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Antifungal Activity of Commiphora Wightii (Guggul) Oleo- Gum Resins against Fuxarium Oxysporum and Aspergillus Niger

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ABSTRACT: The potential of extractives and fumes oleo-gum resin of Commiphora wightii (Guggul) were assessed against Fuxarium oxysporum and Aspergillus niger. Significant variation in antifungal activities was observed at different dilutions of polar and non polar solvent extractives against tested both fungal species. All extractives showed significant anti fungal activities, varied 7.8 to 87.8%. Maximum fungal inhibition was observed in polar solvent i.e. methanol. This study clearly indicates the presence of bio constituents present in extractives and fumes of oleo gum resin which effect population of microbes.

Keywords: Oleo- gum resin, Commiphora wightii,fungal population, Guggul fumes.

I. INTRODUCTION

Polysaccharides-Gums and resins, are the natural polymers, present in cavities or intercellular space of plant parts, sometimes secreted due to disease or mechanical injury to the bark or wood and protect the injured part, prevent water loss and infection. The uses of oleo-gum resins viz., balsams, myrrh and frankincense have been referred in the ancient literature for the treatment of several diseases and for religious purposes in India and China.

Guggul, C. wightii (Arnott) Bhandari, is a spiny shrub having profuse branching and reaching height upto 3-4 m (Varier, 1994) (Fig.1). It is an important medicinal plant, an oleo –gum resin obtained from plant is possessing medicinal properties and also documented in ancient literature of India about 5000 years ago. The thin ash colored bark, flakes off in thin papery rolls exposing the green glossy bark of the tree. The plant flowers twice during the year, September-October and March – April (Fig.2), however, it depends on the local climatic conditions.

C. wightii is found drier parts of the globe i.e. Africa, Asia and Northern part of America (Lal and Kasera, 2010). In India It is mostly found in arid parts like Madhya Pradesh, Rajasthan and Gujarat (Atal et al., 1975; Gupta et al.,1996; Billore et al., 1991; Tomar, 2013). Mesorb et al. (1998) reported that biologically active principles of oleoresin are 2% guggulsterone and 4 - 4.5% two isomers, guggulsterones- E and Z in ethyl acetate extract which are inter-convertible (Ramawat et al., 2008), tested through pharmacology and clinical studies showed hypolipidemic activity (Urizar and Moore, 2003; Wang et al., 2004). The bioactive chemicals of guggul are found useful in several diseases/ disorders related with bones, metabolism, inflammation, cardiovascular, tumor, wound, microbial infection, pain, skin and disorder of lipid metabolism (Dave et al., 2017)). Due to medicinal and other uses, it has very high demand in herbal industries.

C. wightii oleo gum resin is known as a Yog-Vahi rasayana which has synergistic action that enhances the effects of other herbal medicines when taken in conjunction. There are already over 25 medications on the market, some of which are combined with other herbal remedies. It is found highly efficacious in treatment of several diseases-obesity, arthritis, inflammation, cardiovascular, skin diseases and disorder of lipid metabolism. It is also one of the important ingredients of Hawan Samagri. Keeping these facts in mind present study was undertaken to assess the efficacy of Guggul against microbes-fungi.

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Fig.1: Commiphora wightii plant

Fig.2: Oozing of Guggul resin in field

II. MATERIAL AND METHODS

Oleo gum resin of C. wightii collection

Sample was harvested from forest of Bhuj (Gujarat) and dried in shade condition.

Crude extract Preparation:

Guggul (1to 5 gm) was dissolved in 10 ml solvents (distilled water, methanol, ethyl-acetate, and Petroleum ether) at room temperature and kept for overnight. Whatman No 1 filter paper was used to filter each extract.

Assessment of antifungal activities:

Antifungal efficacy of Guggul extractives was assessed by Poisoned food technique (Nene and Thapliyal, 1979) against test fungi- Fuxarium oxysporum and Aspergillus niger.

Preparation of media and inoculation of test fungi:

Nutrient media, 39gm Potato Dextrose Agar media (PDA) was taken in one litre distilled water and added 1 ml of the extractives to it, after 20 minutes autoclaving, warm media was transferred into Petriplates.

The laminar cabinet was UV sterilized and inoculation of test fungi –Fuxarium oxysporum and Aspergillus niger were carried out.

After inoculation, petriplates were kept at 37^0C in incubator and radial growth was measured in cm after every 24 hours for the 7 days. The fungal growth % reduction of over control was determined.

$$\% \text{ reduction of fungal growth} = \frac{\text{Fungal growth in control}}{\text{Fungal growth in treatments}} \times 100$$

III. RESULTS AND DISCUSSION

The evaluation of fungal inhibition of different solvent extractives- methanol, aqueous, ethyl-acetate and petroleum ether in different concentrations (50,100, 250 and 500 mg/ml) against fungal species- Fusarium oxysporum and Aspergillus flavus were assessed by standard method i.e. poisoned food technique. The fungal inhibition was determined over control, results are presented in Table 1 & Fig.3&4,

Antifungal activities of oleo-gum-resin of C.wightii

The different extractives of oleo-gum resin showed significant variation in antifungal activity. The observations showed the increases in fungal inhibition with the increase in concentrations of extractives (recorded after 7 days). The results revealed that methanolic extract of Guggul has maximum fungal inhibition potential as compared to other extractives (Table 1). All extractives showed significant variation in antifungal activity.The highest concentration of methanol extract (500 mg/ml) of resin showed minimum fungal growth of F.oxysporum (0.34 cm) and A.flavus (0.56 cm) as compared to control,(2.8 and 3.2 cm fungal diameter). Significant variation in antifungal activities was observed at different dilutions against tested both fungal species on comparison to control. The antifungal activities of different extractives – Methanol, Petroleum ether, Ethyl acetate and aqueous against F. oxysporum and A. flavus, varied 50.3 to 87.8%, 29.21 to 69.6%, 41.0 to 71.0 and 36.4 to 77.7%, respectively over control. All extractives showed significant anti fungal activities, varied 7.8 to 87.8%. Maximum fungal

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inhibition was observed in polar solvent i.e. methanol. The findings of the study is also in accordance with the earlier studies related with extraction of antimicrobial chemicals from medicinal plants in polar solvent, methanol (Ahmed et al.,2015; Karaman et al., 2003; Pathak et al., 2003). The potential of natural product, oleo gum resins obtained from C. myrrha as substitute to synthetic carcinogenic chemical fungicides reported by Al-Sabri et al., (2014). Similarly antimicrobial activity of water, methanolic and chloroform soluble fractions of C. myrrha studied by Alhussaini et al. (2015). They evaluated antimicrobial action of oleo-gum resins aqueous, methanol and chloroform extracts against against fungal dermatophytes.

Table-1: Efficacy of oleo-gum resin against fungi Fusarium oxysporum and Aspergillus flavus

Different solvent extractives	Concentration mg/ml	Fungal growth (cm)	
		F.oxysporum	A. flavus
Petroleum ether	50	1.58±0.16	1.71±0.04
	100	1.31±0.20	1.31±0.05
	250	0.81±0.20	1.25±0.25
	500	0.45±0.15	0.88±0.11
Ethyl-acetate	50	1.55±0.61	1.95±0.52
	100	1.05±0.53	1.41±0.21
	250	1.01±0.20	1.18±0.18
	500	0.81±0.19	0.71±0.22
Methanol	50	1.79±0.51	1.84±0.45
	100	1.21±0.20	1.34±0.33
	250	1.02±0.51	1.07±0.33
	500	0.74±0.24	0.87±0.29
Water	50	1.78±0.20	1.75±0.23
	100	1.35±0.19	1.18±0.10
	250	0.98±0.33	1.08±0.16
	500	0.68±0.28	0.79±0.21
Control		2.80	3.20
CD(0.05)		0.430	0.467

Values are the mean of three replications; ± Standard deviation

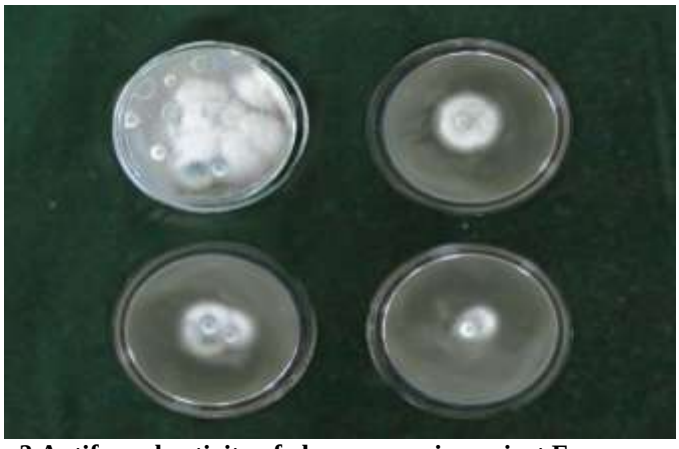

Fig.3 Antifungal activity of oleo-gum resin against F.oxysporum

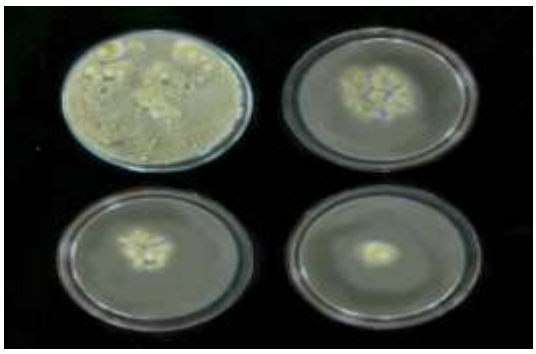

Fig.3 Antifungal activity of oleo-gum resin against A.flavus

Fusarium oxysporum species and Aspergillus are the notorious fungi responsible fusariosis and aspergillosis in plants, animals, and humans (Hedayati et al.,2007;Gomes et al.,2014; Al-Hatmi et al.,2018). It clearly indicates in the present study that the presence of bio constituents present in oleo gum resin which effect population of microbes, may be a practicable, result oriented scientific practice to clean the environment.

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