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RESEARCH ARTICLE

SEASONAL IMPACT ON QUANTIFICATION OF SECONDARY METABOLITES *IN VIVO* AND *IN VITRO* IN *COMMIPHORA WIGHTII* (ARN.)BHANDARI

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ABSTRACT

Commiphora wightii is an endangered medicinal plant which has been collected from North Gujarat. Callus and different plant parts have been screened for secondary metabolites like phenol, tannin, flavanoid and saponin during the growth seasons in the month of Oct- Nov and March-April.

INTRODUCTION

Commiphora wightii also locally known as guggal is a small tree indigenous to India, growing wild in the semi-arid states of Rajasthan, Gujarat, and Karnataka. In its natural range in India, the tree drops its leaves during rainy season. New leaves and fruits develop during the months of October –November and March-April.

Guggal has been a key component in ancient Indian Ayurvedic system of medicine, and now is widely used in modern medicine for treatment of heart ailments. But Guggal as it is locally known, has become so scarce because of its overuse in its two habitats in India where it is found — Gujarat and Rajasthan that the World Conservation Union (IUCN) has enlisted it in its Red Data List of endangered species. For removing the tannins tribal people use crude and haphazard methods of incising the main stem by axe often stripping off patches of bark. Heavy tapping injures the cambium and curtails the life span of the tree on account of poor wound healing. Today, its existence is threatened because of low seed production in an adverse natural condition and recent environmental changes due to change in rainfall pattern and increasing level of atmospheric pollution. This plant species is fighting for its survival in the natural habitat since a long time. As a part of saving this tree conservation measures are required to be taken or in a short span of time this tree would become extinct.

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With the discovery of the hypolipidemic activity for the gum resin, several chemical investigations have been undertaken. It was found that guggul resin is a complex mixture of various classes of chemical compounds such as lignans, lipids, diterpenoids and plant steroids. A waxy solid comprising a mixture of esters based on homologous long chain tetraols and ferulic acid with a unique structure, was identified in the benzene phase (Satyavati, 1991). In a more detailed study by Kumar *et al.* (1987), the stereochemistry of these tetraols has been determined. Guggalsterone is the resin of Mukul myrrh tree, a small, thorny plant found predominantly in the rocky, dry regions of India. Gum Guggulu, the yellowish resin produced in the stem of the *Commiphora mukul* tree is obtained by tapping the tree throughout the year. This resin is the source of the active components, Z-guggulsterone and E-guggulsterone (Antonio 1999) as well as another eight steroids, acids, several aromatic acids, terpenes, and fatty acid alcohols. Some components seem to focus on cholesterol reduction activity, some are anti-inflammatories (Arora 1972, Duwiejua 1993) and some appear to work synergistically.

MATERIALS AND METHODS

Plant material

Plant was collected from herbal garden of North Gujarat University.

Fresh plant parts during the growth seasons March-April and October-November were collected and dried in oven at 50^{O}C and powdered for further use. Also callus and *in vitro* plants

were dried and powdered during the respective seasons. Extraction was carried out in methanol. 2gm dried powder was added to 200 m methanol and kept in shaker at 200rpm for 48 hrs.

Chemicals

All the chemicals used were of analytical grade.

Secondary Metabolite Estimation

In vivo and *in vitro* plant plants were evaluated quantitatively to estimate phenols, flavanoids, saponins and tannins following the established methods for Phenols (Folin method of Swain and Hills 1959), Tannins (Folin Denis method by Schanderl 1970), Flavanoids (Hongbin *et al.,* 2009) and Saponin (Obadoni and Ochuko 2001). All experiments were repeated thrice for precision and values were expressed in percentage in terms of dried material.

RESULTS

A drastic variation in secondary metabolites was noticed during the change in season. Levels of secondary metabolites were found to be highest during the season March-April compared to that of October-November. Levels of phenol (3.90%), tannin (2.65%) and flavanoid (2.05%) was found to highest in callus. Saponin (11%) content in *invitro* plant was the highest.

Table 1. Quantitative analysis of Secondary Metabolites

Secondary metabolites	March-April				October-November			
	Leaf	Stem	Callus	In vitro plant	Leaf	Stem	Callus	In vitro plant
Phenolic compound	0.2%	1.80%	3.90%	2.75%	0.2%	1.2%	2.90%	2.05%
Tannin	0.8%	2.00%	2.65%	1.45%	0.45%	1.5%	1.85%	0.95%
Flavanoid	1.2%	1.65%	2.05%	1.5%	0.95%	0.85%	1.15%	0.7%
Saponin	10%	8%	9%	11%	6%	5%	7%	10%

DISCUSSION

Difference in season does have an impact on the production of secondary metabolites in a plant. When the season is more favorable the primary metabolites are produces more than the secondary metabolites. While when the season is less favorable the primary metabolites are produces less than the secondary metabolites. In the above studies months of March-April seems to be more favorable for the secondary metabolite production in the plant than October-November.

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