

DEPENDANCE OF PHENOLIC AND FLAVONOID CONTENT FROM TEMULAWAK (CURCUMA XANTHORIZA ROXB) ON THE EXTRACTION METHODS AND SOLVENTS

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Background

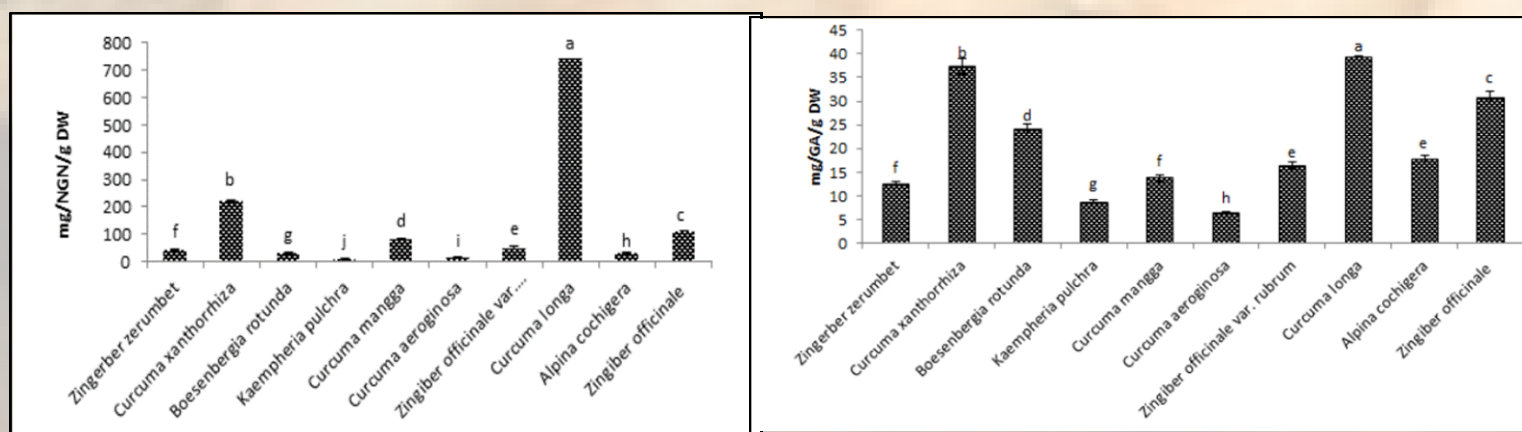
Temulawak contains antioxidant compounds which function to fight free radicals in the human body, namely phenolic compounds and flavonoids. To extract antioxidant compounds from ginger, knowledge is needed regarding the best methods, the best solvents that can be used, and the optimal conditions of the extraction process.

Objectives

1. investigate the best extraction method and solvent used in phenolic and flavonoid extraction from temulawak
2. optimization of operating condition for phenolic and flavonoid extraction from temulawak

Methods

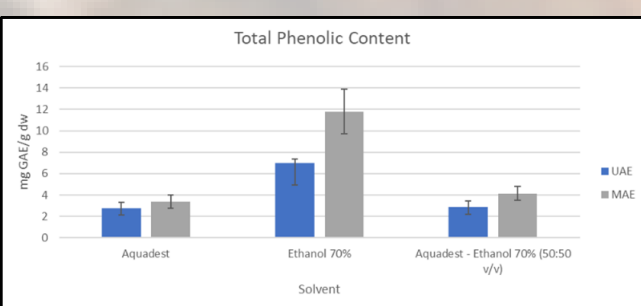
1. Pretreatment of Temulawak
2. Preliminary: Extraction
3. Vacuum Filter
4. Total Phenolic Content (TPC) and Total Flavonoid Content (TFC) test
5. Optimization using Response Surface Methodology (RSM)



Source picture : Akinola et al. (2014)

temulawak hold the record as second highest Total Fenolic and Total Flavonoid content amongst 10 species of rhizome from family Zingiberaceae, only behind Curcuma longa (kunyit)

PRELIMINARY: TOTAL PHENOLIC CONTENT



Discussion:

The combination of MAE and Ethanol 70% as the methods and solvent used in extraction shows the highest Total Phenolic Content. Meanwhile, the combination of UAE and aquadest as the methods and solvent used in extraction shows the lowest Total Phenolic Content.

EXPERIMENTAL CONDITIONS

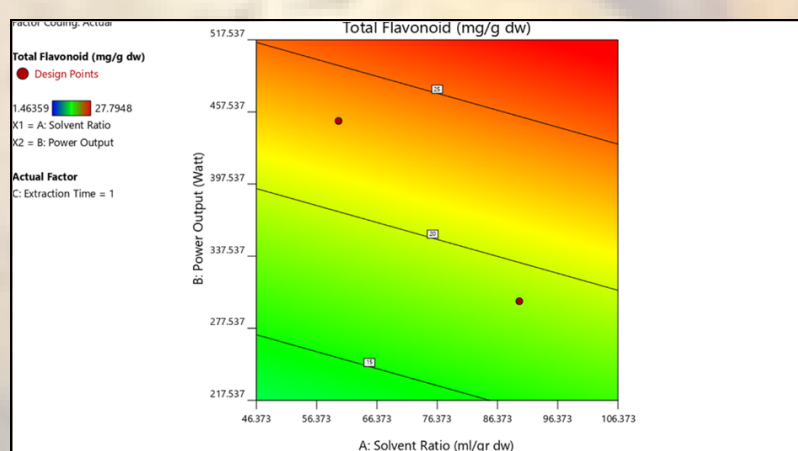
PREATTREATMENT : PRELIMINARY

Solvent	Extraction Method
Aquadest	MAE
Ethanol 70%	UAE
Aquadest - Ethanol 70% (50:50 v/v)	

OPTIMIZATION

Optimization Condition	Low	Center	High	
Factors				
Solvent Ratio	g/ml	1:30	1:60	1:90
Power	Watt	150	300	450
Time Exposure	minutes	1	3	5

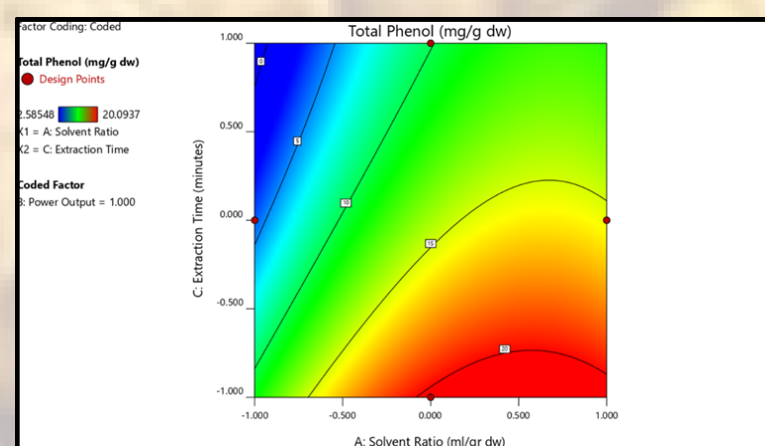
OPTIMIZATION: TOTAL FLAVONOID CONTENT



Discussion:

Using Box-Behnken Design, it suggested to use linear model for further analyzation on Total Flavonoid Content. To achieve maximum Flavonoid content from temulawak extraction, maximum power output (450 watt), maximum solvent ratio (1:90 w/v), and minimum extraction time (1 minute) are required.

OPTIMIZATION: TOTAL PHENOLIC CONTENT



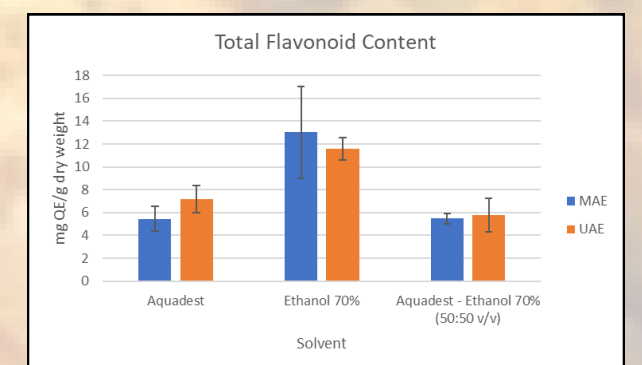
Discussion:

Using Box-Behnken Design, it suggested to use quadratic model for further analyzation on Total Phenolic Content. To achieve maximum Phenolic content from temulawak extraction, maximum power output (450 watt), maximum solvent ratio (1:90 w/v), and minimum extraction time (1 minute) are required

RESULT AND DISCUSSION

PRELIMINARY: TOTAL FLAVONOID CONTENT

Methods	Solvent	mg OE/g dw	mg GAE/g dw	SD Flavonoid	SD Phenol
UAE	Aquadest	7,180787467	2,778856997	1,184124103	0,522748154
	Ethanol 70%	11,58818679	7,01258079	0,978553163	0,352571953
	Aquadest - Ethanol 70% (50:50 v/v)	5,771120569	2,860792802	1,473149044	0,577948763
MAE	Aquadest	5,454460572	3,367880486	1,092183177	0,634639413
	Ethanol 70%	13,02182691	11,80815963	3,997018413	2,054390871
	Aquadest - Ethanol 70% (50:50 v/v)	5,486449125	4,154425407	0,450496238	0,672060627



Discussion:

The combination of MAE and Ethanol 70% as the method and solvent used in extraction shows the highest Total Flavonoid Content. Meanwhile, the combination of MAE and aquadest as the method and solvent used in extraction shows the lowest Total Flavonoid Content

Conclusion

1. Microwave Assisted Extraction is the better method compared to Ultrasonic Assisted Extraction
2. Etanol 70% is the best solvent to be used in Phenolic and Flavonoid Extraction from temulawak
3. To achieve maximum Phenolic and Flavonoid content from temulawak extraction, maximum power output (450 watt), maximum solvent ratio (1:90 w/v), and minimum extraction time (1 minute) are required

Reference

Akinola A, Ahmad S, Maziah M. 2014. Total anti-oxidant capacity, flavonoid, phenolic acid and polyphenol content in ten selected species of Zingiberaceae rhizomes. African Journal Traditional Complementary Altern Medicines 11(3): 7-13.