

# Spectrophotometric Analysis of Vitamin A and Vitamin E in Different Species of Dioscorea Tuber

Jonalyn E. Espuelas<sup>1</sup>, Karina Milagros R. Cui-Lim<sup>1,2</sup>, Merle N. Tonog<sup>1,2</sup>, Rolando A. Delorino<sup>3</sup>

<sup>1</sup>Department of Physical Sciences, College of Science,

<sup>2</sup>University Research and Development Services,

<sup>1,2</sup>University of Eastern Philippines, University Town, Northern Samar, Philippines

<sup>3</sup>University Research and Development Services, University of Eastern Philippines

<sup>3</sup>University Town, Catarman N. Samar, Philippines

<sup>3</sup>Office of the President, University of Eastern Philippines, Catarman N. Samar, Philippines

**How to cite this paper:** Jonalyn E. Espuelas | Karina Milagros R. Cui-Lim | Merle N. Tonog | Rolando A. Delorino "Spectrophotometric Analysis of Vitamin A and Vitamin E in Different Species of Dioscorea Tuber" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-3 | Issue-3, April 2019, pp.837-839, URL: <https://www.ijtsrd.com/papers/ijtsrd23177.pdf>



IJTSRD23177

Copyright © 2019 by author(s) and International Journal of Trend in Scientific Research and Development Journal. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0) (<http://creativecommons.org/licenses/by/4.0>)



## INTRODUCTION

Yam, a term usually applied to a plant of the genus *Dioscorea* (family *Dioscorea*), including several tropical species cultivated for food. There are plant with thick annual, climbing stems bearing alternate or opposite entire or lobed leaves and unisexual in long clusters. The flowers generally small and individually conspicuous, though collectively show. Each consists of greenish, build shape or flat perianth six species, enclosing stamens of the male flowers or surmounting a three-celled, tree winged ovary in the female. The ovary ripens into a membranous capsule, bursting by three valves liberates numerous flattish or globosely seeds. The species are native of the warmer region of both hemispheres. The plant grows freely in deep sandy soil, moderately enriched (Morisawa, 1999).

Everywhere and not all of us get the courage to take. There are risks that are worthy to be taken and some are not. When it comes to the food we are eating we choose to have consumed the ordinary ones and not something that is extraordinary. But, for us Filipinos we let our minds travel

## ABSTRACT

This study was conducted to determine the physical properties and the vitamin A and vitamin E present using spectroscopic analysis in different *Dioscorea* species tuber extracts found in Lavezares, Northern Samar, Philippines. The result for the physical characterization of different *Dioscorea* species in tuber extracts has a boiling point of 97.6°C, milky white in color, unpleasant in odor, has a density of 0.81 g/mL, and has a pH of 4.9. In solubility, the ethanol and water are miscible. While the tuber extracts has a boiling point of 98.6°C, brown in color, like tea in odor, has a density of 0.86 g/mL, and has a pH of 5.6, in solubility the ethanol and water are miscible. UV- Vis analysis was used to determine the vitamin A and vitamin E content of *Dioscorea* species and was compared to standard sample. The vitamin content analysis shows that the sample has good natural vitamins.

**KEYWORDS:** *Dioscorea*, spectrophotometric analysis, vitamin A, vitamin E

and let our creativity spill through the foods we serve to our family. One of the foods that really need our creativity is *Dioscorea hispida* dennst this root crop is now becoming or considered to be one of the Philippines alternative staple foods for rice. Many of us still don't know what this root crop is.

*D.hispida* can also have benefits if not taken as food. In some country, it is considered as medicinal plant. It is capable of relieving abdominal contraction and stomach pain. In addition, *Dioscorea hispida dennst* can help women in optimal breast enlargement because it is excellent source of beta-carotene and diosgenin, a powerful that is capable of doing diseases like diabetes, leprosy, heart burn library pain menstrual pain, inflammation of gall bladder, rheumatism or joint pain and callus.

Hence, this study was conducted to determine the vitamin A and vitamin E content of different species of *Dioscorea* tuber extract.

## METHODOLOGY

### Collection and Preparation of the Plant Extracts

The *Dioscorea* species of tuber extracts were weighed separately and grinded using electric blender. About 200g of each species tubers were finely cut into a small pieces then squeezed through clean cheesecloth to separate the tubers extracts to a beaker. The extracts was poured in a clean bottle in preparation for the physical characterization and determination of vitamin A and E content.

#### Determination of Physical Properties

The physical properties of the *Dioscorea* species tuber extracts were determined using the following procedures.

#### Boiling point

About 2 mL of each species of *Dioscorea* tuber extract was placed in a test tube. The test tube was heated in an oil bath and the temperature where the tuber extract started to boil was recorded. The process were repeated thrice.

#### Color

The color was observed by five evaluators using the sense of sight. About 5 mL of different *Dioscorea* species of tuber extracts was poured into a transparent beaker. Then, using the sense of sight, the evaluators was ask to described the color of the different *Dioscorea* species tuber extracts contained in the transparent beaker.

#### Density

The extract used in determination was poured into a previously weighed graduated cylinder. The volume was recorded. Then it was weighed on the triple analytical balance. The mass of the extract was obtained by subtracting the mass of the empty graduated cylinder from the mass of the cylinder with the plant extract. Density was calculated using the formula.

$$\text{Density} = \frac{\text{Mass (of the Dioscorea species extracts)}}{\text{Volume (of the Dioscorea species extracts)}}$$

#### Odor

The odor were observed by five evaluators using the olfactory sense. About 5 mL of different *Dioscorea* species of tuber extracts was poured into a transparent beaker. Then, using the sense of smell, the evaluators was described the odor of the different *Dioscorea* species tuber extracts contained in the transparent beaker.

#### pH

The pH was tested on the different *Dioscorea* species using a digital pH meter. About 20 mL of different *Dioscorea* tuber extract was placed in a beaker. Then, a digital pH meter was placed to record. The procedure was repeated thrice.

#### Solubility

The three (3) solvents were used, namely; hexane, water and ethanol. About 2 mL of each species of *Dioscorea* tuber extracts was placed into nine (9) clear test tubes. Then, three test tubes was poured with two (2) mL each of hexane, same goes to another three test tubes, but was poured with two (2) mL each of water, and lastly, the remaining three test tubes with tuber extracts was poured with two (2) mL each of ethanol solvent. The nine test tubes were observed to determine the solubility of the different *Dioscorea* tuber extracts in three (3) solvents. The results were recorded as miscible or immiscible. Miscible if only one phase was

formed and immiscible if more than one phase was formed. Three trials were done for solubility determination.

### Determination of vitamin A and vitamin E

The plant sample of 4mg in ethanol were mixed with 2.5 oleic acid in 99.5% ethanol (4.1mL), 0.05 M phosphate buffer, pH 7 (8mL) and kept in cap containers under the dark conditions at 40°C. To 0.1 mL of this solution, 9.7 mL of 99.5% of ethanol and 0.1 mL of 30% ammonium thiocyanate were added. After 3 min, 0.1mL of 2M ferrous chloride in 3.5% HCL was added to the reaction mixture and the absorbance of the red color was measured at 500 nm each 1 hour until the absorbance control reached maximum. The control and the standard were subjected to the same procedure ass the sample except for the control, where there was no addition of sample, and for the standard 4 mg of sample were replaced with 4mg of  $\alpha$ -tocopherol or vitamin E and retinol for vitamin A.

## RESULTS AND DISCUSSION

This study focused on two different *Dioscorea* species tuber extract such as korot (*Dioscorea hispida* dennst), and tinampay (*Dioscorea alata* var. *clava* Linn). The physical properties of the *Dioscorea* were determined and spectrophotometer was used to determine the vitamin A and vitamin E content of each different species of tuber extracts. To be able to determine vitamin A and vitamin E a way of determination like spectrophotometry was chosen. This is due to a good precision of the method. As a result, spectrophotometric methods are widely used, among others in food analytics for determination of natural compounds including vitamins.

### Physical Properties

The physical properties of the two different *dioscorea* species tuber extracts separately were determined in terms of boiling point, color, odor, pH, and solubility.

Physical property	<i>Dioscorea hispida</i> dennst	<i>Dioscorea alata</i> var. <i>clava</i> Linn
Boiling point	97.6°C	98.6°C
Color	milky white	brown
Odor	unpleasant	unpleasant
Density	0.81 g/mL	0.86 g/mL
pH	4.9	5.6
Solubility in	Water	Miscible
	Ethanol	Miscible
	Hexane	Immiscible

### Spectrophotometric Analysis of vitamin A and E

The extracts of two species of *Dioscorea* were analyzed for their number of vitamin A and E. The reaction mixture of each plant extract were subjected to 500 nm wavelength. It was obtained that the maximum absorbance reading of Korot at the said wavelength was 3.842 for vitamin A and 3.122 for vitamin E while Tinampay has an absorbance of 2.987 and 3.001 for vitamin A and E, respectively. The controls, which are commercially available vitamin A and E were also subjected to the same procedure where the alpha-tocopherol (Vitamin E) has a wavelength of 3.989 and retinol (Vitamin A) observed an absorbance of 4.331 of the same wavelength. This implies that the vitamin absorbance of the two *Dioscorea* samples have almost the sample absorbance with the commercial vitamins based on the same wavelength and extract preparations. This suggests that the two species

of *Dioscorea* can be a good source of natural vitamins A and E.

### CONCLUSIONS

Based on the findings of this study, the researcher formulated the following conclusions. The two different species *Dioscorea* tuber extracts both has a lower boiling point, the color of korot has milky white and the tinampay is brown, unpleasant in odor, the tubers extracts are both a polar substance. Also, *Dioscorea* species known as a toxic plant have a good source of natural vitamins A and E.

### References

- [1] Coursey, D. G. (1976) Yams; Account of the Nature, Origins Cultivation, and of the Useful members of *Dioscorea*, London; Lony mains and Co. Ltd. 239 pp.
- [2] Foster S. Duke Ja. (1990) A Field Guide to Medical Plants, Eastern and Central North America, Boston, MA Houghton Mifflin.
- [3] Guerrero, Leon. Ma (1915) "Medical uses of the Philippines Plants" Bureau of Forestry Bull 22, useful plants on the Philippines, Team press Ballert.
- [4] Jain S. K. and R. Mitra (1990) Ethono Botany in India. Retrospect and Prospect Contribution to Ethno botany in India.
- [5] Nabors, Muray (2004) Introduction to Botany. 1<sup>st</sup> edition Pearson Education Inc. Pub. As Benjamin-Cummings.
- [6] Osawa T. Namiki M. (1981) Agric. Biol. Chem., 45,735-739.

