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Phytochemical Studies in Eleven Species of Ferns from Satara District of Maharashtra (India)

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Article Info	Abstract
Article History Received : 15-04-2011 Revised : 02-08-2011 Accepted : 02-08-2011 *Corresponding Author Tel : +91-231-2654658 Fax : +912312654658 Email: lakish786@yahoo.co.in ©Scholar Journals, SSR	The present study was carried out with respect to phytochemical analysis such as chlorophylls, carotenoids and polyphenols contents in the eleven species of ferns from the Satara district of Maharashtra. The different species showed variation in their photosynthetic pigments. the different species shows increase in photosynthetic pigment during vegetative stage and decreases during mature stage. The decrease in photochemicals during reproductive stage may be due to sporangium formation which may create a stress during the maturation and increasing the amount of phenols. Key Words: Phytochemical, Chlorophylls, Carotenoids, Maharashtra

Introduction

In contrast to the large amount of information available concerning rates of photosynthesis and respiration in flowering plants, very few studies of this sort have been made with ferns (Joseph and Frederick, 1975). It has been suggested that the distribution of ferns is mostly determined by factors of climate and habitat due to relatively low limitations in ferns for dispersal and establishment (Wild, 2005). Chlorophylls play a very important role in photosynthesis; plants have additional pigments that participate in photosynthesis. These are indeed called antenna pigments, for true plants, which taxonomists are generally defining as green algae, bryophytes, ferns, and seed plants, the pigments for photosynthesis are chlorophylls a and b and carotenoids (Taiz and Zeiger, 2002). Previous investigations of photosynthesis and respiration in ferns include those of Johansson (1923), Bohning and Bumside (1956), Starzecki (1958) Hew and Wong (1974) and the recent study about photosynthetic pigments is carried out by Shaikh and Dongare (2008) and Kale (2003).

Materials and Methods

The material was collected from Satara district which is situated between North Latitudes 17.5 to 18.11 and 73.33 to 74.54 East. The temperature range is about 11.6° - 37.5° with 1426 mm average rainfall. The chlorophylls are determined by using method of Arnon (1949), carotenoids by the method given by Kirk and Allen (1965) and Polyphenols by Folin and Denis (1915).

Results and Discussion

In the present investigation it was observed that the photosynthetic content of the eleven fern species having clearly variability. The photosynthetic pigments at different habitats with varied climatic condition observed distinguishly

different (Table 1). The chlorophyll ranges from 81.36 to 195.9 in vegetative while 79.8 to 183.36 with changing carotenoids from 9.7 to 35.88 in vegetative and 10.19 to 39.5 at reproductive stage. Guha *et al.* (2006) studied content of chlorophylls in three Adiantoid ferns. The studies by Kale (2003) revealed that chlorophyll content in the dimorphic leaves of four homosporous ferns growing in different habitats is different. It was analyzed that total chlorophylls and carotenoids content in vegetative fronds are more in the terrestrial and epiphytic ferns while Polyphenols were found to be increased in reproductive stage in most of the ferns.

The increase or decrease in chlorophylls is depend on the available light. There was a much greater quantity of chlorophylls and Carotenoids in the terrestrial and epiphytic species than in the aquatic and climber species. Shaikh and Dongare, (2008) showed that variation in chlorophyll and carotenoids contents varied with microclimatic conditions in *Adiantum philippense*. Because of numerous factors concerned with nutrition and light which can influence chlorophyll content, and because the plants sampled were growing under a variety of conditions (Wolf, 1958). The Polyphenols are observed to be increased in reproductive stage. The similar observation was made by Kale, 2003 and Shaikh and Dongare, 2008. The increase in phenol content shows the adaptation of species to the unfavorable conditions which ultimately increases the its amount. It is also considered that these variations may be due to altitudes at which plant species is to be occurred, phytochemical studies on nineteen taxa of thelypteroid ferns of the Western Ghats of South India showed the relationship between the amount of pigments such as chlorophylls, carotenoids, anthocyanins and flavonoids and the habitat of the species has been studied (Masal, *et al.*, 2010 a and b, De Britto *et al.*, 1994).

Table 1: Pigment status of eleven Pteridophytes from the Satara District of Maharashtra (India).

Sr. No	Pteridophyte species	Habitats	Total chlorophyll mg 100 ⁻¹ g fresh wt		Carotenoids mg 100 ⁻¹ g fresh wt		Polyphenols g 100 ⁻¹ g fresh wt	
			Vegetative	Fertile				
1	<i>Microsorium membranacum</i> (D. Don.)	Epiphytic	152.00±2.31	150.9±1.61	34.17±0.10	34.2±1.50	2.75±0.08	2.76±0.05
2	<i>Nepobolus lanceolatus</i> Trim.	Epiphytic	161.2±8.66	183.36±6.49	24.4±0.12	39.5±1.38	1.76±0.00	1.61±0.10
3	<i>Pleopeltis wightiana</i> (Beddome)	Epiphytic	157.88±0.84	126.1±1.25	34.64±1.25	38.00±1.45	1.39±0.41	1.36±0.00
4	<i>Lygodium flexuosum</i> (L.) Sw.	Climber	125.72±2.15	123.79±2.47	16.9±1.06	15.6±0.95	1.78±0.15	1.64±0.12
5	<i>Marsilea minuta</i> L.	Aquatic	81.36±1.13	79.8±1.73	9.7±0.68	10.19±0.68	1.35±0.15	1.16±0.20
6	<i>Athyrium hohenackeranum</i> Kunze	Terrestrial	101.98±3.91	97.17±5.71	18.7±1.14	20.4±1.10	1.68±0.25	1.42±0.14
7	<i>Pityrogramma calomelanos</i> (L.) Link	Terrestrial	193.1±3.37	179.24±4.16	31.06±1.34	28.4±1.25	1.96±0.08	1.74±0.11
8	<i>Christella parasitica</i> (L.) H. Lev.	Terrestrial	168.8±4.26	157.00±0.94	29.64±1.25	27.04±1.00	1.32±0.05	1.38±0.00
9	<i>Diplazium esculentum</i> (Retz.) Sw.	Terrestrial	140.3±3.28	137.6±1.24	19.7±0.55	24.1±1.02	2.12±0.34	1.82±0.11
10	<i>Pteris vittata</i> (L.)	Terrestrial	104.87±2.52	105.31±1.06	25.00±1.02	24.1±0.67	1.25±0.00	1.26±0.00
11	<i>Tectaria coadunata</i> (Wall. ex Hook. & Grev.) C. Chr.	Terrestrial	195.9±2.24	114.26±1.65	35.88±2.41	24.72±0.68	2.83±0.08	3.72±0.13

Conclusion

The different species shows increase in photosynthetic pigment during vegetative stage and decreases during mature stage. The decrease in photochemicals during reproductive stage may be due to sporangium formation which may create a stress during the maturation and increasing the amount of phenols.

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