The Bioactive and Bioavailability Properties of a Polyphenol–rich sugarcane extract (PRSE)

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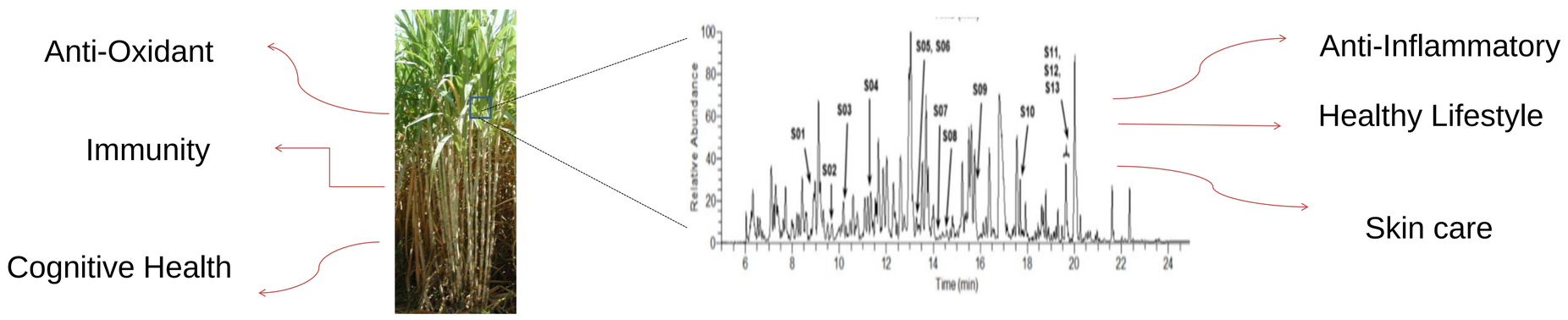
Introduction

Sugarcane (Saccharum officinarum) is a tall perennial grass indigenous to tropical South East Asia, but now grown in over 90 countries globally principally to produce raw sugar (1). Post-harvest processing of sugarcane results in several by-products such as molasses, with well over 60 million tonnes produced annually. Sugarcane and its by-product, molasses is known to be rich in unique phytochemicals including polyphenols and flavonoids which deliver powerful antioxidant, anti-inflammatory, anti-microbial, anti-viral, anti-proliferating, and immunomodulation properties (2-6). Here we summarize the bioactive properties of our Polyphenol Rich Sugarcane Extract (PRSE), essentially free of sugars , from this abundant crop. We have unlocked the goodness of the Sugarcane plant, deserving its elevation to the status as a Super Food, beyond its original use as a source of raw and white refined sugar.



PRSE and Anti-oxidant , Anti-inflammatory and Anti-proliferative properties

Table 1: Polyphenol Content of PRSE

Analyte	Concentration, µg/g dry weight
	Polynol™
Chlorogenic acid	74.29
Caffeic acid	7.54
Syringic acid	107.57
Vanillin	2.13
Homoorientin	0.58
Orientin	4.50
Sinapic acid	1.73
Vitexin	1.62
Swertisin	5.25
Diosmin	227.00
Apigenin	0.01
Tricin	0.40
Diosmetin	0.16
Total polyphenols	432.78

Table 2: Oxygen radical absorbance capacity (ORAC) of PRSE

Analysis	Result (µmole Trolox Equivalents (TE)/gram
ORAC against peroxyl radicals	2336
ORAC against hydroyl radicals	13785
ORAC against peroxynitrite	255
ORAC against super oxide anion	450
ORAC against singlet oxygen	2011
ORAC against hypochlorite	620
ORAC 6.0 (sum of above)	19457

- Activates Nrf2, Master Redox Switch, generates indigenous anti-oxidant compounds
- Modulation of Oxidative stress
- Inhibits pro-inflammatory cytokines, TNF-α, NF-Kβ
- Inhibits COX2, LOX-5, PLA2, PGE2 Arachidonic acid inflammatory pathway
- Anti-proliferative effects via alteration in cytokines, VEGF-1 and NF-κB expression.

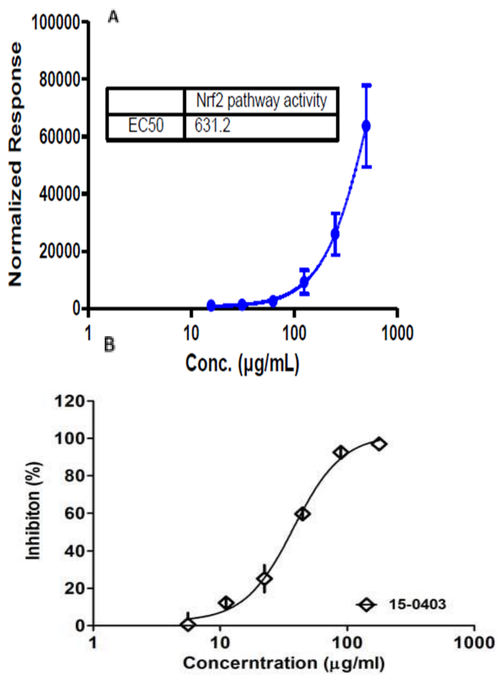


Fig 1: Effect of PRSE pro-inflammtory cytokine TNF-α and Nrf2 in human cells. 1A: concentration-dependent inhibition effect of PRSE on TNF-α in a cellular inhibition model. 1B: PRSE enhances Nrf2 activity in human HepG2 cells in a dose-dependent manner (2).

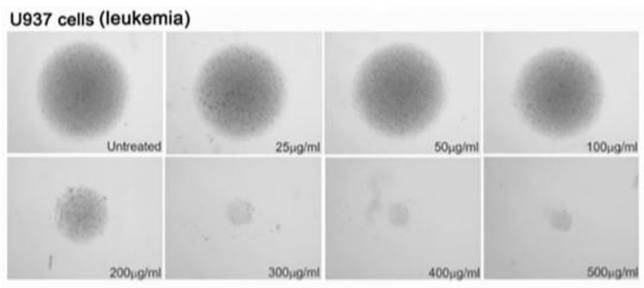


Fig 2: Cell imaging using light microscope, of cancer cell line in the absence (-) or presence of 400µg/ml PRSE (+) (3).

PRSE and Anti-oxidant , Anti-inflammatory and Anti-proliferative properties

- Provides UV protection and control of Melanin metabolism, dark spot reduction
- Inhibits collagenase and Elastase, key enzymes in skin cells regarding wrinkles
- Inhibits MMP-1, a biomarker produced by UV stress, which causes excessive breakdown of connective tissue, increasing wrinkles and aging
- Balances of hydrating minerals

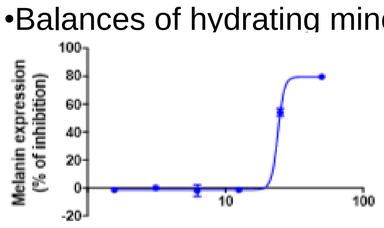


Fig 3. Concentration dependent inhibition effect of Officinol™ on melanin pigmentation in human melanocytes MNT-1 cells (4).

PRSE and Anti diabetes and digestive health

- Reduces the glycemic response/glacaemic index of ingredients and food
- Activates insulin production/secration from dysfunctional pancreatic β-cells
- Modulates intestinal transporters, GLUT-2, GLUT-4, SGLT-1

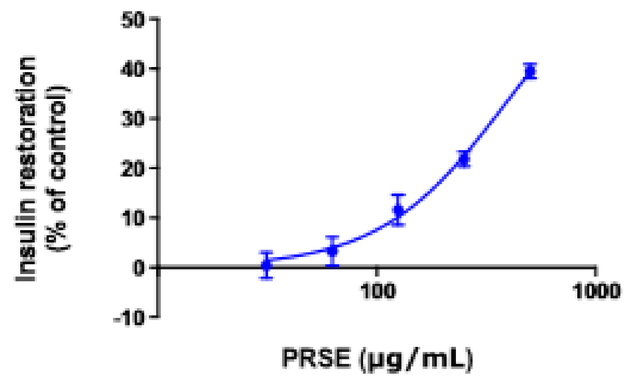


Fig 4. Effect of polyphenol-rich sugarcane extract (PRSE) on insulin production in insulin dysfunctional beta-cells. Concentration-dependent insulin restoration effect of PRSE on insulin production in insulin dysfunctional beta-cells (5).

PRSE and Anti-aging and Cognitive Health

- Upregulates neuronal genes relevant to cognitive health and anti-aging
- Inhibits Monoamine Oxidase (MAO), possible elevating effects on serotonin and dopamine levels
- Inhibits acetylcholinesterase (AChE)

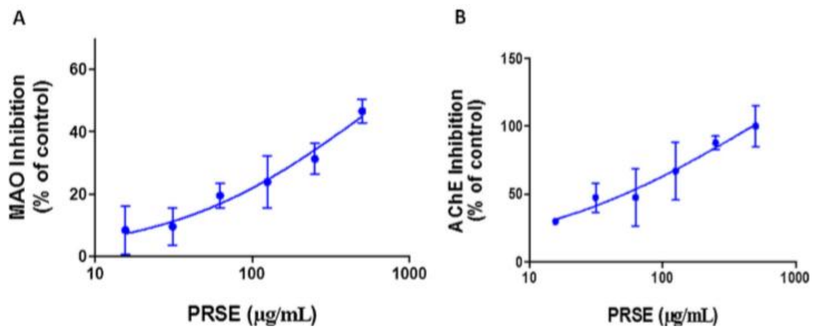


Fig 5: PRSE inhibits MAO and AChE, two therapeutic targets for neurological disorder treatment. 5A: Concentration-dependent inhibition effect of PRSE on the expression of MAO in human neuronal cells.5 B: Concentration-dependent inhibition effect of PRSE on AChE activity (6).

Summary

TPM's Enriched Sugar cane extracts have numerous beneficial properties with many potential applications in dietary supplements and in human health and wellbeing.

References

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