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COMPARATIVE STUDY OF PHOTOSYNTHETIC PIGMENTS AND PHENOLIC CONTENT IN THREE *BARLERIA* SPECIES

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ABSTRACT

Genus *Barleria* L. (family - Acanthaceae) comprises over 300 species distributed worldwide. Most of them are wild ornamentals and also having medicinal properties. Extracts of some species are effective against vata, pitta, gingivitis stomatitis, burns, dental cares, inflammation, ascites, edema, wounds, nocturnal ejaculation and crocking heel. Attempts have been made to highlight the quantity of photosynthetic pigments and phenolic contents in three *Barleria* species. The findings of present study indicated that contents of chl-a, chl-b, total chlorophyll, carotenoids and total phenolics were recorded highest in *B. grandiflora* compared to *B. prionitis* and *B. terminalis*.

Keywords: *Barleria*, Chlorophyll, Carotenoids, Total phenolics.

INTRODUCTION

Barleria L. (family – Acanthaceae) is a large, widespread, pantropical genus of herbs and shrubs comprising over 300 species. Its greatest representation is in Africa and Asia, with its greatest centre of diversity in tropical East Africa [1]. India is represented by 26 species, one subspecies and one variety [2]. Barlerias are highly prized for their ornamental flowers and medicinal implications. The crude extracts of many *Barleria* species have several pharmacological activities including anti-inflammatory, analgesic, antihyperglycemic, antioxidant, antibacterial, virucidal and antitumor[3, 4, 5]. Many species bears bioactive compounds *viz*. Balarenone, Pipataline, Lupeol and Prinoniside [6].

The functional bioactivity of a plant extract, in general, depends upon the presence of compounds such as chlorophylls, carotenoids and polyphenols [7]. The chlorophylls are virtually essential pigments for the conversion of light energy to stored chemical energy. The

amount of solar radiation absorbed by a leaf is a function of the photosynthetic pigment content; thus, chlorophyll content can directly determine photosynthetic potential and primary production [8,9]. Carotenoids are some of the most vital colored phytochemicals, accounting for the brilliant colors of a variety of fruits and vegetables. Carotenoids are localized in subcellular organelles (plastids), *i.e.* chloroplasts and chromoplasts. In chloroplasts, the carotenoids are chiefly associated with proteins and serve as accessory pigments in photosynthesis, whereas in chromoplasts they are deposited in crystalline form or as oily droplets [10]. Phenolic compounds are ubiquitous bioactive compounds and a diverse group of secondary metabolites universally present in higher plants. Therefore, the main purpose of the present study was to determine the Chl *a*, Chl *b*, total chlorophylls, total carotenoids and total phenolic content in the acetone leaf extract of three *Barleria species viz. B. grandiflora, B. prionitis and B. terminalis.*

MATERIALS AND METHODS

Chlorophyll content was determined from fresh green leaves following method described by Arnone [11] with some modification. Briefly, 0.5 g of leaf material was homogenized in 80% acetone at 4^0C in dark. Extract was filtered through Whatman filter paper no 1 and final volume of the sample was adjusted to 100 ml with 80% acetone. The extract produced in this way was subjected to reading on a UV-VIS spectrophotometer 119 (Systronics, India). Carotenoids content was determined as per the method of Jensen and Jensen [12]. while total phenolic content was estimated by modified method of Chavan *et al.* [13].

RESULTS AND DISCUSSIONS

Higher plants are characterized by the presence of chlorophyll-'a' and 'b', which are constituents of photosynthetic apparatus. The level of chlorophyll in the leaf tissue depends on the rate of its synthesis and the rate of its degradation both. Photosynthesis is related to chlorophyll content [14, 15]. Chlorophyll content may helps to know an idea about photosynthetic efficiency of a plant.

The content of chlorophyll *a*, Chlorophyll *b*, total chlorophyll and the ratio of chl *a*:*b* ratio was measured in three *Barleria* species viz. *B. grandiflora, B. prionitis* and *B. terminalis* (Table 1). The content of chlorophyll *a* is significantly greater than that of chlorophyll *b* in all three species. The highest amount of Chl a (74.34) and Chl b (33.11) was recorded in the leaves of *B. grandiflora*, while the leaves of *B. prionitis* showed lowest levels of Chl a

(29.1526) and Chl b (12.48.8). Similar kind of result recorded by Sangeetha and Ramarethinam (2000) in mulberry variety MR2, by Desai [16] in *Morinda* species and by Aparadh and Karadge [17] in five *Cleome* species. As was expected, the highest total chlorophyll content was recorded in the leaves of *B. grandiflora* (106.5126) followed by *B. terminalis* (78.76) and *B. prionitis* (41.43). However, Chl *a*:*b* ratio was significantly higher in the *B. terminalis* (Table 1). It is evidence from results carotenoids content in three *Barleria* species. The greatest values of carotenoids content was recorded in the leaves of *B. grandiflora* (14.28), but these values were considerably lower than values of chlorophyll content. The lowest carotenoids content was measured in the leaves of *B. prionitis* (6.68). The highest levels of the phenolic content were recorded in the acetone leaf extract of the *B. prionitis*. However, not much variation of total polyphenol content was recorded with studied *Barleria* species.

Table 1: Chlorophyll and Carotenoid contents* and Total polyphenol content in leaves of three *Barleria* species from Satara City.

Sr. No.	*Barleria* species	Chl a	Chl b	Total Chlorophyll	Chl a:b ratio	Carotenoids	Total polyphenols (g/100 g DW)
1	*B. grandiflora*	73.89	32.58	106.45	2.27	14.25	1.16±1.2
2	*B. prionitis*	29.32	12.13	41.43	2.42	6.65	1.20±0.8
3	*B. terminalis*	56.52	22.26	78.76	2.54	12.15	1.02±0.24

*** Values are in mg 100^{-1}g plant tissue.**

CONCLUSIONS

The findings of present study indicated that contents of chl-a, chl-b, total chlorophyll, carotenoids and total phenolics were recorded highest in *Barleria grandiflora* compared to *B. prionitis* and *B. terminalis*. Hence productivity and photosynthetic efficiency is higher in *B. grandiflora* than that of other species.

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