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# **Dietary Importance of Some Commonly Available Vegetables**

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KEYWORDS	ABSTRACT:		
Dietary importance,	The commonly available vegetable in Indian market has more or comparatively less dilatory value.		
absorption spectrum,	Nutraceutical is	a term applied to the products that a	re isolated from herbal products, dietary
chlorophyll a,	supplements, sp	ecific diet, and processed foods. Many ve	getables having a medicinal effect on health
chlorophyll b,	of human being	s. The recent studies deal with the study	v of comparison between the estimation of
total chlorophyll	absorption spec	rum, chlorophyll a, chlorophyll b, total c	hlorophyll content, protein and Flavonoids
content,	in some vegetab	les so as to define the consumption of the	m for certain supplements in diet.
Flavonoids.			

#### Introduction

Indian culture believes on balanced diet which contains adequate energy source, nutrients and vitamins, minerals, carbohydrates, fats, protein etc. Consumption of rice, cereals and pulses along with use of ghee and crude oil along with vegetables are considered as protective supplementary food as it contains many dietary factors like vitamins, minerals, amino acids etc. Fresh vegetables provide a variety of compounds showing positive influence on human health. The fresh vegetables and fruit contain phytochemicals found in antiinflammatory, enzyme inhibiting and bioactive features capable of combating the activities of oxidants.

Clinical studies have revealed that increased intake of fresh fruits and vegetables in daily diet lower the risk of many human diseases especially degenerative aliments linked to ageing process. For the normal functioning of the body physiology, consumption of leafy vegetables is a major source of vitamins and micro-nutrients needed. Apart from nutritive contribution of carbohydrates, vegetables serve as a good source of antioxidants, proteins and lipids. There is a vast body of literature accumulated in the recent years and the role of leafy vegetables in health management and especially lowering the risk of chronic human ailments such as cancer, cardiovascular disease and other age related disorders [1]. The generation of free radicals is a vital phenomenon of the normal metabolism of human body. Varieties of free radicals are generated as a byproduct of cellular functions. A well-balanced meal high in nutrients, vitamins, minerals, carbohydrates, fats, and protein is highly prized in Indian culture. Rice, grains, pulses, ghee, and crude oil are all considered protective supplemental foods since they include a wide range of nutrients, including vitamins, minerals, amino acids, and other elements. Several compounds present in fresh veggies have been proven to be good for human health. Fresh fruits and vegetables include phytochemicals with anti-inflammatory, enzyme-inhibiting, and bioactive qualities that can prevent oxidative activity.

Clinical trials have shown that consuming more fresh fruit lowers the risk of numerous human diseases, particularly degenerative illnesses connected with aging. Consumption of leafy greens provides the body with essential vitamins and minerals. In addition to the nutritional value of carbohydrates, veggies are high in antioxidants, proteins, and fats. A large body of research has accumulated in recent years. Clinical investigations have showed that eating more fresh fruit lowers the risk of many human diseases, particularly degenerative illnesses connected with the aging process.

The recent studies deal with the study of comparison between the estimation of absorption spectrum, chlorophyll a, chlorophyll b, total chlorophyll content, proteins and Flavonoids in some vegetables so as to define the consumption of them for certain supplements in diet.

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### **Material and Methods**

#### Abstraction spectrum of chlorophyll:

**Requirements:** Acetone80%, Distilled water, mortar pestle, plant sample, colorimeter.

**Procedure:**1. Weigh 0.5g 0f plant sample and crush using 10ml of 80% acetone.

2. Transfer the extract to centrifuge tube and centrifuge it at 5000 rpm.

3. Take 2ml of supernatant and add 2ml of 80% Acetone and make volume up to 4ml.

4. Take O.D. at different filters.

#### **Estimation of chlorophyll**

**Requirements:** Acetone80%, Distilled water, mortar pestle, plant sample, colorimeter.

### **Procedure:**

1. Weigh 0.5g 0f plant sample and crush using 10ml of 80% acetone.

2. Transfer the extract to centrifuge tube and centrifuge it at 5000 rpm.

3. Take 2ml of supernatant and add 2ml of 80% Acetone and make volume up to 4ml.

4. Take reading at 645 and 663nm

With the help of formulae, calculate chlorophyll a, chlorophyll b and total chlorophyll.

#### **Estimation of flavonoids**

**Principle:** Aluminium chloride forms an acid stable complex with C4 Keto group and either the C3 or C5hydroxyl group of flavons and flavonols.

**Requirements:** 10% Aluminium chloride, 1% Potassium acetate, plant sample, Quercetin

**Preparation of extract:** Take 10g dried powder of plant material in 100ml methanol, keep it overnight, filter, evaporate filtrate to dryness. Make the volume to10ml with methanol.

**Standard:** 10mg of Quercetin dissolved in 100ml 0f methanol (0.1mg/ml)

#### **Results and discussion**

# Absorption spectrum for chlorophyll pigments and Total Chlorophyll:

All light harvesting complexes (LHCs) and both reaction centers (RCs) in animals, photosystem I (PS I) and photosystem II (PS II), which collect predominantly red light from the sun spectrum, contain chlorophyll (chlorophyll a) [2].

Organic liquids exhibit absorption peaks at 420 and 660

nm, whereas photosynthetic cells have absorption peaks at 453 and 670–480 nm. It is the predominant donor in PS I and PS II RCs [2].

Each compound has its absorption spectrum at different wavelength at given set of condition. Therefore, when confronted with a pure sample of an unknown that absorbs light, an absorption spectrum of unknown compounds and can provide an initial qualitative characterization of the compound. Chlorophyll is an important plant pigment. It has nutraceutical values like, it acts as blood cleanser, oxygen booster, etc

Following that, French [3] identified two types of chlorophyll a: Ca 670 and Ca 680, which are responsible for light spectrum absorption at different wavelengths. He validated the observation by analyzing curves of absorption spectra from various plants and algae. Ca 670 had a bigger half-width than Ca 680 in the fraction in PS I, but Ca 680 had a greater half-width than Ca 670 in the fraction in PS II [4-6].

The pigment absorbs blue and red light from solar radiation at 430 and 660 nm, respectively, and reflects the green spectrum while researching the structural features, health advantages, and presence of chlorophyll in virgin olives [7]. Chlorophyll b was previously known as chlorophyll. It has been shown that chlorophyll b is found in both higher plants and green algae.

In recent studies, the wild and seasonal vegetables (figure 1) show distinct difference in absorption spectrum. Celosia argentia shows its higher pick at 470 and least activity at 700nm. While Casia tora and Clerodendron serratum shows almost similar absorption showing higher peak at 470 nm. Pisum sativum shows much higher peak at 470nm than the other vegetables in study. Abelmoschus esculentus and Trichosanthes anguina shows equal peaks at 420nm and 470 nm Along with chlorophyll a, it contributes to photosynthesis. Capsicum shows its higher peak at 420 nm while Memordica anguina shows its higher absorption at 530 nm. Whereas chlorophyll b is normally yellow, it absorbs blue light across the entire solar spectrum when they analyzed the spectral absorption properties of natural and fully deuterated chlorophylls a and b [8]. Chlorophyll b's characteristic absorption peak occurs in vitro at 453 nm and 625 nm, and in vivo at 480 nm and 650 nm [8]. The vegetables in studies shows a pattern of chlorophyll b content than chlorophyll a when total chlorophyll is taken as control. Almost 60% difference is seen in chlorophyll

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b and total chlorophyll but there is no such pattern is observed in the relation of chlorophyll a and total chlorophyll.

There are three subclasses of chlorophyll b found in different species of algae. They are known as chlorophyll  $c_1$ ,  $c_2$ , and  $c_3$ . A wide range of marine species, including diatoms, brown algae, and other marine algae, readily absorb this pigment [9]. An absorption peak of chlorophyll c for the photosynthetic spectrum in an organic solvent between 445 nm and 625 nm. chlorophyll d is a small chlorophyll found in red algae (Rhodophyta) [8,10].

It catches sunlight's brilliant red spectrum. In vitro, chlorophyll d absorption spectra were determined at wavelengths of 450 nm and 690 nm, and in living animals, the red band was measured up to 740 nm. A wide range of marine species, including diatoms, brown algae, and other marine algae, readily absorb this pigment. An absorption peak of chlorophyll c for the photosynthetic spectrum in an organic solvent between

445 nm and 625 nm [8,10].

The chemical formula for chlorophyll is  $C_{55}H_{72}MgN_4O_5$ . A chlorin ring with a magnesium ion in the center and four nitrogen atoms surrounding it [11]. The side chains of different chlorophyll molecules affect the characteristics of other chlorophyll types and alter the absorption spectrum of solar radiation [12].

The vegetables in study (figure 2) shows variation in their chlorophyll contents. *Celosia argentia* shows comparatively higher range of total chlorophyll and chlorophyll b while chlorophyll a is in much amount. *Casia tora* also has about 91% of total chlorophyll considering *Celosia argentia* as control. As shown in figure 2, the wild and seasonal vegetables like Celosia *argentia, Clerodendron serratum, Casia tora* shows higher amount of Total chlorophyll, chlorophyll a and chlorophyll b than the vegetables available through out year in market. *Vigna unguiculata* and *Trichosanthes* has much less amount of chlorophyll content.



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#### Flavonoids:

Flavonoids have anti-inflammatory, anti-allergenic, antiviral, anti-aging, and anti-carcinogenic characteristics [13]. Flavonoids are water soluble pigments. It prevents colon cancer in humans. It has anti-viral properties. Flavonoid molecules function as antioxidants and may also inhibit cyclooxygenase and lipoxygenase activity in platelets and macrophages, hence protecting against heart disease [14].

Based on evidence from several papers, Banerjee D. and Aritra S. concluded that there is a link between phenolic content and reported antioxidant activity in specific plant species [15,16]. When Shahidi et al. investigated natural antioxidants from low-pungency mustard floor, they discovered a variety of phenolics with varying antioxidative strengths, as well as the synergistic effect of polyphenolics (flavonoids, condensed tannins, and gall tannins) on the antioxidant activity [17].

Flavonoids make up the majority of polyphenolic

compounds and include anthocyanins, proanthocyanins, flavanols, and catechins when working on antioxidant activities, total anthocyanins, phenolics, and flavonoids contents of some sweet potato genotypes under stress of different sucrose and sorbitol concentrations [18]. Flavonoids scavenge or chelate while researching their chemistry, metabolism, cardioprotective effects, and dietary sources [19]. Flavonoids have anti-inflammatory, anti-allergenic, antiviral, anti-aging, and anticarcinogenic properties [13]. Flavonoid chemicals have antioxidant properties and may block cyclooxygenase and lipoxygenase activity in platelets and macrophages, hence protecting against heart disease [14].

In recent studies, the pie chart (figure 3) shows comparatively more about 25% of flavonoids in *Pisum sativum* while only 2% of flavonoids in *Amaranthus viridis*. Capsicum is consumed almost daily in different forms which has about 13% of flavonoids.

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Above studies indicates that comparatively chlorophyll pigments, proteins flavonoids and absorption spectrum are more in wild plants than the other non seasonal vegetables. So, these vegetables should get available in local market regularly. Also, the extract forms should be collected to make them available in powdered or tablet/ capsule form.

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