

## Estimation of Chlorophyll In The Leaves of Some Medicinal Plants of Aurangabad District ( M. S.)

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### Abstract:

The seasonal variation of chlorophyll a , chlorophyll b and carotenoid have been investigated in the leaves of *Adhatoda vasica* , *Azadirachta indica* , *Calotropis procera* , *Datura stramonium* , *Santalum album* , *Syzygium comini* and *Withania somnifera* are important medicinal plants of Aurangabad district . Comparative account of chlorophyll a , chlorophyll b and carotenoid content of leaves of seven medicinal plants revealed that , *Adhatoda vasica* , *Azadirachta indica* and *Withania somnifera* showed high level of ( range 3.14 to 4.06 mg / g fresh weight.) chlorophyll a than *Calotropis procera* , *Datura stramonium* , *Santalum album* and *Syzygium comini* .

**Key words:** Medicinal plants, chlorophyll, carotenoid .

### Introduction:

The pigment which are involved in the process of photosynthesis are called photosynthetic pigments . The pigment are the colored organic compound that have capacity to absorb certain wavelength of light and reflect to others . Several kinds of chlorophyll have been discovered in plants. The formation of chlorophyll is physiological process that occurs only in living cells . The essential conditions for chlorophyll formation is the presence of genetic factors .

According to Maclachlan and Zalic , (1963) the chloroplast of higher plants contain four different pigments – chlorophyll a ( C<sub>55</sub> H<sub>72</sub> O<sub>5</sub> N<sub>4</sub> Mg ) and chlorophyll b ( C<sub>55</sub> H<sub>70</sub> O<sub>6</sub> N<sub>4</sub> Mg ) are the green pigments and carotenes ( C<sub>40</sub> H<sub>56</sub> ) and xanthophylls (C<sub>40</sub> H<sub>56</sub> O<sub>2</sub> ) are the orange and yellow pigments respectively

. Carotenes and xanthophylls together called carotenoids. The photosynthetic pigments ( chlorophylls and carotenoids ) play an important role in photosynthesis.

Chlorophyll are used in preparation of medicines , candles , soaps , tooth paste and oil ( Sivrajan and Indira Balchandran , 1994 ; Kadam , 2000 ; Kadam and Ahire , 2006 ; Kadam *et.al.*, 2008 ) . Juice of leaves of *Adhatoda vasica* given along with honey for treating cough and asthma . It is good medicine to stop internal and external bleedings. It is good ingredient in decoctions for all types of fever due to kapha and pitta doshas. It is expectorant, antispasmodic and good blood purifier. It speeds up the children birth

The oil of the *Santalum album* is useful in dysuria and also useful in tuberculosis of gall bladder, oil which obtained by this plants seeds is useful in skin diseases. The oil is also useful in making of perfumes. *Datura stramonium* leaves, flowering tops and seeds are anodyne, antiasthmatic, antispasmodic, hallucinogenic, hypnotic, mydriatic and narcotic. The plant is used internally in the treatment of asthma and Parkinson's disease, excess causes giddiness, dry mouth, hallucinations and coma. Externally, it is used as a poultice or wash in the treatment of fistulas, abscesses wounds and severe neuralgia ( Chunekar , 1969). It should be used with extreme caution and only under the supervision of a qualified practitioner since all parts of the plant are very poisonous and the difference between a medicinal dose and a toxic dose is very small (Chopra *et.al.*, 1986). The leaves can be used as a very powerful mind-altering drug, they contain hyoscyamine and atropine. The leaves have been smoked as an antispasmodic in the treatment for asthma. The seeds are used in Tibetan medicine, they are said to have a bitter and acrid taste with a cooling and very poisonous potency. The juice of the fruit is applied to the scalp to treat dandruff ( Ranjana Arya *et.al.*, 2004 )

Therefore , we are attempted to investigate the occurrence and seasonal variations of chlorophyll a , chlorophyll b and carotenoid content in leaves of seven important medicinal plants of Aurangabad district , Maharashtra .

#### Materials and Methods:

The fresh leaves of seven medicinal plants under investigation have been collected from Aurangabad district during Monsoon ( August ) , Winter ( December

) and Summer ( April ) seasons for two years. The pigment were extracted using 80 % acetone from freshly plucked third leaf from the top. The amount of chlorophyll a , chlorophyll b and carotenoid were calculated in terms of mg pigment / gm of fresh leaves by using the following formula ( Duxbury and Yentsch , 1956 and Maclachlan and Zalic , 1963 ) .

Formula for calculation:

- 1) Chlorophyll a ( mg / g fresh weight )

$$\frac{12.3 D_{663} - 0.86 D_{645}}{d \times 1000 \times W} \times V$$

- 2) Chlorophyll b ( mg / g fresh weight )

$$\frac{19.3 D_{645} - 3.6 D_{663}}{d \times 1000 \times W} \times V$$

- 3) Carotenoid ( mg / g fresh weight )

$$\frac{7.6 D_{480} - 1.49 D_{510}}{d \times 1000 \times W} \times V$$

Where:

‘V’ - is the volume of the chlorophyll solution ,

‘D’ is the length ( cm ) of light path and

‘W’ is the fresh weight ( g ) of leaves .

### Results and Discussion:

The chlorophyll a content of leaves of *Adhatoda vasica* was raised in summer (3.40 mg / g fresh wt.) over that of monsoon (3.14 mg / g fresh wt.) and winter ( 3.21 mg / g fresh wt.) . Chlorophyll b content of leaves was higher in summer (2.72 mg / g fresh wt.) than monsoon and winter (2.50, 2.64 mg / g fresh wt.) respectively. The carotenoid content of *Adhatoda vasica* also higher in summer (1.46 mg / g fresh wt.) than monsoon and winter (1.32, 1.36 mg / g fresh wt) respectively. The chlorophyll a content of leaves of *Azadirachta indica* was raised in summer ( 4.06 mg / g fresh wt.) over that of monsoon ( 3.72 mg / g fresh wt.) and winter ( 3.80 mg / g fresh wt.) . Chlorophyll b content of leaves was higher in summer (3.39 mg / g fresh wt.) than monsoon and winter (3.17, 3.24 mg / g fresh wt.) respectively.

Sr. No.	Name of Plant	Chlorophyll ( mg / g fresh weight )								
		Summer			Monsoon			Winter		
		Chl.a	Chl.b	Carote noid	Chl.a	Chl.b	Carote noid	Chl.a	Chl.b	Carote noid
1.	<i>Adhatoda vasica</i> Nees.	3.40	2.72	1.46	3.14	2.51	1.32	3.21	2.64	1.36
2.	<i>Azadirachta indica</i> A.Juss.	4.06	3.39	2.28	3.72	3.17	2.06	3.80	3.24	2.19
3.	<i>Calotropis procera</i> (Ait)R.Br.	2.82	1.70	1.29	2.56	1.44	1.12	2.69	1.51	1.19
4.	<i>Datura stramonium</i> Linn.	2.26	1.88	1.50	2.13	1.66	1.32	2.16	1.79	1.44
5.	<i>Santalum album</i> Linn.	2.07	1.50	1.12	1.68	1.36	0.98	1.87	1.44	1.07
6.	<i>Syzygium comini</i> Linn.	2.52	2.09	1.39	2.39	1.74	1.27	2.44	1.82	1.32
7.	<i>Withania somnifera</i> (L.)Dun.	3.40	2.62	1.86	3.22	2.41	1.57	3.34	2.53	1.65

Table 1 : Chlorophyll content in the leaves of some medicinal plants of Aurangabad District (M. S.)

The carotenoid content in the leaves of *Azadirachta indica* also higher in summer ( 2.28 mg / g fresh wt.) than monsoon and winter ( 2.06 , 2.19 mg / g fresh wt.) respectively . The chlorophyll a content of leaves of *Withania somnifera* was raised in summer ( 3.40 mg / g fresh wt.) over that of monsoon ( 3.22 mg / g fresh wt.) and winter ( 3.34 mg / g fresh wt.) . Chlorophyll b content of leaves was higher in summer ( 2.62 mg / g fresh wt.) than monsoon and winter ( 2.41 , 2.53 mg / g fresh wt.) respectively. The carotenoid content of *Adhatoda vasica* also higher in summer (1.86 mg / g fresh wt.) than monsoon and winter (1.57, 1.65 mg / g fresh wt.) respectively.

The chlorophyll a content of leaves of *Calotropis procera* , *Datura stramonium* and *Syzygium comini* were ranging ( 2.13 to 2.84 mg / g fresh wt. ). The chlorophyll b content of leaves of *Calotropis procera* , *Datura stramonium* and *Syzygium comini* were ranging ( 1.36 to 1.88 mg / g fresh wt. ). The carotenoid content of leaves of *Calotropis procera* , *Datura stramonium* and *Syzygium comini* were ranging ( 0.98 to 1.50 mg / g fresh wt. ) . The highest amount of chlorophyll a content in the leaves of *Adhatoda vasica* and *Withania somnifera* ( 3.40 mg / g fresh wt.) in summer season . The lowest amount of chlorophyll a , chlorophyll b and carotenoid content in the leaves of *Santalum album* ranging ( 1.68 to 2.07 , 1.36 to 1.50 and 0.98 to 1.12 mg / g fresh wt. ) in various seasons compare to other investigated taxa .

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