



DETERMINATION OF TOTAL SOLUBLE SUGAR CONTENT IN SOME SELECTED SPECIES OF FAMILY EUPHORBIACEAE OF SIKAR DISTRICT OF RAJASTHAN, INDIA

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Abstract

Euphorbiaceae is a largest, complex and diverse family of Angiosperm. This family have 334 genera and more than 8,000 species in the world (Radcliffe – Smith, 2001). In India 73 genera and 410 species have been reported by Divya *et al.*, (2011). Sugar is a significant molecule in plants which was estimated in the root, stem and leaves of seven selected species of family Euphorbiaceae collected from Sikar district of Rajasthan. Maximum sugar was observed in *Croton bonplandianum* (38.43 mg/gdw) and minimum sugars were recorded in *Euphorbia thymifolia* (12.01 mg/gdw).

Key words: Euphorbiaceae, Sikar district, Total Sugar

Introduction

District Sikar is situated on the north eastern part of Rajasthan at an average altitude of 1418.35 ft. and lies between 27°21' to 28°12' N latitudes and 74°44' to 75°25' E longitudes. The total area of the district is 7,742.44 Sq. km. The district covers 2.27% of the total area of the state. The major part of the region is an undulating sandy tract. The soil of this region varies from sandy to loam. All seven plant species *viz.* *Croton bonplandianum*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Euphorbia thymifolia*, *Phyllanthus fraternus*, *Phyllanthus maderaspatensis* and *Phyllanthus virgatus* were collected during 2015-2016 plants growing up to flowering and fruiting stage, at various localities of Sikar District.

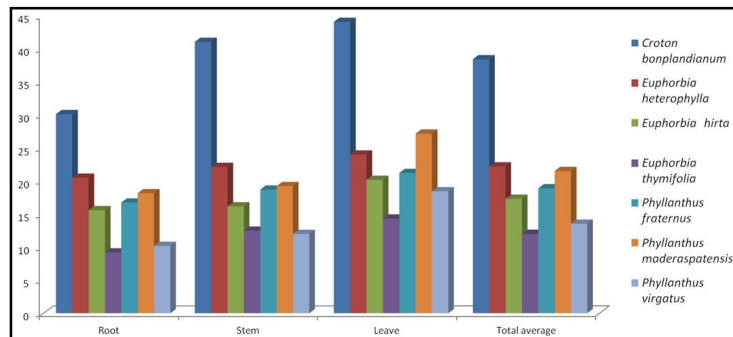
Sugar takes a central position in plant growth, development and stress responses. The central role of sugar was already suggested many decades ago, with proposed roles in overall plant growth and development Allsopp 1954; Horsfall and Dimond 1957; Loeb 1924; Gibbs 1974; Evans and Kinghom 1977; Seigler and David 1994 and Harborne 1998 supported phytochemical study. Sugar plays a role as a signalling molecule that regulates a variety of genes Koch 1996. Phytochemical studies have been taken up by Liu *et al.*, 2002; Amir 2006; Krishnaiah *et al.*, 2009; Ayatollahi *et al.*, 2010 Baloch and Baloch 2010; Julius and Patrick 2011; Khan *et al.*,

2011; Takuo and Hideyuki 2011; Yong and Cheng 2011; Moreira *et al.*, 2013; Pounikar *et al.*, 2013; Rahman and Akter 2013; Sener 2013; Andrea and Judit 2014; Milan and Nenad 2014; Andréa *et al.*, 2014; Bhumi and Savithramma 2014; Dash and Sheikh 2015; Banibrata *et al.*, 2015; Santhi and Sengottuve 2016 on angiospermic plants. It probably affects various aspects of development in higher plants. The substance commonly isolated from the family are Esters, Terpenoids, Alkaloids, Sugars, Flavonoids, Saponins, Cyanidin, Delphinidin and Drugs of unknown composition.

Euphorbiaceae, the spurge family, is one of the most complexes, large and diverse family of Angiosperms (Wurdack *et al.*, 2004) with 334 genera (Webster 1994) and over 8,000 species (Radcliffe-Smith 2001), which are distributed mainly in the tropics in the several types of vegetations and habitats. In India, 73 genera and 410 species have been reported by Divya *et al.*, (2011). Most of plant species are herbs, but some, especially in the tropics, are shrubs or trees. The present study enumerate the 7 species of family Euphorbiaceae which were collected from Sikar district of Rajasthan and investigated for their total sugar in different parts of plant. The studied plants include *Croton bonplandianum*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Euphorbia thymifolia*, *Phyllanthus fraternus*, *Phyllanthus maderaspatensis*

Table 1: Total soluble sugars (mg/gdw) in different organs of the selected species of family euphorbiaceae.

S. No.	Name of species	Root	Stem	Leaves	Total average
1.	<i>Croton bonplandianum</i>	30.13	41.08	44.10	38.43
2.	<i>Euphorbia heterophylla</i>	20.51	22.13	24.02	22.22
3.	<i>Euphorbia hirta</i>	15.60	16.17	20.19	17.32
4.	<i>Euphorbia thymifolia</i>	9.21	12.50	14.33	12.01
5.	<i>Phyllanthus fraternus</i>	16.75	18.72	21.23	18.90
6.	<i>Phyllanthus maderaspatensis</i>	18.16	19.24	27.18	21.52
7.	<i>Phyllanthus virgatus</i>	10.20	12.00	18.46	13.55



Text Fig. 1: Total soluble sugars (mg/gdw) in different organs of the selected species of family euphorbiaceae.

and *Phyllanthus virgatus*.

Material and Methods

The collected samples were brought to laboratory in plastic bags, shaded dried and ground to make powder. Total sugar was estimated in different plants parts according to Yem and Willis (1954) method. In the process 200 mg of Anthrone was dissolved in 100 ml ice cooled 80% H₂SO₄. The solution was stirred well. Fresh solution was used every time. Optical density was recorded at 800 nm. Standard curve was prepared using glucose.

Results

Sugar was estimated in root, stem and leaves of *Croton bonplandianum*, *Euphorbia heterophylla*, *Euphorbia hirta*, *Euphorbia thymifolia*, *Phyllanthus fraternus*, *Phyllanthus maderaspatensis* and *Phyllanthus virgatus*. The result of total sugar concentration have been presented in table 1, Text Fig 1 organ-wise, root, stem and leaves of plant material have been analysed. Among the roots, maximum sugar contents were found in *Croton bonplandianum* (30.13 mg/gdw) and the minimum value was recorded in *Euphorbia thymifolia* (9.21 mg/gdw). In stem, the maximum sugars were recorded in *Croton bonplandianum* (41.08 mg/gdw), the minimum being present in *Phyllanthus virgatus* (12.00 mg/gdw). In leaves, maximum sugar contents were

observed in *Croton bonplandianum* (44.10 mg/gdw) followed by *Euphorbia heterophylla* (24.02 mg/gdw) the minimum being recorded in *Euphorbia thymifolia* (14.33 mg/gdw).

In general the maximum sugar were observed in *Croton bonplandianum* (38.43 mg/gdw) followed by *Euphorbia heterophylla* (22.22 mg/gdw) and minimum sugars were recorded in *Euphorbia thymifolia* (12.01 mg/gdw) followed by *Phyllanthus virgatus* (13.55 mg/gdw).

Discussion

Sugar plays an important role in the defense reactions of plants. Currently the mechanisms of growth regulation in plants, dependent on the access to sugar, are being processes, oftenly on the metabolic function. Significant variations have been observed in the quantity of these components in different organs as well as in different species. These data do support the phytochemical basis as the different tolerance and survival of these plants under the hostile climatic conditions of Rajasthan.

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