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Estimation of Total Chlorophyll in Fruits and Vegetables

Theeranat Suwanaruang^{1*}

¹Environmental Science Program, Faculty of Liberal Arts and Science, Kalasin University Namon

District, Kalasin Province 46231, Thailand

Abstract: The aim of research estimation total chlorophyll in fruits and vegetables including papayas (*Caricacapyya L.*), grapes (*Vitis viniferaL.*), jackfruits (*ArtocarpusheterophyllusLam.*), pineapples (*Ananascomosus*), bananas (*Musa sapientum L.*), and tomatoes (*Solanum lycopersicum. L.*), apples (*Malus domestica*), watermelons (*Citrulluslanatus*), celery (*Apiumgrsveolens Linn.*), holy basil (*OciemumSanctum L.*), water morning glory(*IpomceaaquaticaForsk*), carrot(*Daucuscarota L.*), white popinac(*Leucaenaleucocephala*), green shallot (*Alliumcepavar*), stink week (*Eryngium foetidum L.*), dill (*Anethumgraveolens Linn*) and cabbage(*Brassica oleraceavar. capitata L.*). The method was extracted by acetone, then measured with spectrophotometer. The results found total chlorophyll accumulated were 74.08 ± 0.00 , 26.30 ± 1.13 , 7.26 ± 0.04 , 3.55 ± 0.42 , 14.42 ± 0.35 , 4.54 ± 0.48 , 7.19 ± 0.00 , 10.22 ± 9.25 , 4.45 ± 0.23 , 78.35 ± 0.00 , 32.87 ± 0.00 , 4.86 ± 0.13 , 74.78 ± 0.00 , 72.21 ± 0.03 , 70.96 ± 0.36 , 81.05 ± 0.98 and 12.80 ± 0.00 mg/L respectively. The highest total chlorophyll was dill (*Anethumgraveolens Linn*) as 81.05 ± 0.98 mg/L and the lowest was pineapples (*Ananascomosus*) as 3.55 ± 0.42 mg/L. This research was benefit with people that selected various fruits and vegetables.

Keywords: Total Chlorophyll, Fruits, Vegetables, Antioxidants and Spectrophotometer.

I. INTRODUCTION

Nowadays, people is interested healthy food such as fruits and vegetables. Many fruits and vegetables are healing food, many sources of remedial compounds for examples antioxidants (Klomsakul Pongsathorn et al. 2012, Dongjie Jia, 2011, Parisa Sadighara et al., 2016), antibiotics, minerals, vitamin A, vitamin B, vitamin C, essential organic acids, glycosides, essential amino acids, lipid, carbohydrate, proteins, carotenoids, anthocyanin, lycopene chlorophyll and many essential compounds to people (Delia-Gabriela Dumbravă et al., 2012, and Safta, M. et al 2002).

The photosynthetic process including chlorophyll and carotenoids, photosynthetic pigments are present in porphyrin such as chlorophylls, carotenoids, anthocyanins and flavones (Manuela Adriana Costache et al., 2012, Rushikesh S. More and Sakshi S. Chaubal, 2017). Chlorophyll is a green pigment that gives most plants their color, Chlorophyll are many types examples chlorophyll a and chlorophyll b. The different types of chlorophylls are the same basic molecule with very slight differences in their chemical structures. The different chlorophylls have the same basic structure, they all reflect green light and so appear green, but their small structural differences cause them to be different shades of green for examples yellow green, teal green, forest green, blue green, etc. (Wei, K., Wang et al., 2011).

The aim of research estimation total chlorophyll in fruits and vegetables including papayas (*Caricacapyya L.*), grapes (*Vitis viniferaL.*), jackfruits (*ArtocarpusheterophyllusLam.*), pineapples (*Ananascomosus*), bananas (*Musa sapientum L.*), tomatoes (*Solanum lycopersicum. L.*), apples (*Malus domestica*), watermelons (*Citrulluslanatus*), celery (*Apiumgrsveolens Linn.*), holy basil (*Ociemum Sanctum L.*), water morning glory (*IpomceaaquaticaForsk*), carrot (*Daucuscarota L.*), white popinac (*Leucaenaleucocephala*), green shallot (*Alliumcepavar*), stink week (*Eryngium foetidum L.*), dill (*Anethumgraveolens Linn*) and cabbage (*Brassica oleraceavar. capitata L.*).

II. MATERIALS AND METHODS

A. Selected of samples

The vegetables and Fruits Samples selected at Kalasin Market, Kalasin Province Thailand. The samples were papayas (*Caricacapyya L.*), grapes (*Vitis viniferaL.*), jackfruits (*ArtocarpusheterophyllusLam.*), pineapples (*Ananascomosus*), bananas (*Musa sapientum L.*), tomatoes (*Solanum lycopersicum. L.*), apples (*Malus domestica*), watermelons (*Citrulluslanatus*), celery (*Apiumgrsveolens Linn.*), holy basil (*Ociemum Sanctum L.*), water morning glory (*IpomceaaquaticaForsk*), carrot (*Daucuscarota L.*), white popinac (*Leucaenaleucocephala*),



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green shallot (*Allium cepa* var.), stink weed (*Eryngium foetidum* L.), dill (*Anethum graveolens* Linn) and cabbage (*Brassica oleracea* var. capitata L.).

B. Chemical Analysis of Chlorophyll

The method was modified from PallabiKundu, Anitha K and Ramani N, 2016. The chemical extraction were cleaning samples with DI water, grinding samples then weighting samples 5 g add acetone 25 ml per samples and shaking samples, finally filtering samples and measured with spectrophotometer at 663 and 665 nm. The amount of total chlorophyll pigments calculations were made as follows

$$\text{Total chlorophyll (mg/L)} = [20.2(A_{645}) + 8.02(A_{663})] \times V / (1000 \times W)$$

Where, A= Absorbance at wavelength mentioned, V= Final volume of chlorophyll extract in acetone, W=Fresh weight of tissue extracted

III. RESULTS

The results found total chlorophyll accumulated in papayas (*Caricacarpaya* L.), grapes (*Vitis vinifera* L.), jackfruits (*Artocarpusheterophyllus* Lam.), pineapples (*Ananas comosus*), bananas (*Musa sapientum* L.), tomatoes (*Solanum lycopersicum* L.), apples (*Malus domestica*), watermelons (*Citrullus lanatus*), celery (*Apium graveolens* Linn.), holy basil (*Ocimum Sanctum* L.), water morning glory (*Ipomoea aquatica* Forsk), carrot (*Daucus carota* L.), white popinac (*Leucaena leucocephala*), green shallot (*Allium cepa* var.), stink weed (*Eryngium foetidum* L.), dill (*Anethum graveolens* Linn) and cabbage (*Brassica oleracea* var. capitata L.) were 74.08± 0.00, 26.30± 1.13, 7.26±0.04, 3.55±0.42, 14.42±0.35, 4.54 ±0.48, 7.19±0.48, 10.22±9.25, 4.45± 0.23, 78.35± 0.00, 32.87±0.00, 4.86±0.13, 74.78±0.00, 72.21 ±0.03, 70.96±0.36, 81.05±0.98 and 12.80±0.00mg/L respectively in Table

Table 1. Total chlorophyll accumulated in Fruits and Vegetables Samples

Fruits & Vegetables	Total Chlorophyll (mg/L)
Caricacarpaya L.	74.08 ± 0.00
Vitis vinifera L.	26.30 ± 1.13
Artocarpusheterophyllus Lam.	7.26 ± 0.04
Ananas comosus	3.55 ± 0.42
Musa sapientum L.	14.42 ± 0.35
Solanum lycopersicum. L.	4.54 ± 0.35
Malus domestica	7.19 ± 0.48
Citrullus lanatus	10.22 ± 0.00
Apium graveolens Linn.	4.45 ± 0.23
Ocimum Sanctum L.	78.35 ± 0.00
Ipomoea aquatica Forsk	32.87 ± 0.00
Daucus carota L.	4.86 ± 0.13
Leucaena leucocephala	74.78 ± 0.00
Allium cepa var	72.21 ± 0.03
Eryngium foetidum L.	70.96 ± 0.36
Anethum graveolens Linn	81.05 ± 0.98
Brassica oleracea var. capitata L.	12.80 ± 0.00

IV. CONCLUSION AND DISCUSSION

The highest total chlorophyll was dill (*Anethumgraveolens* Linn) as 81.05 ± 0.98 mg/Land then were holy basil (*Ociemum Sanctum* L.) 78.35 ± 0.00 , white popinac(*Leucaenaleucocephala*) 74.78 ± 0.00 , papayas (*Caricapapyya* L.) 74.08 ± 0.00 , green shallot (*Alliumcepavar*) 72.21 ± 0.03 , stink week (*Eryngium foetidum* L.) 70.96 ± 0.36 , water morning glory (*Ipomceaaquatica*Forsk) 32.87 ± 0.00 , grapes (*Vitis vinifera* L.) 26.30 ± 1.13 , bananas (*Musa sapientum* L.) 14.42 ± 0.35 , cabbage (*Brassica oleraceavar. capitata* L.) 12.80 ± 0.00 , watermelons (*Citrulluslanatus*) 10.22 ± 0.00 , jackfruits (*Artocarpusheterophyllus* Lam.) 7.26 ± 0.04 , apples (*Malus domestica*) 7.19 ± 0.48 , carrot (*Daucuscarota* L.) 4.86 ± 0.13 , tomatoes (*Solanum lycopersicum. L.*) 4.54 ± 0.35 , celery (*Apiumgrsveolens* Linn.) 4.45 ± 0.23 and the lowest was pineapples (*Ananascomosus*) as 3.55 ± 0.42 mg/L in Figure 1.

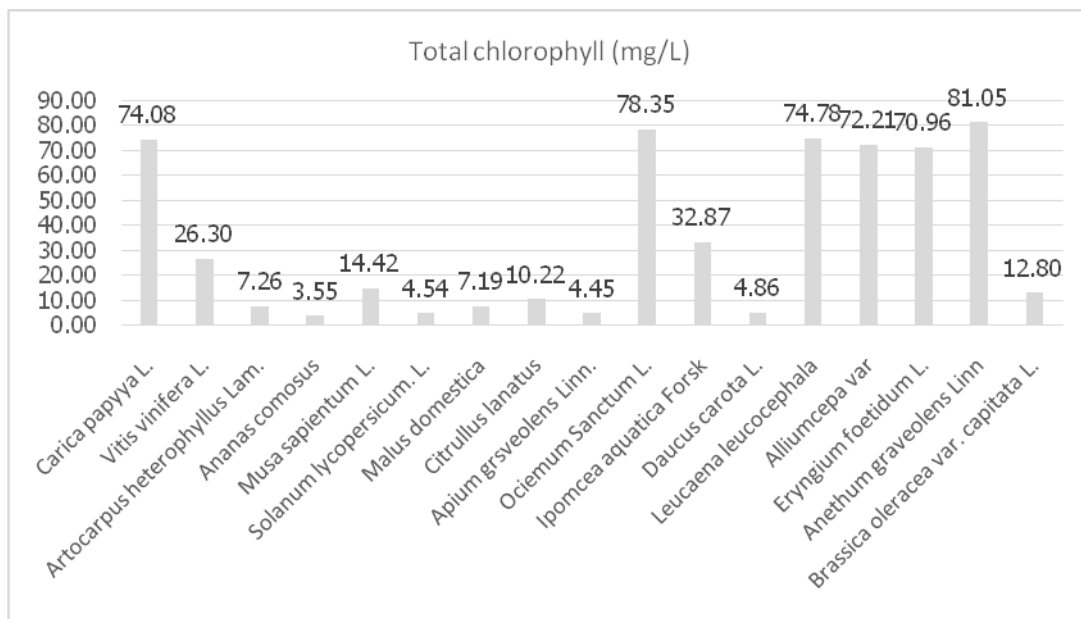


Fig 1. Accumulation of Total chlorophyll in Fruits and Vegetables Samples

This research was benefit with people that selected various fruits and vegetables. Many fruits and vegetables are many essential compounds there are medicine plants (Nouriyani H., Majidi E. et al., 2012). Vegetables and fruits are sources of antioxidants compounds (Klomsakul Pongsathorn et al. 2012, Dongjie Jia, 2011, Parisa Sadighara et al., 2016) antibiotics, many minerals, many vitamins essential organic acids, glycosides, essential amino acids, lipid, carbohydrate, proteins, carotenoids, anthocyanin, lycopene chlorophyll and many essential compounds to people (Delia-Gabriela Dumbravă et al., 2012 and Safta, M. et al 2002). Especially vegetables and fruits accumulated chlorophylls those are benefits to human health, such as providing antioxidant activity and reducing the risk of cardiovascular disease and some forms of cancer.

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