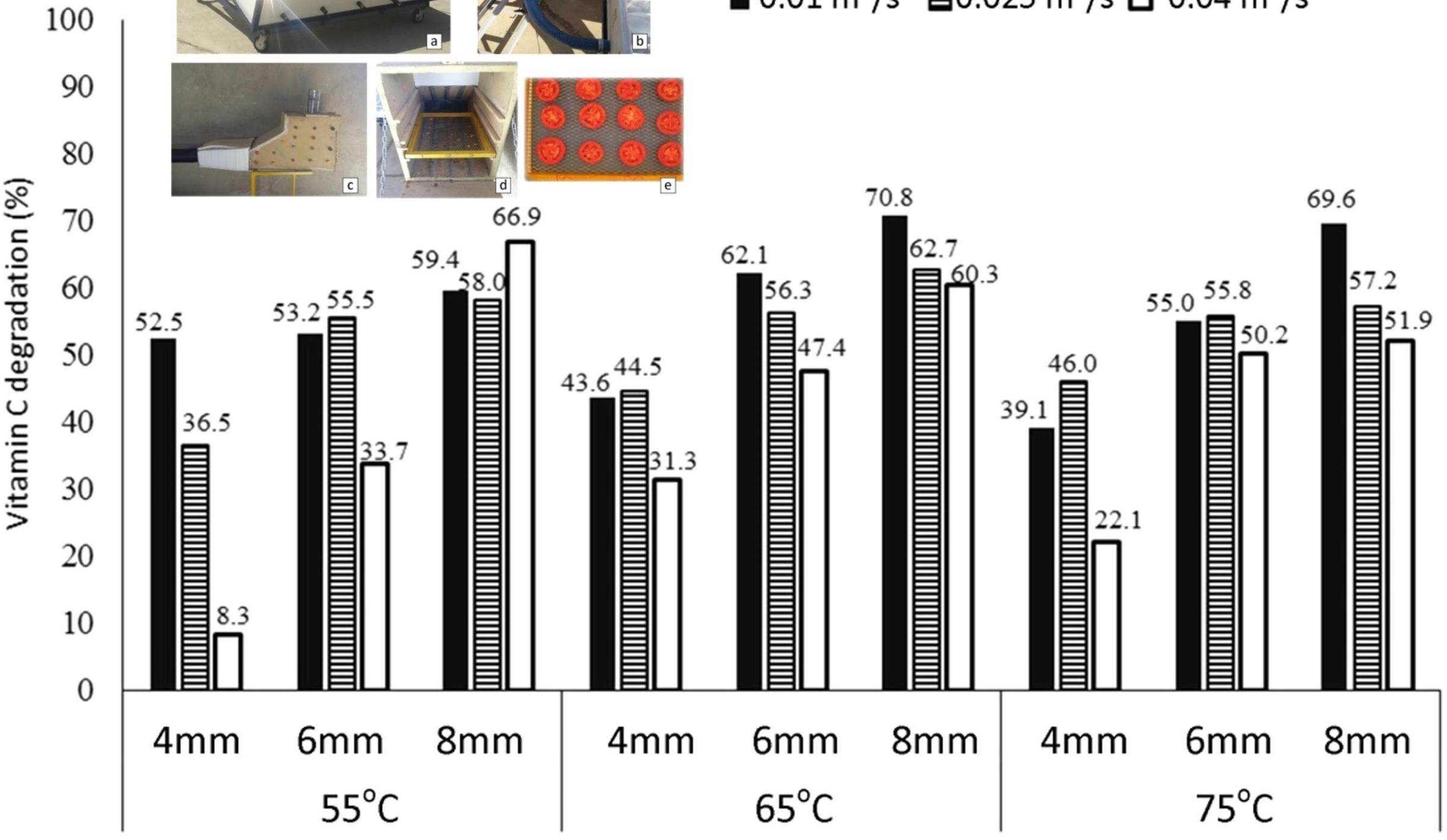
- Fruits and several vegetables contain high amount of vitamin C
- Vitamin C tends to degrade after drying and also losses during washing, blanching

Vitamin C in citrus fruits



https://doi.org/10.1016/j.foodres.2011.03.056

Tomato drying



https://doi.org/10.1016/j.solener.2020.12.026

Vitamin A

- Fruit and vegetable contain beta-carotene which can be converted into “vitamin A” in human body
- Very necessary for eyes health, protecting from vision loss and blindness
- Papaya, carrot, corn, mango, other green vegetables

Dried mango was found to contain high amount of beta-carotene

Table 2: Percentage loss of β-carotene and vitamin C of cowpea leaf and mango fruit samples dried under solar radiation by three different methods in Uganda

Fruit/vegetable	Pro-vitamin / Vitamin	Visqueen-covered solar dryer	Polyethylene-covered solar dryer	Open-sun drying
Mango fruit	β-Carotene	73.22	84.07	94.24
	Vitamin C	53.31	66.95	84.54
Cowpea leaves (un-blanched)				
	b-Carotene	44.43	51.17	63.16
	Vitamin C	66.04	75.94	82.29
Cowpea leaves (blanched)	β-Carotene	24.49	34.42	53.37
	Vitamin C	75.77	82.03	86.15

Ndawula, J et al. “Alterations in fruit and vegetable beta-carotene and vitamin C content caused by open-sun drying, visqueen-covered and polyethylene-covered solar-dryers.” *African health sciences* vol. 4,2 (2004): 125-30.

Table 5. Retinol equivalents (RE) and percentage contribution to the recommended daily intake level of vitamin A of an edible portion of vegetable relish[a]

	Solar-dried		Open sun-dried	
Vegetable	Retinol equivalents (μg)	Contribution to daily vit. A req.[b] (%)	Retinol equivalents (μg)	Contribution to daily vit. A req.[b] (%)
Mgagani	1514	275	943	171
Amaranth	882	160	718	131
Cowpea	907	165	579	105
Sweet potato	1038	189	833	151
Pumpkin	833	152	515	94
Ngwiba	965	175	595	108
Nsonga	1066	194	799	145
Maimbe	662	120	530	96
Mean	983	179	689	125

Mulokozi, G. & Svanberg, U. Plant Foods Hum Nutr (2003) 58: 1.
https://doi.org/10.1023/B:QUAL.0000041153.28887.9c

- Vitamin C
- Dietary fiber
- Beta-carotene

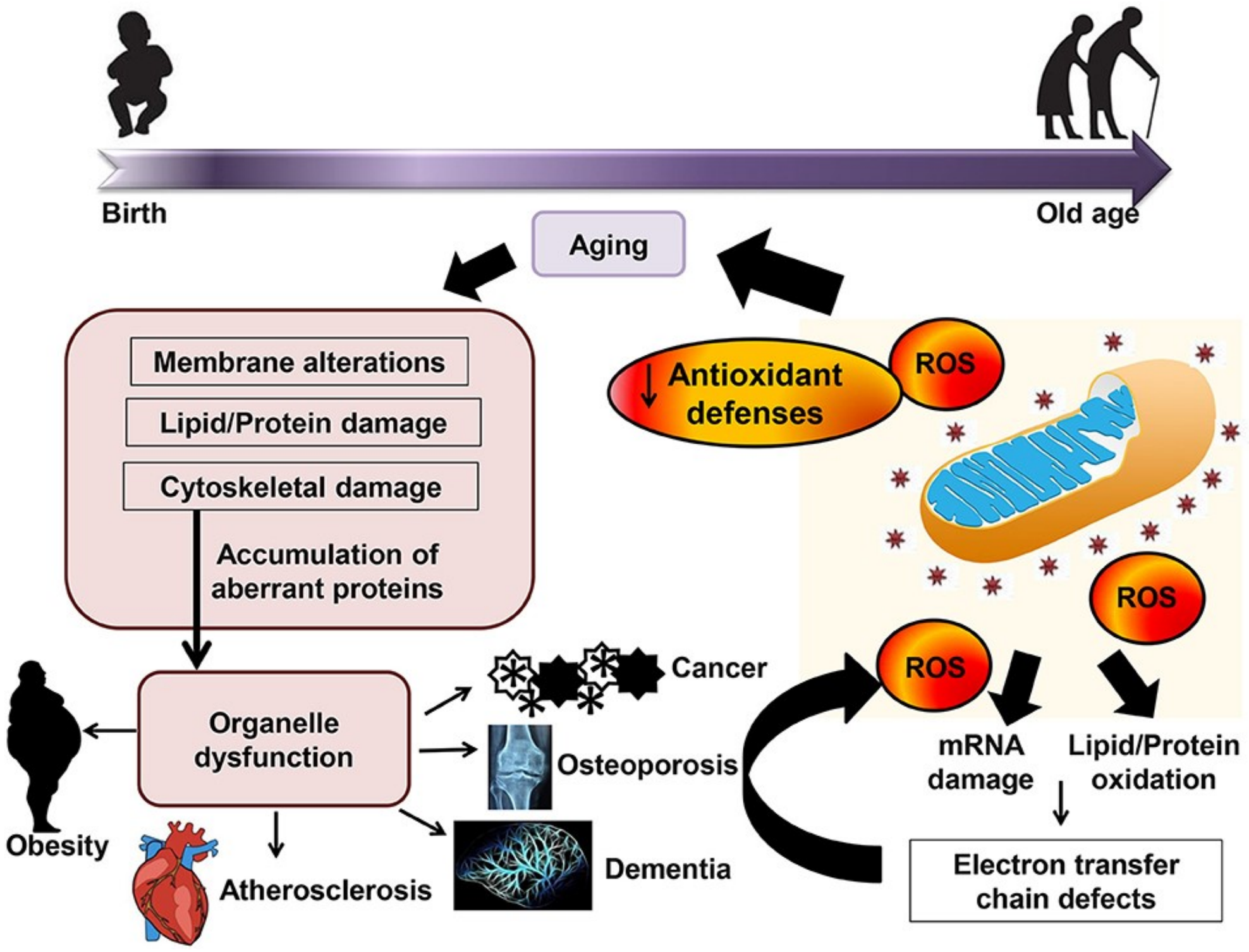
ORGANIC
DRIED
MANGO

Dried vegetables for conveniences of cooking

Bioactive compounds

- Plants contains several health beneficial compounds
- They are called bioactive compounds
- Antioxidants, anticancer, etc
- Usually the effects are not immediate, some need more scientific proving
- Processed into several “dietary supplements”

Effect of oxidative stress and the interaction of aging and age-related diseases



https://doi.org/10.3389/fphar.2018.01162

Carotenoids

- Carotenoids are natural pigments give yellow, orange, red color in fruits and vegetables
- Provitamin A (beta-carotene)
- Nonprovitamin A (Lutein, Zeaxanthin, Lycopene)

Sample	Lycopene losses (%)
Fresh	0
Osmotic dehydrated (OD)	0
OD-vacuum dried	2.4
vacuum dried	3.2
Air dried	3.9

Degradation of lycopene in tomato powder

Storage (day)	Conditions	Lycopene retention (%)
Initial powder		100
30	N_2, 20°C	90
	Air, 20°C	46.3
80	N_2, 20°C	78.5
	Air, 20°C	28.7
120	N_2, 20°C	76.5
	Air, 20°C	25.5
210	N_2, 20°C	69.8
	Air, 20°C	23
385	N_2, 20°C	65.8
	Air, 20°C	21.8

- Lycopene degraded with time
- Air (oxygen) accelerated the degradation

Phenolic compounds

- Found in all plants
- Divided in to several classes
- Possess various activities e.g. antioxidant, anti-inflammatory, reduce cholesterol etc.
- Phenolic compounds are quite stable during drying

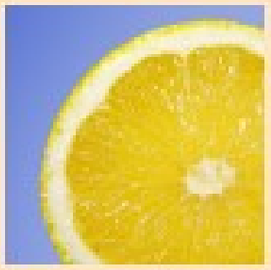
Tea is rich in catechin

Phenolic substances in selected foodstuffs.

hydroxycinnamic acids (***8***–***12***)



flavones (***18***)

tannins (***23***–***27***)



isoflavones (***19***)

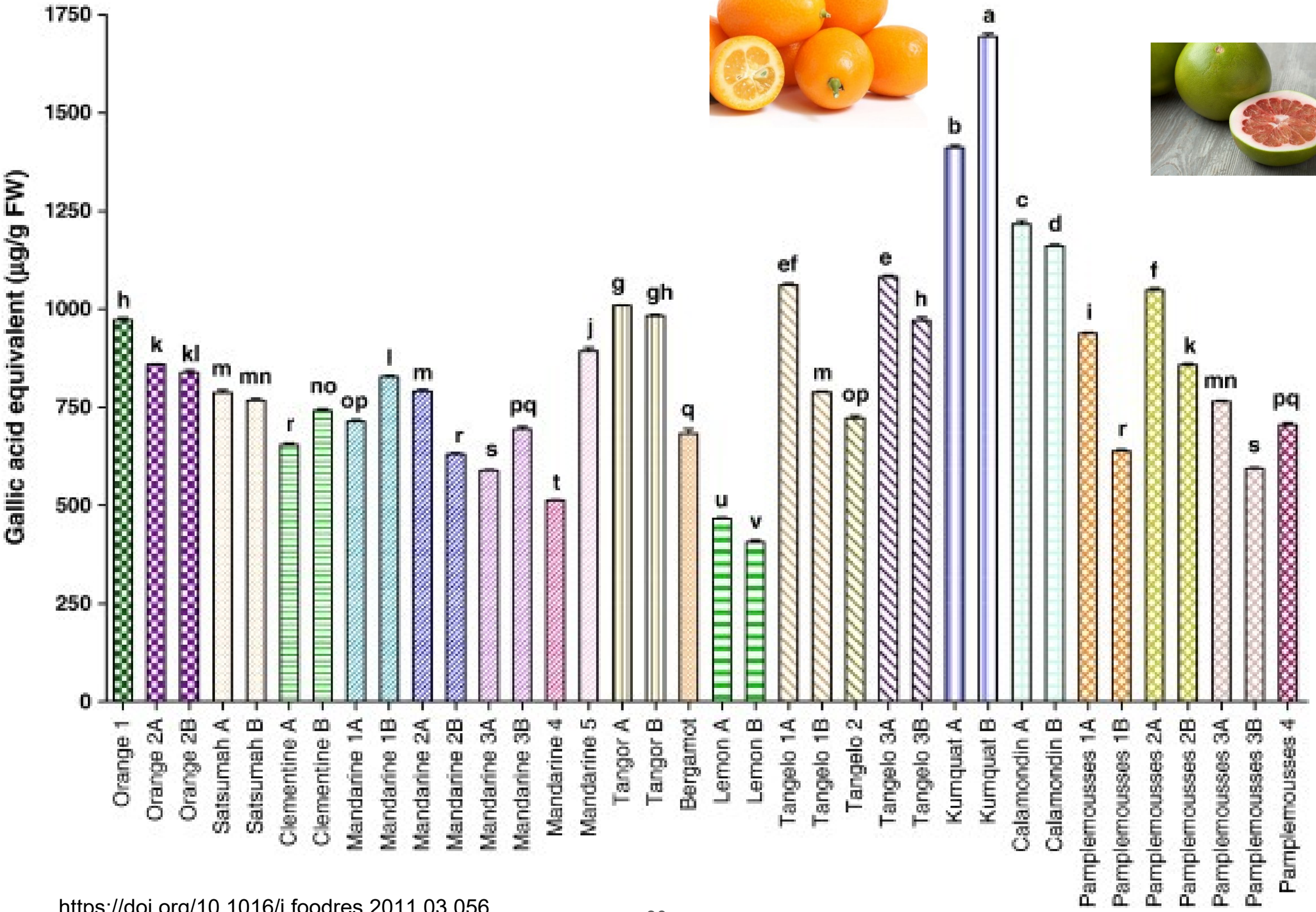
flavonols (***16***–***17***)


proanthocyanidins and anthocyanins (***23***–***25***)




catechins (***14***–***15***)


https://doi.org/10.1002/chemv.201700037



https://doi.org/10.1016/j.foodres.2011.03.056

Anthocyanins

- One class of phenolic compound
- Give purple, blue, red color
- Good antioxidant activity

purple sweet potato

butterfly pea flower

Roselle (Hibiscus)

Red cabbage


ดอกอัญชันแห้ง
Clitoria Ternatea
แก้กระหาย บำรุงสมอง
เพิ่มการไหลเวียนของเลือด
ส่วนประกอบ
ดอกอัญชันแห้ง 100%
วิธีใช้ : ล้างน้ำและต้ม ใส่น้ำมะนาว กรองแยกกาก
เติมความหวานตามความต้องการ
น้ำหนักสุทธิ 100 กรัม
แบ่งบรรจุโดย บริษัท เอ็มพี โปรดักส์ จำกัด
โทร. 061-624-4744


กระเจี๊ยบแดง
Roselle
ประโยชน์
บรรจุ 100 กรัม.

Betacyanins

- Another red-purple pigment
- Red-flesh dragon fruit, beetroot
- Nitrogen-containing anthocyanins
- Antioxidant activity
- Quite stable during drying

fresh

40 ºC	50 ºC	60 ºC	70 ºC	80 ºC

Dried


SUPERFOODS from the nature
BioFinest
BEETROOT
POWDER
ORGANIC
GLUTEN-FREE
NON-GMO
KOSHER
VEGAN
USDA
ORGANIC
NON GMO Project
VERIFIED
VEGAN
NET WT. 4 OZ (114G)
USDA
ORGANIC

Medicinal plant

Moringa
(Moringa oleifera)

Vitamin A, C, Protein

https://doi.org/10.1016/j.fshw.2016.04.001

Moringa tea

Moringa powder

TABLE 1 Effects of drying on the phytochemical constituents of *Moringa oleifera* leaf

Parameters	Freeze-dried (mg/g)	Air-dried (mg/g)	Sun dried (mg/g)	Oven dried (mg/g)
Phenolics	68.75 ± 0.00^{d}	59.38 ± 0.42^{c}	50.00 ± 0.00^{ab}	46.88 ± 1.42^{a}
Flavonoid	62.50 ± 0.89^{d}	58.33 ± 0.00^{cd}	45.83 ± 0.89^{b}	25.00 ± 0.00^{a}
Vitamin C	52.94 ± 0.31^{d}	41.17 ± 0.31^{c}	35.29 ± 0.63^{bc}	23.53 ± 0.60^{a}
Tannin	0.06 ± 0.03	0.05 ± 0.02	0.05 ± 0.03	0.05 ± 0.03
Phytate	70.26 ± 2.40^{c}	89.82 ± 0.98^{d}	60.98 ± 0.00^{ab}	58.50 ± 1.42^{a}
Saponin	16.36 ± 0.92^{c}	16.36 ± 0.00^{c}	10.91 ± 0.82^{b}	7.27 ± 0.71^{a}
Alkaloid	12.8 ± 1.71^{c}	13.4 ± 0.00^{c}	5.00 ± 0.92^{a}	10.6 ± 2.41^{b}
Oxalate	9.96 ± 0.84^{c}	9.09 ± 0.72^{c}	6.66 ± 0.00^{a}	8.19 ± 0.60^{b}
Cardenolides	13.68 ± 0.71^{b}	11.72 ± 1.90^{b}	12.53 ± 2.40^{b}	8.17 ± 1.71^{a}
Cardiac glycosides	17.36 ± 1.31^{b}	16.72 ± 1.91^{b}	14.79 ± 2.81^{a}	14.79 ± 1.82^{a}

Note. Values represent mean ± standard deviation of triplicate experiments. Superscripts with different alphabets along the same row are significantly ($p < 0.05$) different.

https://dx.doi.org/10.1002%2Ffsn3.770

Island Herb Garden Island Herb Garden (Island Herb Garden) 90 Supplements (From Itojima and Izu Oshima / Pesticide-free Capsules) (3 Moringa Seeds Gift

Brand: アイランドハーブガーデン（Island herb garden）

★★★★☆ 24 ratings

Price: ¥2,180 (¥24 / 粒) + ¥1,482 shipping

Dosage Form	カプセル
Brand	アイランドハーブガーデン（Island herb garden）
Unit Count	90 粒
Ingredients	モリンガ粉末／ゼラチン（カプセル剤）

About this item

- Moringa, known as Miracle Tree, is nutritious and a super food containing more than 90 nutrients. A botanical supplement filled with full Moringa
- Recommended for those who feel irregular and lack of nutrition, those who are concerned about their own odor, or want to be prepared for their energy
- Name: Moringa powder-coated food; Contents: 90 capsules
- Shelf Life: 24 months from date of manufacture. Storage Method: Store in a place that is away from direct sunlight. Avoid high temperatures and humidity

¥2,180
+ ¥1,482 shipping

Arrives: **Wednesday, Sep 8**

Deliver to Thailand

In Stock. Click here for details of availability.

Quantity: 1

Add to Cart

Buy Now

Secure transaction

Ships from Amazon
Sold by Island herb garden(…
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Details

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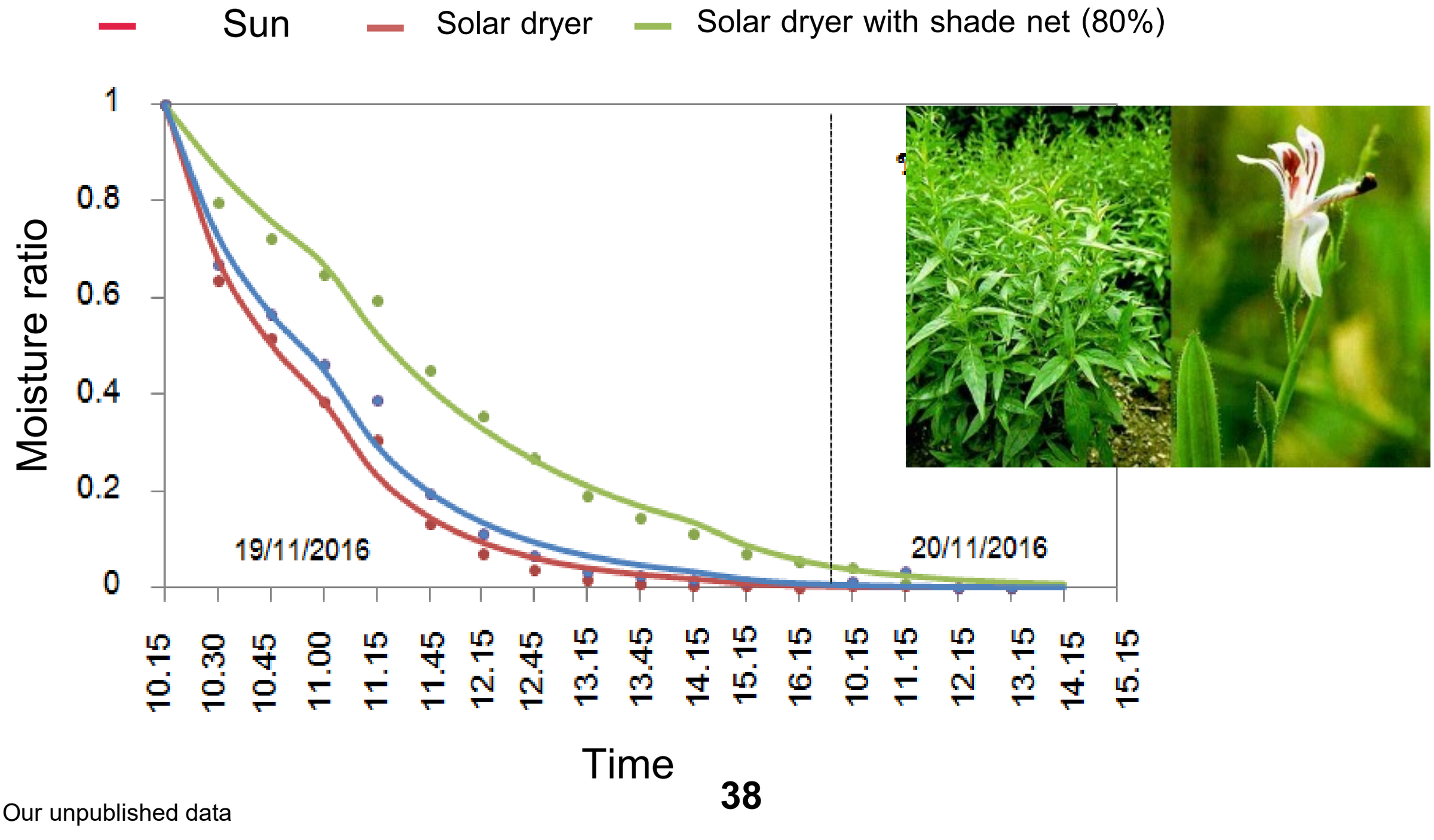
Example of presentation of the nutrient and bioactive compounds of product

Retention of bioactive compounds in medicinal plant/herb after drying in parabola solar dryer

Green chiretta (*Andrographis paniculata*)



Our unpublished data

Dried green chiretta

Sun

Solar dryer

Solar dryer with shade net (80%)

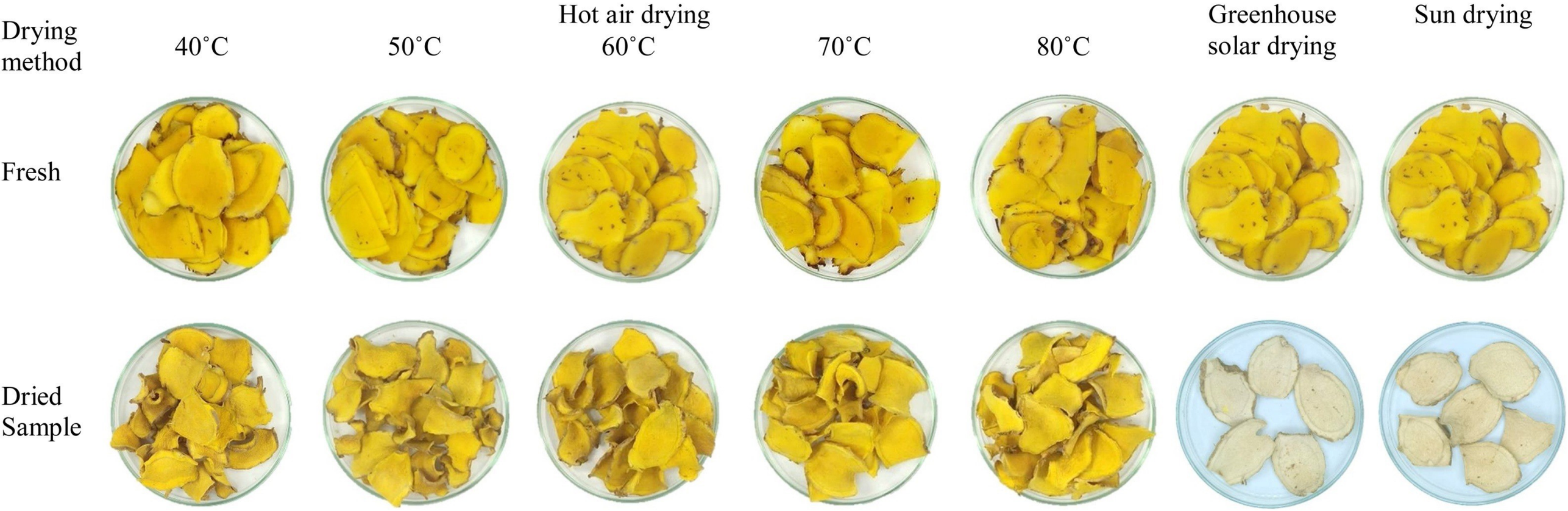
Our unpublished data

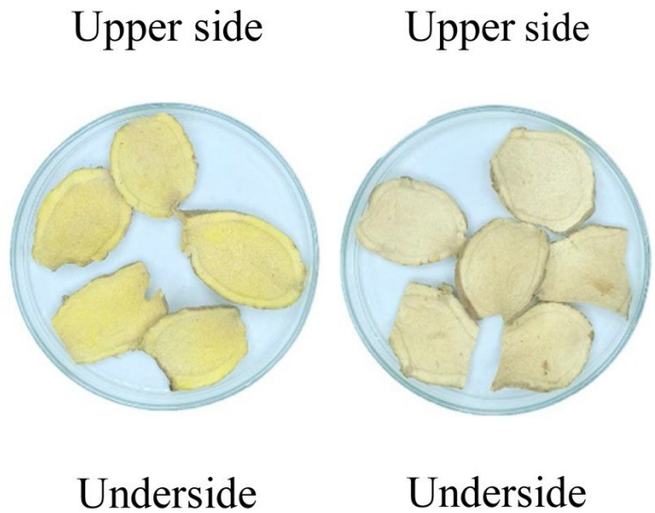
green chiretta contains andrographolide which a bioactive effective for treatment of common cold and even COVID-19 patient with mild symptoms

Sample	Andrographolide (mg/100 g DW sample)	%change[ns]
Sun	2548.68±45.5[a]	-36.27±7.77
Solar dryer with shade net (80%)	2657.45±775.20[a]	-30.61±17.64

Our unpublished data

cassumunar ginger (*Zingiber montanum*)





Topical oil for muscle pain treatment

https://doi.org/10.1016/j.jarmap.2020.100262

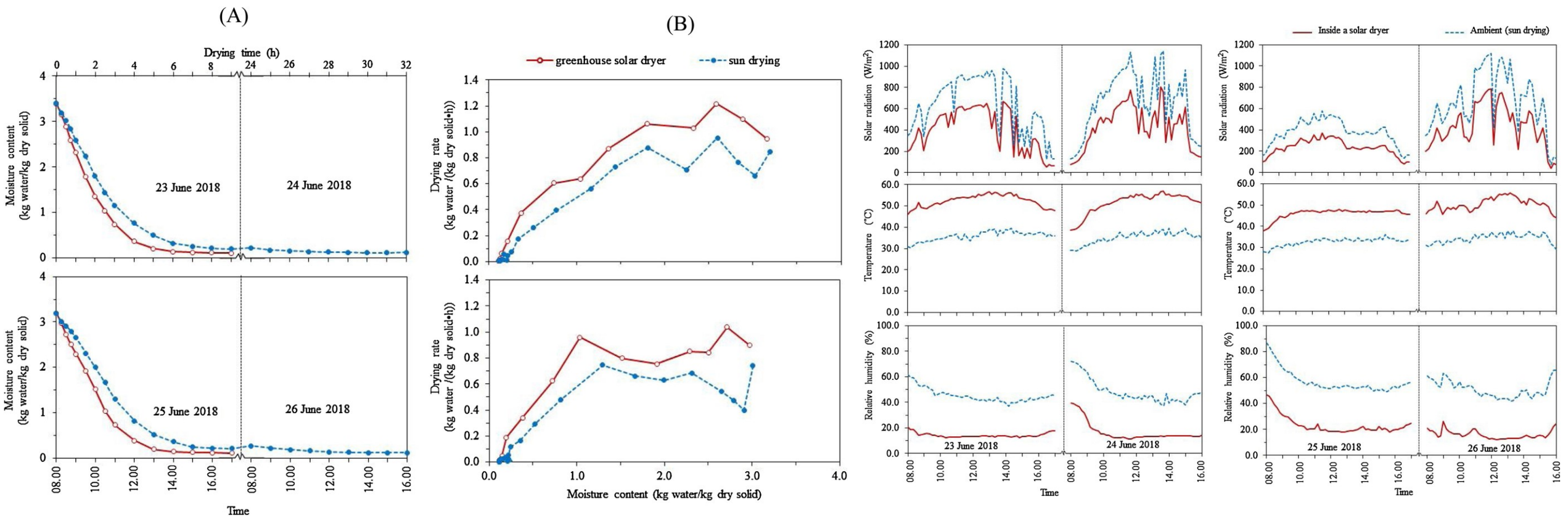


Table 3

Curcumin, compound D, and essential oil yields of the fresh and dried cassumunar gingers as affected by drying conditions.

Drying method	Curcumin (mg/g d.b.)		Compound D (Relative peak area)		Oil yield (mL/100 g d.b.)	
	Fresh^{ns}	Dried	Fresh^{ns}	Dried^{ns}	Fresh^{ns}	Dried
Hot air dryer						
40 °C	4.93 ± 0.14	8.99 ± 0.44^{a}	0.20 ± 0.02	0.18 ± 0.04	11.59 ± 0.49	8.43 ± 0.27^{ab}
50 °C	4.25 ± 0.46	8.24 ± 1.06^{ab}	0.22 ± 0.03	0.21 ± 0.03	10.66 ± 0.27	8.77 ± 0.50^{ab}
60 °C	4.65 ± 0.02	7.66 ± 0.60^{bc}	0.20 ± 0.01	0.22 ± 0.01	11.3 ± 0.55	9.28 ± 0.18^{a}
70 °C	4.46 ± 0.30	7.32 ± 1.03^{c}	0.20 ± 0.03	0.18 ± 0.03	11.43 ± 0.98	8.26 ± 0.41^{bc}
80 °C	4.33 ± 0.36	6.34 ± 1.00^{d}	0.21 ± 0.01	0.19 ± 0.00$_4$	11.85 ± 0.77	7.61 ± 0.41^{c}
Greenhouse solar dryer	3.70 ± 0.04	1.33 ± 0.10^{A}	0.21 ± 0.01	0.25 ± 0.01	10.89 ± 0.19	7.68 ± 0.15^{A}
Sun drying	3.70 ± 0.04	0.54 ± 0.04^{B}	0.21 ± 0.01	0.27 ± 0.02	10.89 ± 0.19	7.82 ± 0.04^{A}

Data are expressed as mean ± SD. Different superscript capital letters indicate significant difference between the greenhouse solar dryer and the sun drying and different lowercase letters indicate significant difference between drying temperatures ($p \leq 0.05$).

^{ns}represents not significant difference among drying methods ($p > 0.05$).

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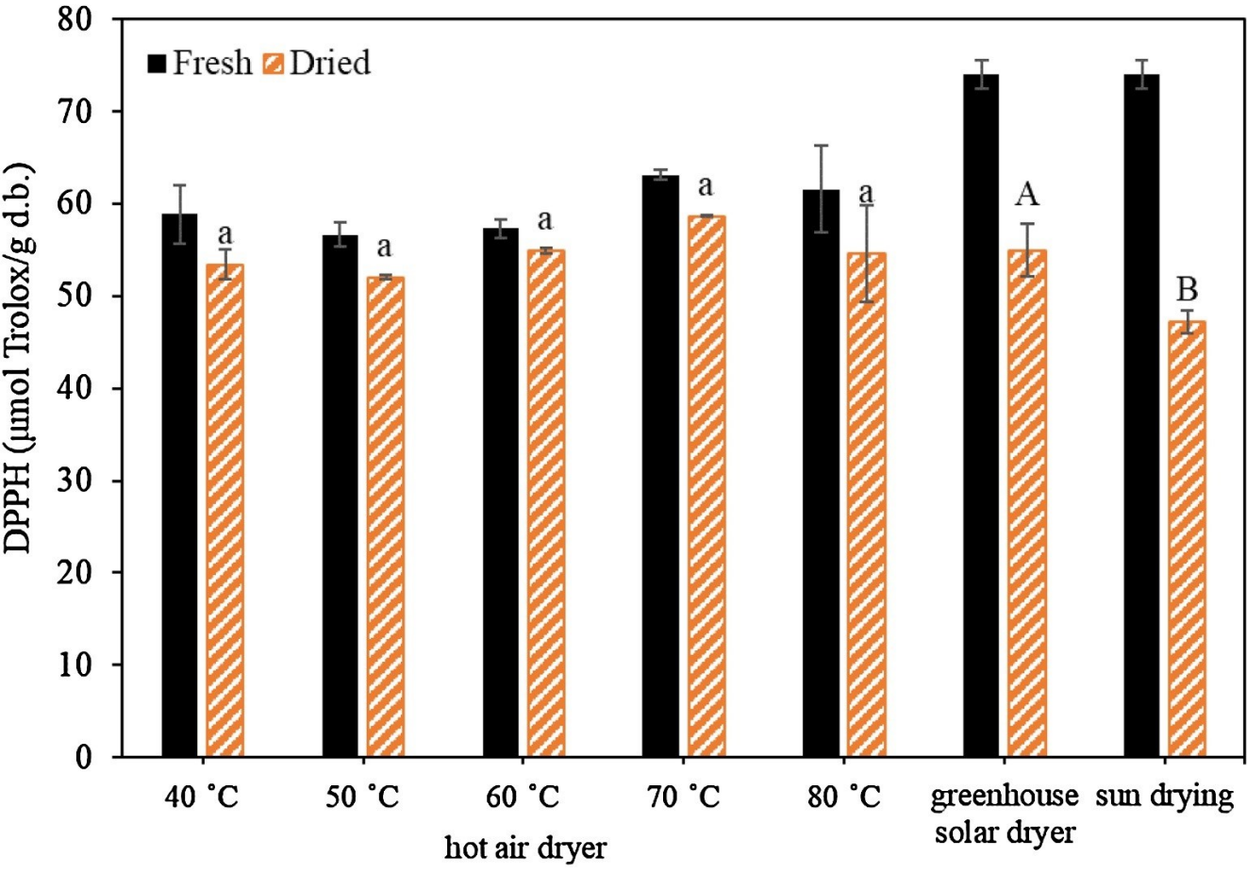
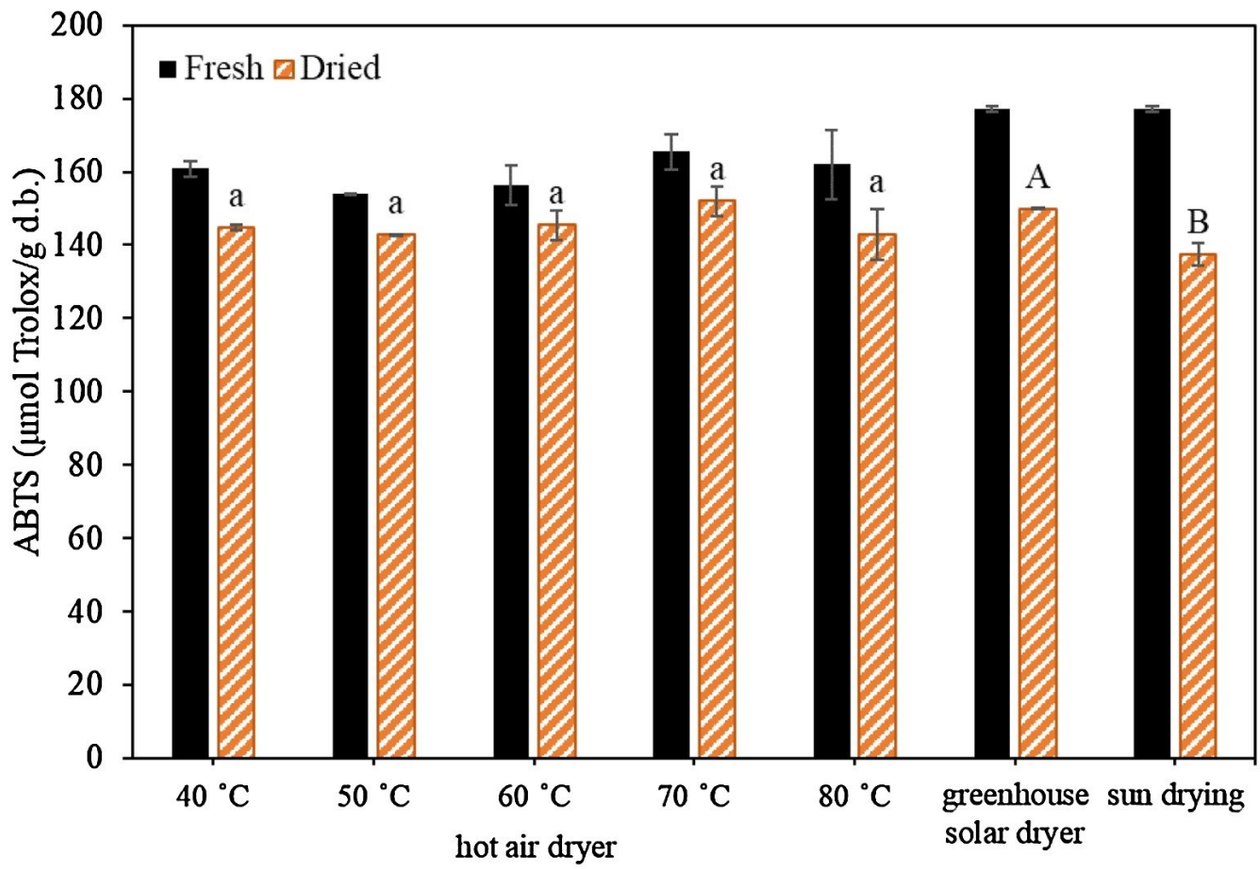
(A)



(B)



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