



## **Comparative of Different Drying Methods on the Phytochemical and Some Nutrient Components of Scent Leaf (*Ocimum gratissimum*)**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author NBM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors SS and AIU managed the analyses of the study. All authors read and approved the final manuscript.*

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### **ABSTRACT**

The effect of air, sun, and oven drying methods on scent leaf (*Ocimum gratissimum*) and the organic and dietary elemental composition of its leaves was evaluated using standard analytical procedures. Drying increased significantly and the concentration of organic constituents evaluated. The ash content was markedly enhanced by drying and it range from 2% in the fresh sample to 11.5% in the oven-dried sample, the fiber content range from 1.5% in the fresh sample to 5.5% in the air-dried sample, also the lipid content from 0.5% in fresh sample to 2.5% in both air-dried and oven-dried sample, the moisture content was markedly low in the drying method compared to the fresh, the carbohydrate content range from 9.46% in the fresh sample to 76.20% in the sun-dried sample, the protein content ranging from 1.54% in the fresh sample to 2.80% in the sun-dried sample. Preserving *Ocimum gratissimum* leaves in a more hygienic way and ensure its all-year round availability and possible elimination of most nutrient deficiencies. A significant increase in mineral content was observed upon drying except for K and Ca whose concentration was found to

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be high ( $2050 \pm 0.003$  mg/kg and  $1.50 \pm 0.003$  mg/kg) in the fresh sample and observed low in the dried samples. All the results are expressed in MEAN $\pm$ SEM (Standard Error of Mean) and a significant difference was observed among the drying methods. The result of this study suggest that drying methods increase the concentration of organic and dietary elemental compositions.

**Keywords:** Fiber; element; carbohydrate; dietary; protein.

## 1. INTRODUCTION

In Nigeria and many other Africa countries, indigenous people use many plants as food and medicine. Such plants have a variety of compounds which are of medicinal and nutritional importance; they are use as spices food or medicine [1].

The genus *Ocimum* (family Lamiaceae), commonly and collectively called as "Basil" is a diverse and rich source of aromatic essential oils attributed for their pharmaceutical, culinary and aromatic properties [2]. Many species of the genus *Ocimum*, namely; *Ocimum americanum*, *Ocimum basilicum*, *Ocimum canun*, *Ocimum gratissimum*, *Ocimum sactum* and *Ocimum suave* have been reported for various medicinal uses [3,4].

The economically important parts of *Ocimums* are their leaves and tender shoots which on steam distillation yield pleasant smelling volatile essential oil having phenylpropanoids and terpenoids as their major active compounds [2].

*Ocimum gratissimum* is an herbaceous perennial shrub notably found in Tropical and sub-tropical countries including Nigeria where it is called clove basil, sweet basil, tea-bush scent leaf or fever plant. It is also known with different local names in Nigeria; Nupe: Tan-motsungi-wawagi; Ebira: Ireru; Hausa: Daidoya ta gida; Yoruba: Efinrin; Ibo: Nchanwu (Burkill, 1998). Several ethnobotanical surveys show that *Ocimum gratissimum* was among the plants reported in Nigeria communities to be use traditionally in the treatment of bacterial infections such as; Diarrhea, dysentery and other gastro-intestinal infections; upper respiratory tract infection associated with coughing, pneumonia, asthma, and bronchitis; urinogenital infection, skin infections (eczema, dermatitis, scabies, measles), ophthalmic and diabetes and veterinary problems [5].

Drying is the oldest method of preserving food. Throughout history, the sun, the wind, and a smoky fire were used to remove water from fruits,

meats, grains, and herbs. By definition, food dehydration is the process of removing water from food by circulating hot air through it, which prohibits the growth of enzymes and bacteria. Dried foods are tasty, nutritious, lightweight, easy-to-prepare, and easy-to-store and use. The energy input is less than what is needed to freeze or can, and the storage space is minimal compared with that needed for canning jars and freeze containers. The nutritional value of food is only minimally affected by drying. Vitamin A is retained during drying; however, because vitamin A is light sensitive, food containing it should be stored in dark places. Yellow and dark green vegetables, such as peppers, carrots, winter squash, and sweet potatoes, have high vitamin A content. Vitamin C is destroyed by exposure to heat, although pre-treating foods with lemon, orange, or pineapple juice increases vitamin C content. Dried fruits and vegetables are high in fiber and carbohydrates and low in fat, making them healthy food choices [6].

*Ocimum gratissimum* popularly known as scent leaf is a common popular vegetable in Nigeria used as a spice in many delicate and as medicine. Most people believe that when vegetable like scent leaf is preserved by drying method, most of its essential minerals are lost. This present study tends to investigate the mineral composition, proximate composition and phytochemical screening of air, sun and oven drying methods on scent leaf.

## 2. MATERIALS AND METHODS

### 2.1 Collection and Identification of Scent Leaf

The Scent leaves were collected from Sokoto Central market and Identified by a qualified Botanist.

### 2.2 Preparation of the Scent Leaf for Analysis

The leaves were washed to remove the dirty materials. The leaves were divided into four parts, first part was left fresh; second part was air dried

in shade away from the sun; the third part was sun dried directly under the sun; the fourth part was put in the oven dried using an electric oven dryer at 104°C. The samples were pounded into fine powdered sample were kept at 4°C in a tight container before further analysis.

Phytochemical Screening of the leave extract was carried out using standard method.

Proximate Analysis was carried out using the method of Association of Official Analytical Chemistry [7].

Determination of Calcium by EDTA Titration Method.

Magnesium Determination by EDTA Method.

Determination of Potassium and Sodium by Flame Photometry.

Determination of phosphorous by spectrophotometer method.

### 3. RESULTS

The result of qualitative phytochemicals compositions of scent leaf and the effect of various drying methods on some nutrients composition were presented in Tables 1-3.

### 4. DISCUSSION

The present work investigate the Proximate, Mineral and Phytochemical composition of *Ocimum gratissimum* (Scent leaf) as affected by their different drying methods, namely; air dried, sun dried, oven dried and fresh sample that serve as the control sample.

The result of the proximate composition of scent leaf sample is influenced by different drying methods as presented in Table 3. The analysis of proximate composition gives information on the basic chemical composition of food, the compositions are ash, moisture, protein, lipids, fiber and carbohydrate.

**Table 1. The qualitative phytochemicals composition of scent leaf at different drying methods**

Test	Fresh(control)	Air-dried	Sun-dried	Oven-dried
Flavonoid	++	+	++	++
Alkaloid	+	-	-	-
Tannin	++	+++	+++	+++
Saponin	++	+++	++	+
Glycoside	++	+++	++	+

+ Trace; ++ Moderately; +++ High; - Not detect

**Table 2. The proximate composition of scent leaf (*Ocimum gratissimum*) at different drying method (%)**

Drying method	Ash-content	Moisture-content	Crude-protein	Crude-lipid	Crude-fiber	Carbohydrate
Air-dried	13±0.03*	6±0.003*	2.13±0.003*	2.5±0.006**	5.5±0.0033***	70.87±0.003*
Sun-dried	11±0.003*	4.5±0.057*	2.8±0.003*	1.5±0.006**	4±0.0057*	76.20±0.03*
Oven-dried	11.5±0.02*	3.5±0.033*	2.46±0.057*	2.5±0.057**	4.5±0.003*	75.54±0.03*
Fresh(control)	2±0.033**	85±0.033**	1.54±0.033*	0.54±0.003*	1.5±0.737**	9.46±0.003**

Values are expressed as Mean ± SEM of three replicates. Values with different superscript along the same column indicate significant difference but those with the same superscript along the same column indicates no significant difference (P at p<0.05 (One-way ANOVA): The Mineral Composition of Scent leaf at different drying method

**Table 3. The mineral composition of scent leaf at different drying method**

Drying method	Na(mg/kg)	K(mg/kg)	Mg(mg/kg)	Ca(mg/kg)	P(mg/kg)
Sun-dried	152.5±0.003*	1900±0.0033*	2.15±0.0056*	0.80±0.003*	5.06±0.003*
Air-dried	157.5±0.003*	1800±0.0033*	2.05±0.002*	0.75±0.002*	5.12±0.003*
Oven-dried	147.5±0.003*	1850±0.003*	2.20±0.003*	0.75±0.003*	5.18±0.002*
Fresh(control)	70±0.003**	2050±0.003**	1.45±0.0057**	1.50±0.003**	4.71±0.0057**

Values are expressed as Mean ± SEM of three replicates. Values with different superscript along the same column indicate significant difference but those with the same superscript along the same column indicates no significant difference at (p<0.05)

The ash content gives a measure of total amount of inorganic compounds like minerals present in a sample. The ash content of the dried leaves of *Ocimum gratissimum* were higher than the fresh sample this is an indication that the leaves of *Ocimum gratissimum* contain less minerals than the processed leaves. The differences in the ash content of dried vegetables could be as a result of the drying methods used during which some of inorganic salt in the vegetables might have leached off [8].

The moisture content is an index of water activity. The reduction in the moisture of all the methods of drying scent leaf used in the present investigation as compared to the fresh leaf ( $85 \pm 0.033$ ) could be as a result of rapid water loss from the samples by the fiber and other natural chemical component of scent leaf. The findings of the present study agrees with that of Ajala, [9] who reported that water loss from vegetables is influenced by their drying methods. He also concluded that high moisture content will increase susceptibility of the vegetables to microbial attacked, in this study, oven dried leaves contain the least moisture contents this will favour their preventive properties against microbial attack and thus the storage life of *Ocimum gratissimum* will be high [10].

Protein is an essential component of human diet needed for the replacement of tissue and for the supply of energy and adequate amount of required amino acid. Protein deficiency cause growth retardation, muscle wasting, oedema, abnormal swelling of the body and collection of fluid in the body of children [6].

The remaining proximate compositions such as lipid, fiber and carbohydrate were determine too. All the drying methods causes increase in the composition compared to the fresh sample.

The nutritive metals basically Sodium, Calcium, Potassium, Magnesium and Phosphorous were determined in the scent leaf under different drying methods. All the drying method cause increase in the mineral analyzed except for potassium for all the drying methods. Sodium is the principal extracellular cation and used for acid-base balance and some osmo-regulation in the body fluid [11]. Potassium is responsible for nerve action and very important in the regulation of water and electrolyte balance and acid-base balance in the blood and tissues (NRC, 1989). Calcium is necessary for the strong bones and teeth. It is relatively high in cereals, nut and

vegetables [12]. *Ocimum gratissimum* can supplement the daily contribute these minerals and enhance their availability in daily life. These vegetable can supplement the daily requirement of Ca, Mg, P, K and Na, which have been put by [13] at (260 mg/day).

## 5. CONCLUSION

The research revealed that, the plant contain some reasonable amount of bioactive compounds and the different drying method does not affect the level of nutrients when compared with fresh leaves' which serve as control. Oven dried is the method with rich nutrients.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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