Composition, Physicochemical and Antioxidant Properties of Tropical Almond (*Terminalia catappa* L.) Oil as a Novel Source of Lipids

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Introduction

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- Edible oils are important for human nutrition and health
- The demand for edible oils is increasing globally
  - Identification of new natural sources of oils
  - Proper quality and safety evaluation
- **Tropical almond** (TA) (*Terminalia catappa*)
  - Underutilized nut
  - Contain high amount of oil with healthy fatty acids[1]

This study aimed to evaluate the composition, physico-chemical properties and antioxidant potential of TA oil with a view to utilize in the food sector

Methodology

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Oil extraction

Estimation of oil yield

Fatty acid profile (GC-FID-MS)

Thermal Behaviour (DSC)

Physicochemical properties[4]

- Specific gravity
- Color
- Peroxide value
- Acid value
- Iodine value

Shelf life estimation[2]

Antioxidant properties[3] (DPPH, ABTS, FRAP)

Total Phenolic and Total Flavonoid estimation

Results

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❑ Oil yields

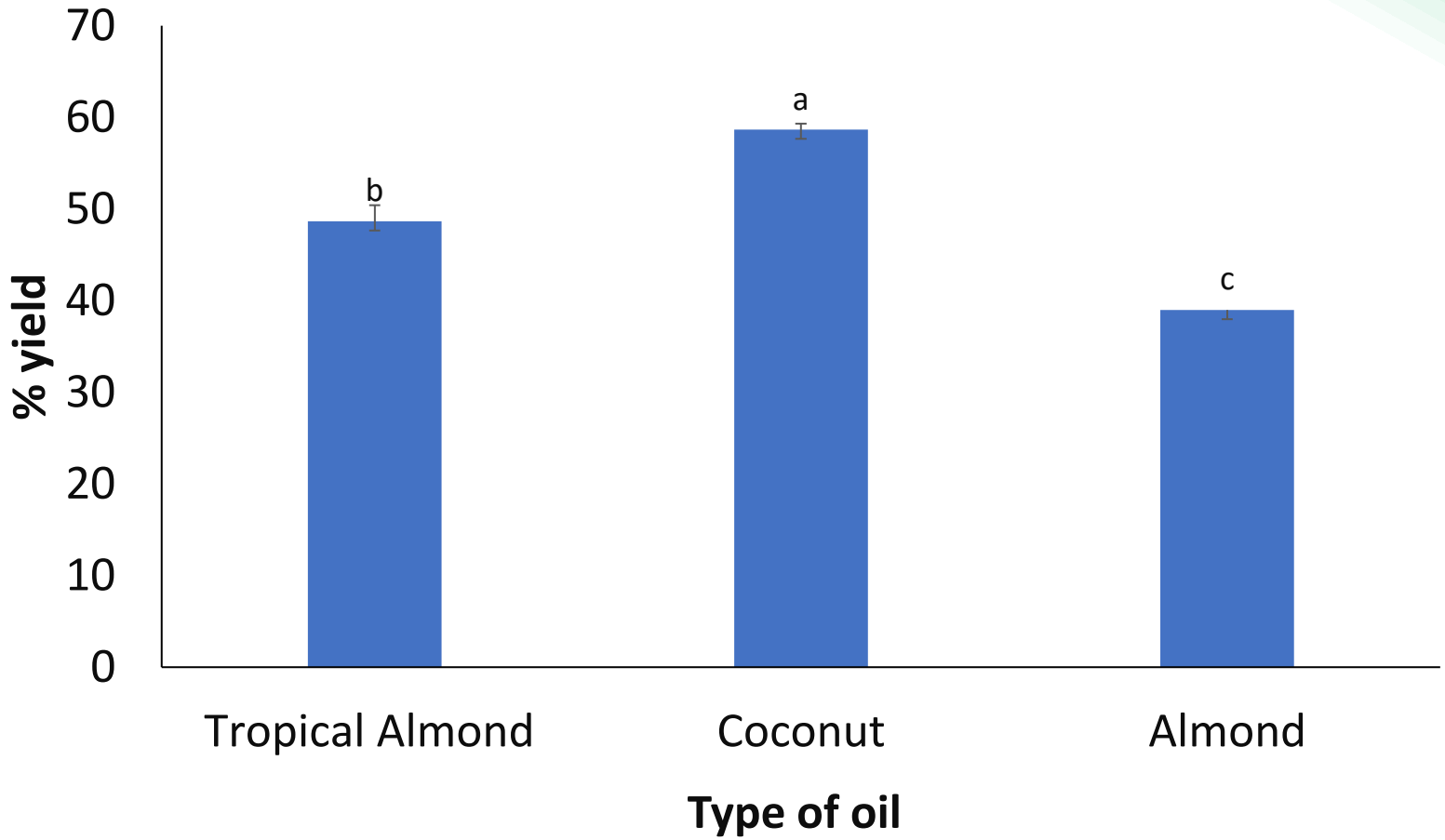

Figure 01: Percentage oil yield (p<0.05)

Results cont.

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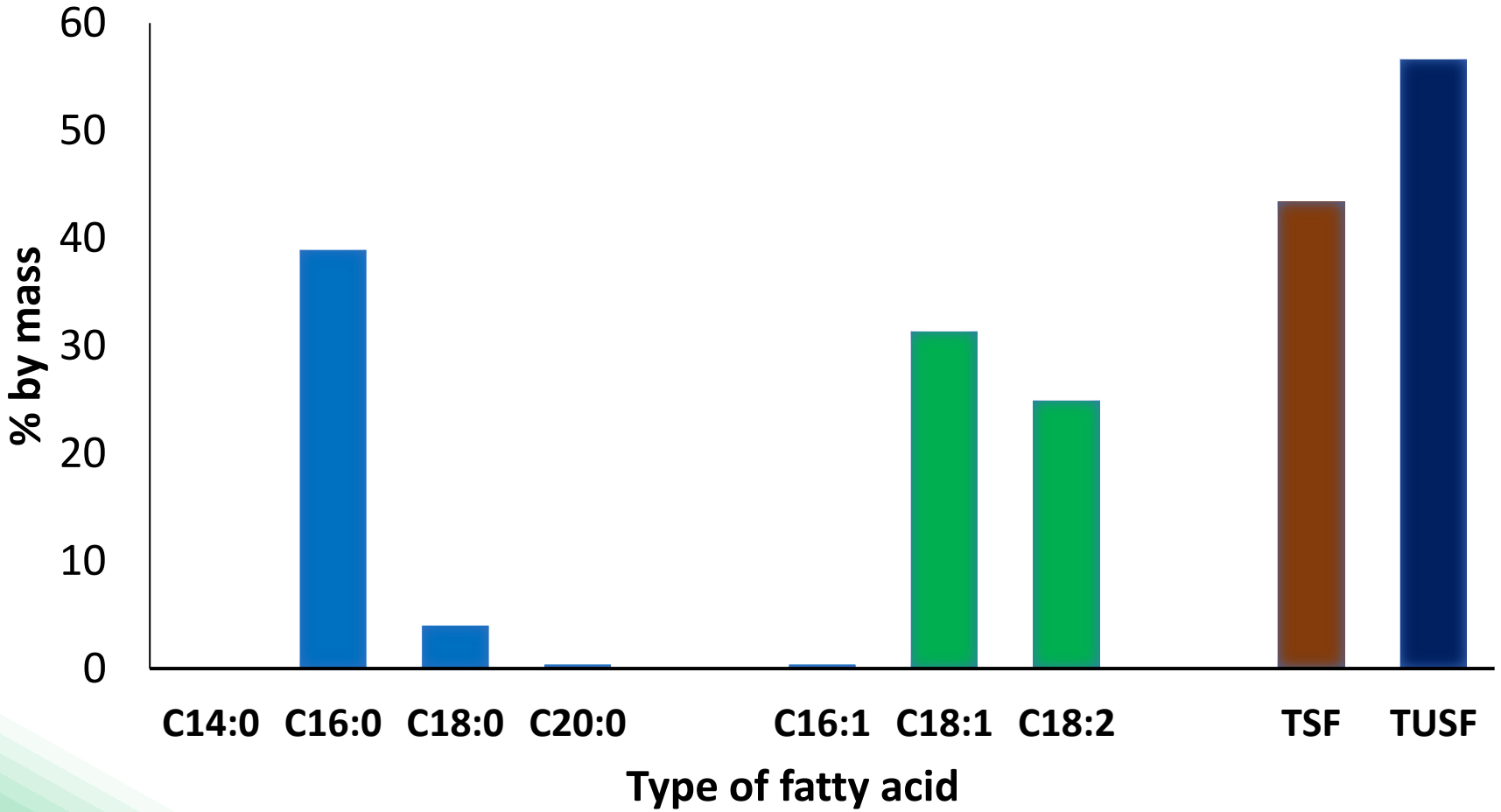
❑ Analysis of TA oil fatty acid profile



C14:0 – Myristic acid
C16:0 - Palmitic acid
C18:0 – Stearic acid
C20:0 – Arachidic acid
C16:1 – Palmitoleic acid
C18:1 – Oleic acid
C18:2 – Linoleic acid
TSF - Total saturated fat
TUSF - Total unsaturated fat

Figure 02: Fatty acid profile of TA oil

Results cont.

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❑ Analysis and comparison of physicochemical properties of oils

Table 01: Physicochemical properties of oils and CODEX/SLS standards (p<0.05)

Property	TA oil	Almond oil	Coconut oil	CODEX[5]/SLS[6] standards
Specific gravity (25°C)	0.912 ± 0.001^{b}	0.913 ± 0.000^{b}	0.920 ± 0.004^{a}	-
Refractive index	1.463 ± 0.001^{a}	1.466 ± 0.00^{a}	1.456 ± 0.001^{b}	-
Acid value (mg KOH/g)	0.625 ± 0.029^{b}	0.831 ± 0.019^{a}	0.133 ± 0.032^{c}	4.0 mg KOH/g
Free fatty acid value (% oleic acid)	0.314 ± 0.014^{b}	0.417 ± 0.010^{a}	0.066 ± 0.016^{c}	< 1% (SLS)
Peroxide value (mEq. O_2/kg)	1.96 ± 0.03^{b}	2.99 ± 0.08^{a}	1.30 ± 0.34^{b}	< 15 mEq. O_2/kg
Iodine value (g I_2/100 g)	54.99 ± 1.71^{b}	102.53 ± 0.95^{a}	4.66 ± 0.089^{c}	-
Viscosity (mPa.s)	41	33	60	-

Results cont.

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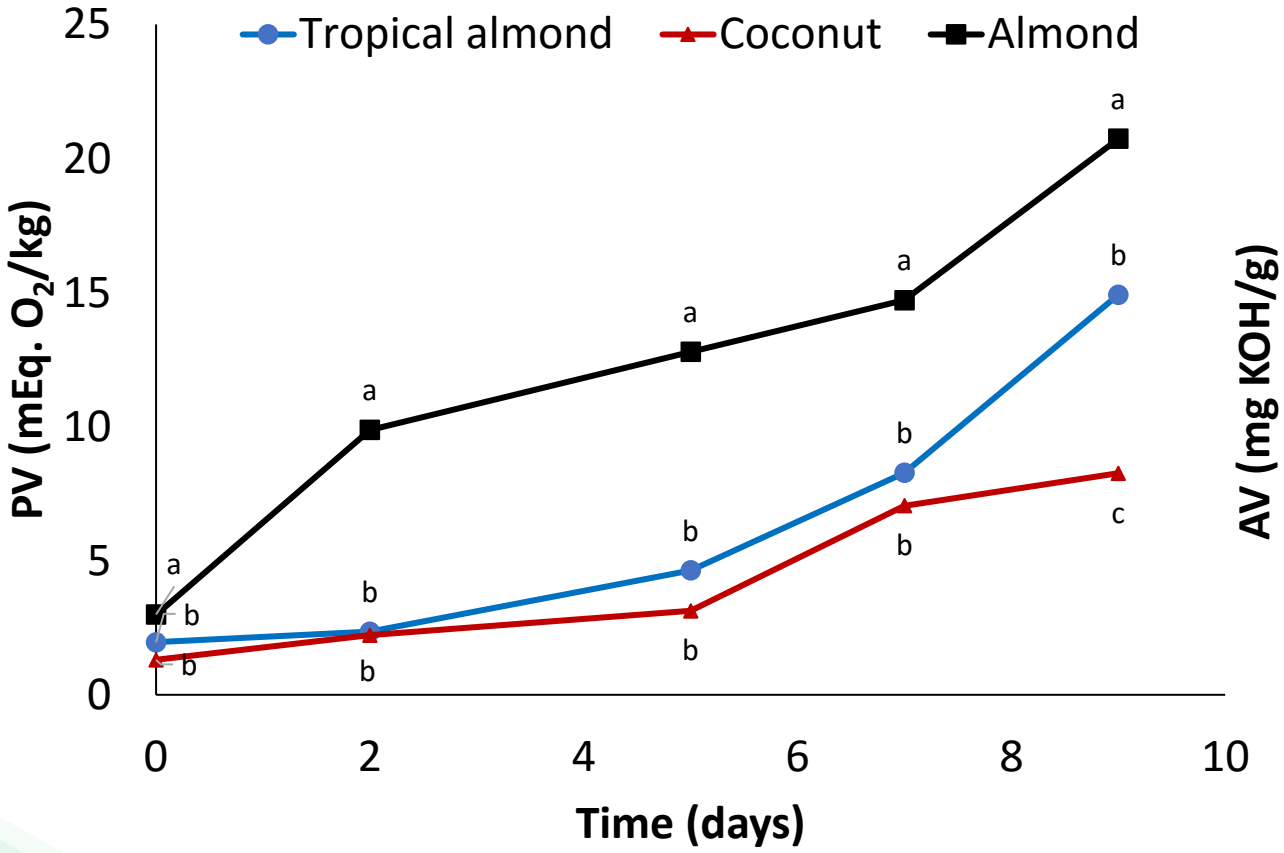
❑ Estimation of shelf life of oils



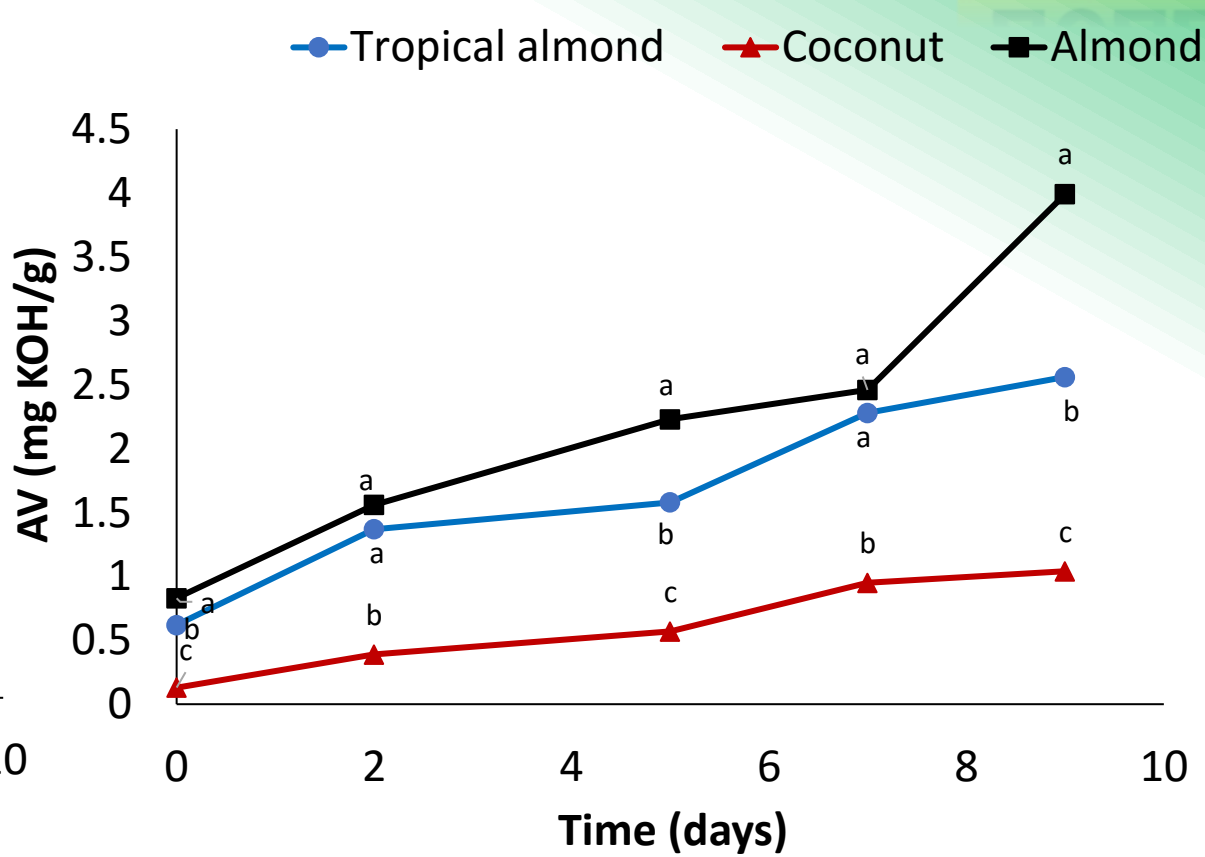


Figure 03: Variation of (a) Peroxide value (b) acid value over the storage time (p<0.05)

Results cont.

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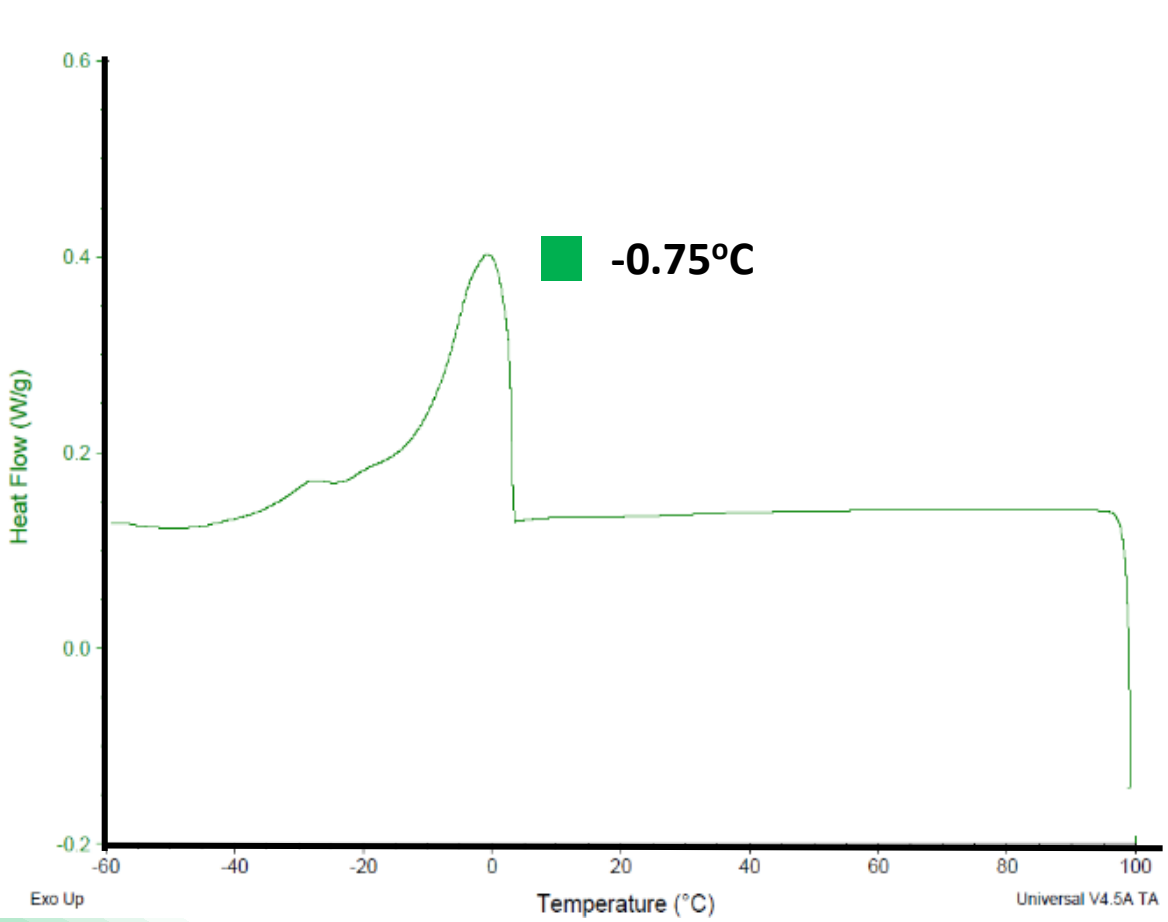
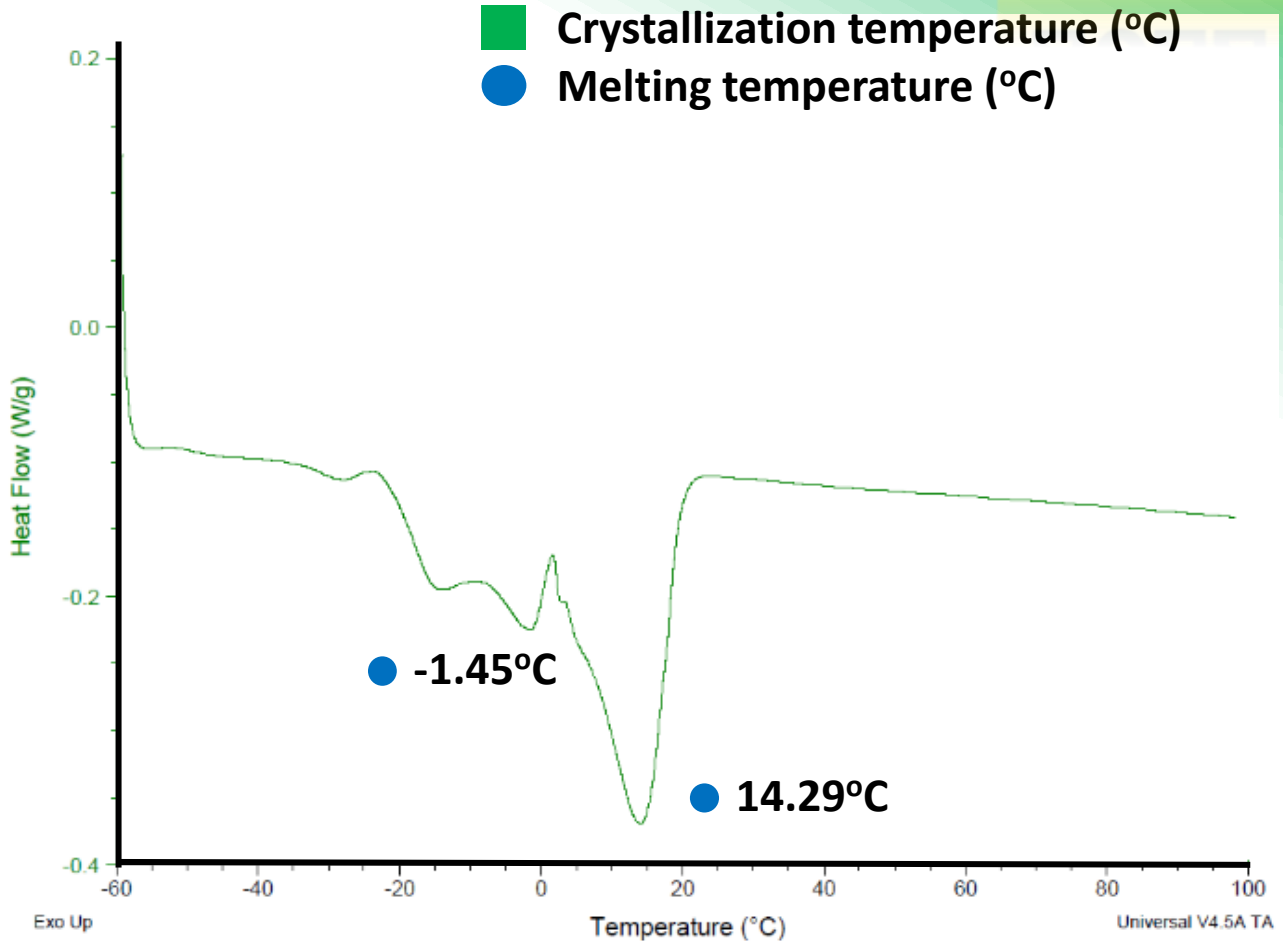
❑ Thermal behaviour cont.



(a)



(b)

Figure 04: DSC cooling (a) and heating (b) thermogram of tropical almond oil

Results cont.

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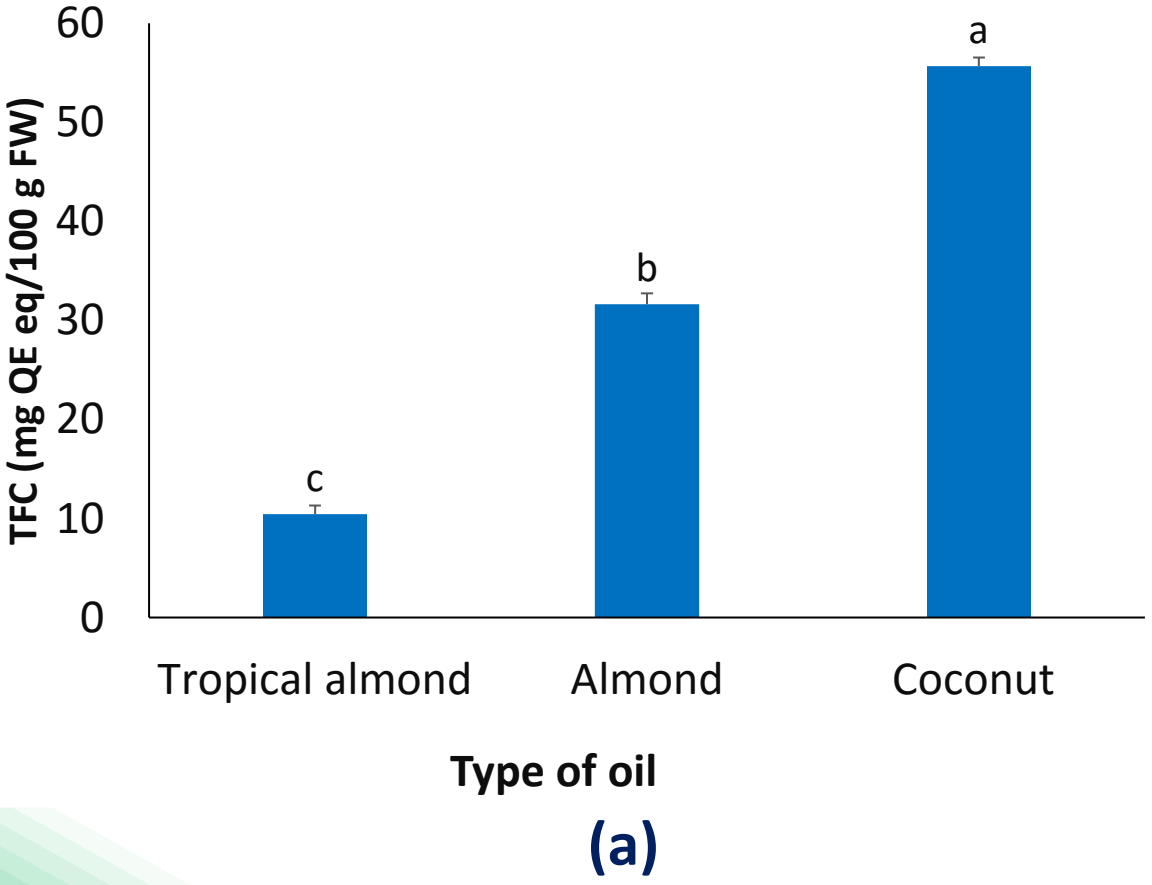
❑ Estimation of bioactive compounds



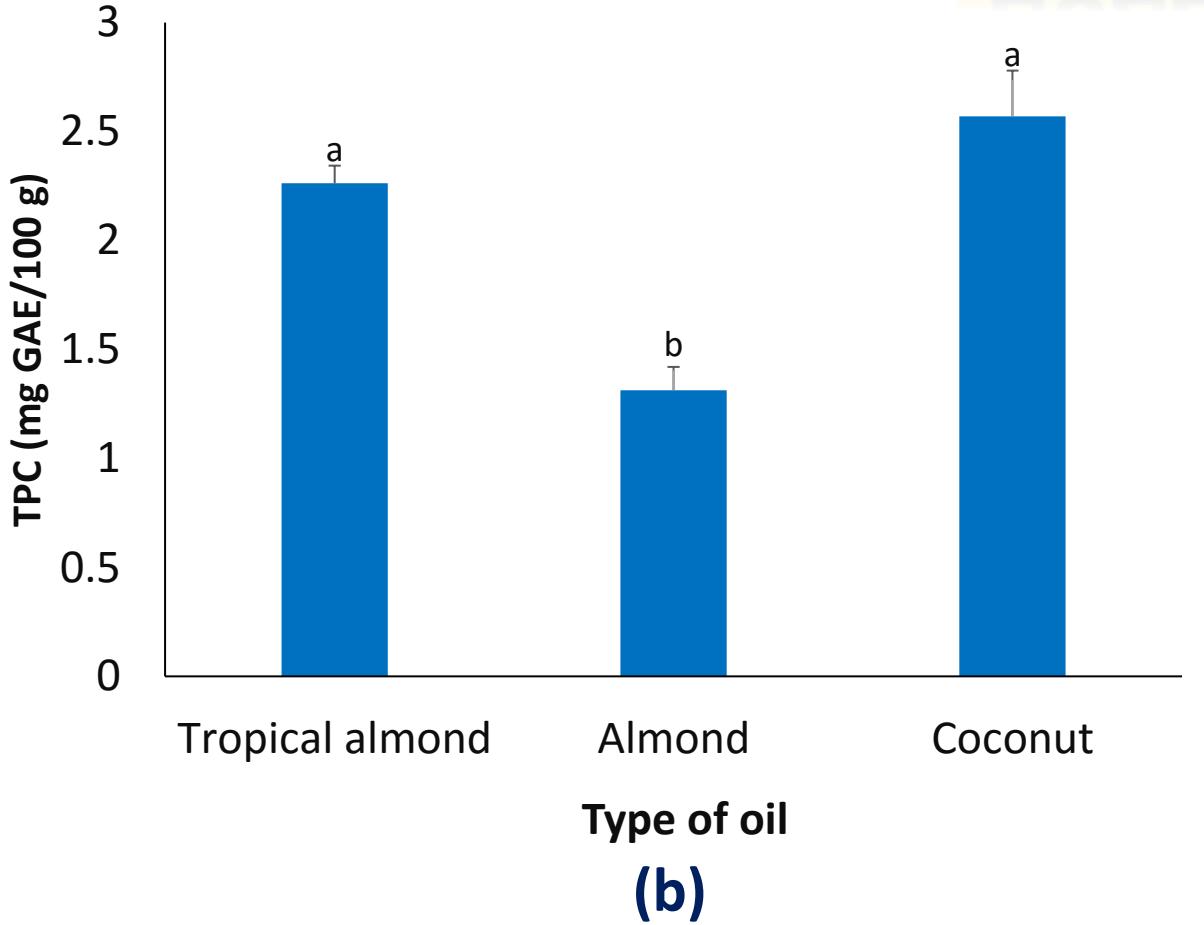


Figure 05: Total flavonoid (a) and total phenolic (b) content of oil samples (p<0.05)

Results cont.

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❑ Estimation of antioxidant properties cont.

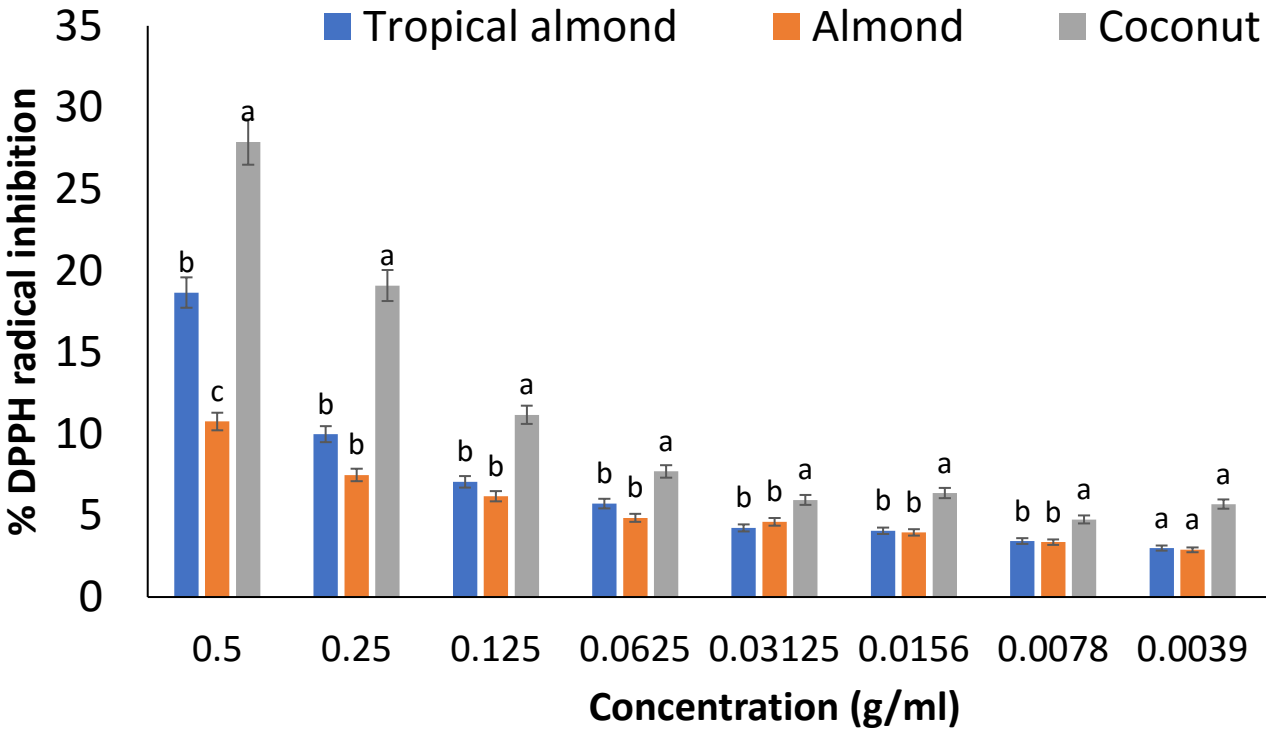

Figure 06: DPPH radical scavenging percentage of oil samples (p<0.05)

Table 02: IC_{50} of extracted oils (p<0.05)

Sample	IC_{50} (mg/ml)
TA oil	1574.93^{b}
Coconut oil	978.63^{c}
Almond oil	3127.80^{a}
Ascorbic acid	0.016^{d}
Tocopherol	0.077^{d}

Results cont.

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❑ Estimation of antioxidant properties cont.

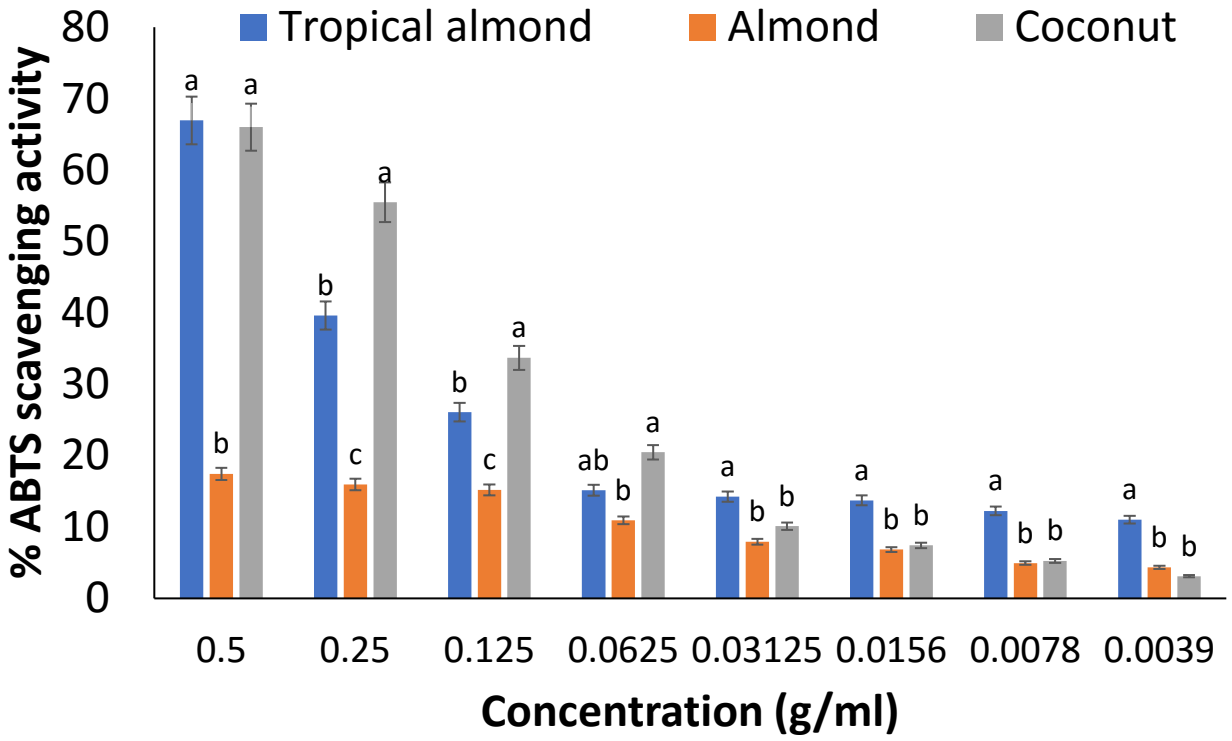

Figure 07: ABTS radical scavenging percentage of oil samples (p<0.05)

Table 03: IC_{50} of extracted oils (p<0.05)

Sample	IC_{50} (mg/ml)
TA oil	340.28^{b}
Coconut oil	212.32^{c}
Almond oil	577.74^{a}
Tocopherol	0.016^{d}
Trolox	0.007^{d}

Results cont.

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❑ Estimation of antioxidant properties cont.

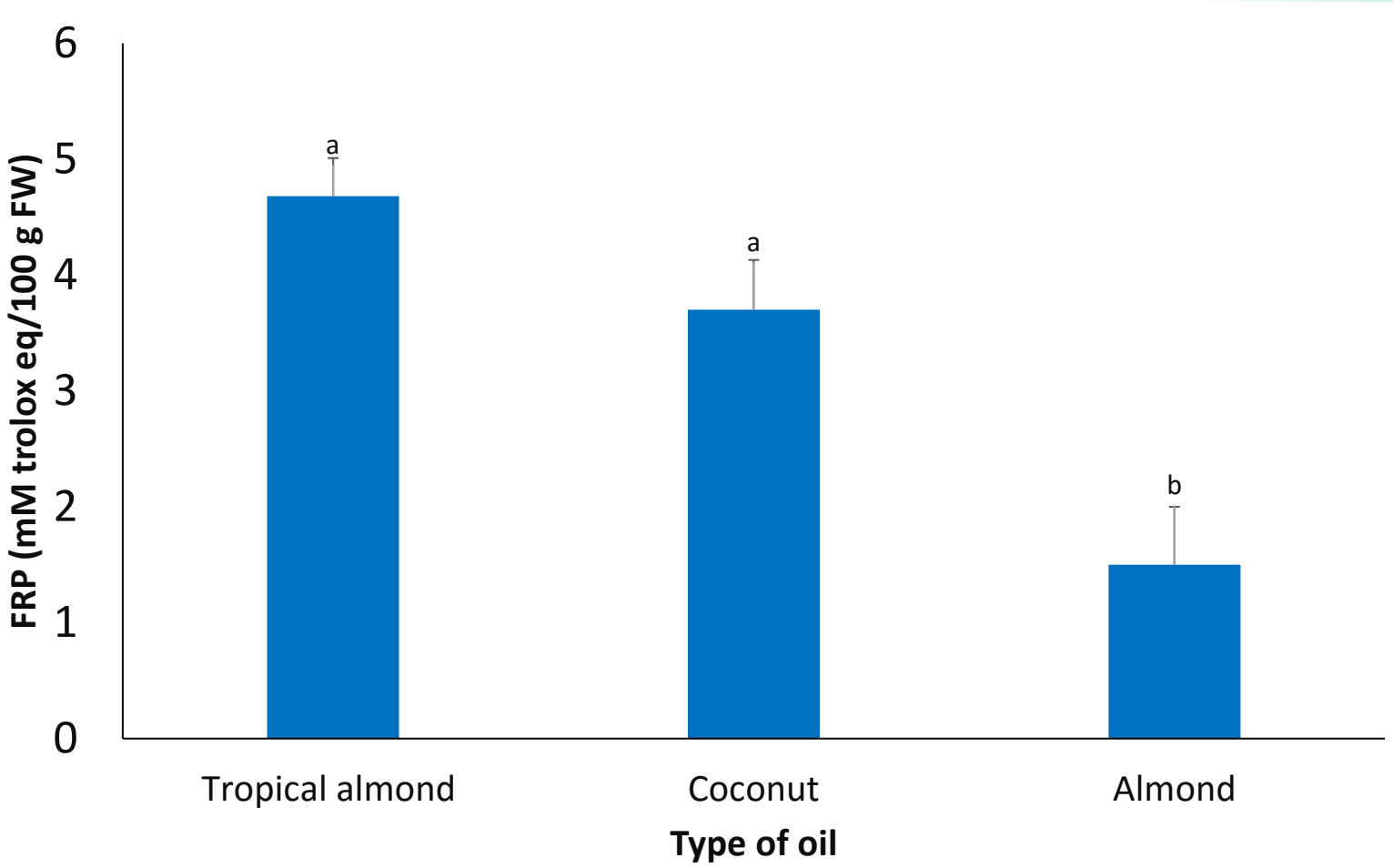

Figure 08: Ferric reducing power of oils (p<0.05)

Conclusions

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- The **composition, physicochemical and antioxidant properties** of novel TA oil were consistent with the standards (CODEX and SLS)
- It could be recommended as a healthy edible oil due to **high oleic and linoleic acid content with high antioxidant potential**

- Further research is needed to assess the other functional properties, health benefits of TA oil and for the modification purpose

References

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THANK YOU...