EFFECT OF CABINET DRYING ON PHYTOCHEMICAL SCREENING OF TWO VERIATIES OF GINGER RYHIZOMS FOR BLANCHED AND UNBLANCHED TREATMENTS

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ABSTRACT

Ginger (Zingiber officinale Roscoe) of two verities {UG I ('Tafin-Giwa', a yellowish variety with plump rhizomes) and UG II ('Yatsun-Biri', a black or dark variety with small compact rhizomes)} were analysed to identify its phytochemical screening. The effects of drying as a processing technique on ginger were investigated with respect to the phytochemical composition of the produce. The UG I and UG II were collected, sorted (whole, peeled and unpeeled) and (slice, peeled and unpeeled), and were subjected to Unblanched and Blanched (50℃ at 3, 6 and 9 minutes respectively) treatments and dried using solar dryer for a period of one month. The phytochemical analysis of UG I and UG II dried and milled samples with various treatments show that the colour variation of flavonoids was yellow, terpenoids was brown, and that of phenol was blue, for both UG I and UG II, using cabinet dryer as a source of drying. For Flavonoid test, the Unblanched samples shows that WP treatment indicates the presence of flavonoid to be high at 101.3 mg/kg and 80.2 mg/kg for both UG I and UG II, respectively. While that of SP treatment was less at 57.0 mg/kg and 60.5 mg/kg for both UG I and UG II, respectively. The Blanched samples shows that WP blanched at 9 mins treatment for UG I at 112 mg/kg and 80 mg/kg WP blanched at 3 mins and WUP blanched at 9 mins treatments respectively for UG II, indicates high presence of flavonoid. While it was reduced at WUP blanched at 6 mins treatment for UG I at 28 mg/kg and SP blanched at

6 mins and WP blanched at 9 mins treatments respectively, for UG II at 39 mg/kg. Phenol content test shows that for the Blanched samples, 92 mg/kg SUP blanched at 3 mins treatment for UG I and 96 mg/kg WP blanched at 6 mins treatment for UG II, indicates high level of phenol presence. At UG I and UG II, 13 mg/kg WUP blanched at 6 mins treatment and 34 mg/kg WUP blanched at 9 mins treatment respectively, shows the presence of phynol to be less. The Unblanched samples indicates high level of phenol content presence at 98 mg/kg for WP treatment, UG I and 94 mg/kg for WP treatments, UG II. While 60 mg/kg shows less presence of phenol at WUP treatment for UG I and 58 mg/kg for WUP treatment, UG II. For Terpenoid test, the Unblanched samples shows that WP treatment, UG I indicates the presence of terpenoid to be high at 867 mg/kg and 765 mg/kg for UG II at SP treatment. While that of SUP treatment, UG I was less at 677 mg/kg and 518 mg/kg for UG II at WUP treatment, respectively. The Blanched samples shows that at UG I, the presence of terpenoid were high at 1052 mg/kg, SP blanched at 9 mins treatment and less at 142 mg/kg, WUP blanched at 3 mins. While at UG II, it was noted to be high at 1090 mg/kg, WUP blanched at 3 mins treatment and less at 396 mg/kg, WP blanched at 3 mins treatment. The higher values in milligrams per kilogram indicate a more profound colour variation than those with the lower values. This was noted for both flavonoids, terpenoids, and phenol content present in the UG I and UG II dried samples.

Keywords: Drying, Ginger, Phytochemical, Screening, Blanched, Unblanched.

INTRODUCTION

Ginger is one of the most important sought-after medicinal spices in the world (Prabhakaran, 2013). It is one of the oldest of all the spices and condiments, and has been under cultivation for millennia in many parts of the world (Spore, 1992; Guwo, 2008).Nigeria is among the major producers and exporters of ginger in the world, with an annual production of about 160,000 metric tons (MT) on 48,910 hectares, which is 7.9% of world production (FAO, 2013). Although it is grown in six States of Nigeria

namely Kaduna, Nasarawa, Benue, Niger, and Gombe, the southern Kaduna area of Kaduna State is the main producing zone with over 95% of the country's total production (Okafor, 2002). According to Fumen et al. (2003) and Yiljep et al. (2005), the two popular ginger varieties produced in the country are the 'Tafin-Giwa', a yellowish variety with plump rhizomes and 'Yatsun-Biri', a black or dark variety with small compact rhizomes. Drying is a major food preservation method widely practiced globally. It is the process of removing the moistness in a product up to certain threshold value by evaporation. In this way, the product can be put in storage for a long period so as to decrease the water activity of the product, reduces microbiological activity and minimizes physical and chemical changes encountered when stored (Darvishi and Hazbavi, 2012).

The aim of this research is to determine the effect of Cabinet drying on phytochemical screening of two verities of ginger rhizomes (UG I and UG II), for Blanched and Unblanched treatment.

Phytochemical analysis is referred to as the extraction, screening and identification of the medicinally active substances found in plants. Some of the bioactive substances that can be derived from plants are flavonoids, alkaloids, carotenoids, tannin, antioxidants and phenolic compounds.

IMPORTANT OF PHYTOCHEMICALS

***** It contains antioxidants in food which protect our cells from free radicals and reduce our risk of developing certain types of cancer.

* Phytochemicals can also protect us from a variety of diseases, for example, studies have shown that plant-based foods high in flavonoids can reduce mortality rates by 25% as well as significantly decrease the instances of myocardial infarction.

* Isoflavones increase blood vessel dilation and reduce symptoms of menopause.

* Saponins interfere with cell replication, including cancer cells.

* Carotenens offers free radical protection.

Source: Rosane Oliveira (2015)

II. MATERAILS AND METHOD

2.1 Research Materials

A costarred bowl (4 kg) of two ginger varieties, namely Umudike Ginger I and Umudike Ginger II (UG I and UG II), were purchased, respectively from the National Root Crop Research Institute, (NRCRI) Umudike, Abia State. 4 Kilogram of UG I and UG II was cleaned and separated into groups. One of the groups was peeled and split with a sharp stainless steel knife. The UG I and UG II split and whole, (peeled and unpeeled) was blanched with the aid of Electric water bath in the Soil and Water Laboratory, Department of Agricultural and Bioresources Engineering, Michael Okpara University of Agriculture, Umudike, Abia State. Ginger rhizomes were blanched at (3, 6 and 9 minute), for 50℃ respectively. Each group with various treatments were subjected to solar drying in sequence. The unblanched UG I and UG II split and whole, (peeled and unpeeled) was also subjected to solar drying for about a period of one month, before taken to the laboratory for phytochemical analysis. All treatments were done at 10mm thickness of UG I and UG II rhizome.

2.2 Chemical analysis

The dried UG I and UG II Samples were milled into powder and subjected to phytochemical screening to determine the level of flavonoid, terpenoid and polyphenol present. The phytochemical analysis of UG I and UG II dried and milled samples with various treatments were carried out by adopting the methods as described by Onwuka, (2005) and various authors below. The bioactive substances determined were terpenoids, flavonoids and phenols. Each of the constituents were calculated in milligram per kilogram of the samples.

2.3 Determination of Terpenoid

The terpenoid content was determined using the method modified by Narayan Ghorai,

SondiponChakrborty, sharnikGucchait Samir Kuma saha and Suman Biswas. Ghoral's lab. West Bengal state university protocol exchange (2012). This was done by soaking 0.8g of the dried and milled samples of UG I and UG II in 10ml of methanol in a test tube, the mixture was shaken well and filtered. 3ml of the filtrate was introduced into a test tube and 3ml of sulphuric acid, the mixture was transferred into a curvette and the absorbance was taken at 538nm. The standard curve was also obtained by serial dilution of linalood solution in methanol to 1.5ml chloroform.

2.4 Total Flavonoid Content

The total flavonoid content was determined using aluminumtrichloride method, using Rutin as a reference compound (Chang et al 2002). This method based on the formation of complex flavonoid aluminum having absorptive maximum at 415nm after allowed to stand for 30 minutes at some temperature. The 0.1g of the dried and milled samples of UG I and UG II was soaked in methanol after about 4hours, it was filtered. Then 0.5ml of the extract, was introduced into a test tube 1.5ml of methanol was added, then 0.1ml of 10% aluminum chloride and 0.1ml 0f 1m potassium acetale and 2.8ml of distilled water were added. The absorbance was taken at UV spectrophotometer. The calibration curve was generated using rutin as standard of various concentrations.

2.5 Determination of Polyphenol

The total phenol content was determined using folinciocalten method by Singleton and Rossi (1965). 0.1g of the sample was extracted in 10ml of methanol, about 1ml of the filtrate was introduced into a test tube, 1ml of folinciocalten was introduced, then 2ml of 20% Na_2Co_3 was added and was allowed to stand for 5minutes, the absorbance was measured using spectrophotometer. Gallic acid was used to generate the standard curve by its serial dilution.

III. RESULTS AND DISCUSSION

3.1 Results

The results obtained in the study and results of the phytochemical analysis are presented in Table 1. It shows the variation range of values for cabinet dried samples of UG I and UG II phytochemical analysis results for blanched and unblanched treatments respectively.

Table 1: Phytochemical (nutrients) contents of UG I and UG II varieties of ginger rhizome, with various treatments for Cabinet dried samples.

	UG I				UG II	
SAMPLE TYPE	FL (Mg/Kg)	PO (Mg/Kg)	Te (Mg/Kg)	FL (Mg/Kg)	PO (Mg/Kg)	Te (Mg/Kg)
			UNBLANCHED			
WP	101.3	98	867	80.2	94	639
WUP	86.2	60	773	70.8	58	518
SP	57.0	92.6	677	60.5	84	765
SUP	86.0	81	688	68	59	620
			BLANCHED @ 3 Mins			
WP	75	67	960	80	89	396
WUP	83	69	142	61	87	1090
SP	30	70	843	44	65	762
SUP	68	92	910	64	54	606
			BLANCHED @ 6 Mins			
WP	82	85	952	78	96	920
WUP	28	13	701	67	65	1012
SP	45	62	831	39	51	530
SUP	74	47	780	63	54	697
			BLANCHED @ 9 Mins			

WP	112	59	670	39	67.5	842
WUP	53	69	950	80	34	664
SP	63	52	1052	44	67.5	657
SUP	52	85	962	58	67.5	747

Where, WP – Whole peeled
WUP – Whole peeled
SP – Split peeled
SUP – Split unpeeled
FL – Flavoniod
PO – Polyphynol
TE – Trapeniod

3.2 Discussions

The phytochemical analysis of UG I and UG II dried and milled samples with various treatments show that the colour variation of flavonoids was yellow, terpenoids was brown, and that of phenol was blue, for both UG I and UG II, using cabinet dryer as a source of drying. The result from Table 1 shows the range variation for Cabinet dried UG I and UG II Phytochemical test.

For Flavonoid test, the Unblanched samples shows that WP treatment indicates the presence of flavonoid to be high at 101.3 mg/kg and 80.2 mg/kg for both UG I and UG II, respectively. While that of SP treatment was less at 57.0 mg/kg and 60.5 mg/kg for both UG I and UG II, respectively. The Blanched samples shows that WP blanched at 9 mins treatment for UG I at 112 mg/kg and 80 mg/kg WP blanched at 3 mins and WUP blanched at 9 mins treatments respectively for UG II, indicates high presence of flavonoid. While it was reduced at WUP blanched at 6 mins treatment for UG I at 28 mg/kg and SP blanched at 6 mins and WP blanched at 9 mins treatments respectively, for UG II at 39 mg/kg.

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indicates high level of phenol presence. At UG I and UG II, 13 mg/kg WUP blanched at 6 mins treatment and 34 mg/kg WUP blanched at 9 mins treatment respectively, shows the presence of phynol to be less. The Unblanched samples indicates high level of phenol content presence at 98 mg/kg for WP treatment, UG I and 94 mg/kg for WP treatments, UG II. While 60 mg/kg shows less presence of phenol at WUP treatment for UG I and 58 mg/kg for WUP treatment, UG II.

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The higher values in milligrams per kilogram indicate a more profound colour variation than those with the lower values. This was noted for both flavonoids, terpenoids, and phenol content present in the UG I and UG II dried samples. Ugwoke and Nzekwe (2010) summarized the phytochemical screening of powdered ginger rhizome sample, indicating Alkaloids, flavonoids, and terpenoids in a high concentration in line with the result findings of this study.

IV. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

The results obtained in this research, can be concluded that, while the two variety of

ginger provides flavour, aroma and enhancing taste of food, it also serves as sources of some essential nutrients which are naturally present in them even though it's not in high concentration. The cabinet drying is effective in sufficient moisture removal and also for the enhancement of some nutritional composition of the produce (ginger rhizomes).

4.2 Recommendation

There is an increase in market demand for good quality dried ginger hence this study shows that cabinet drying method is suitable for a better end product, which will meet the market demand noting high nutritional components as part of the quality source by customers. Therefore, blanching and cabinet drying at two weeks interval is recommended for post-harvest storage and for ginger powder production because cabinet drying effect enhances its phytochemical composition.

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