

**BIOLOGICAL INVESTGATIONS OF INDIAN
PHAEOPHYCEAE 16. ANTIBACTERIAL ACTIVITY OF
PHENOLIC SUBSTANCES, EXTRACTED FROM
SARGASSUM JOHNSTONII SETCHELL ET GARDNER
COLLECTED FROM OKHA, WEST COAST OF
INDIA**

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Abstract

Free and hydrolysed phenolic substances were extracted from a dry sample of *Sargassum Johnstonii* using 80% methanol and tested for their antibacterial activity by agar diffusion method. The growth of two gram-positive bacteria tested were inhibited while none of the gram - negative bacteria were affected by both the phenolic substances. Hydrolysed phenolic substances exhibited better antibacterial activity against *Staphylococcus aureus* than free phenolic substances.

Introduction

The physodes of brown algae contain phenolic substances. large amounts of polyphenols are present in the Fucalae and polyphlorophenols are found in most of the Phaeophyceae. More complex phenolic constituents have been detected by Sieburth and Conover (1965), Glombitza *et al* (1974), Khaleafa *et al* (1975), Ragan (1976) and Ragan & Craigie (1979). Tannins from *Sargassum ringoldianum* were reported by Ogino (1957), and Klein (1964).

The objective of the present study is to extract two types of phenolic substances viz. hydrolysed and free phenolic substances from the brown alga *Sargassum johnstoi* growing on the west coast of India and study their effects on various bacteria.

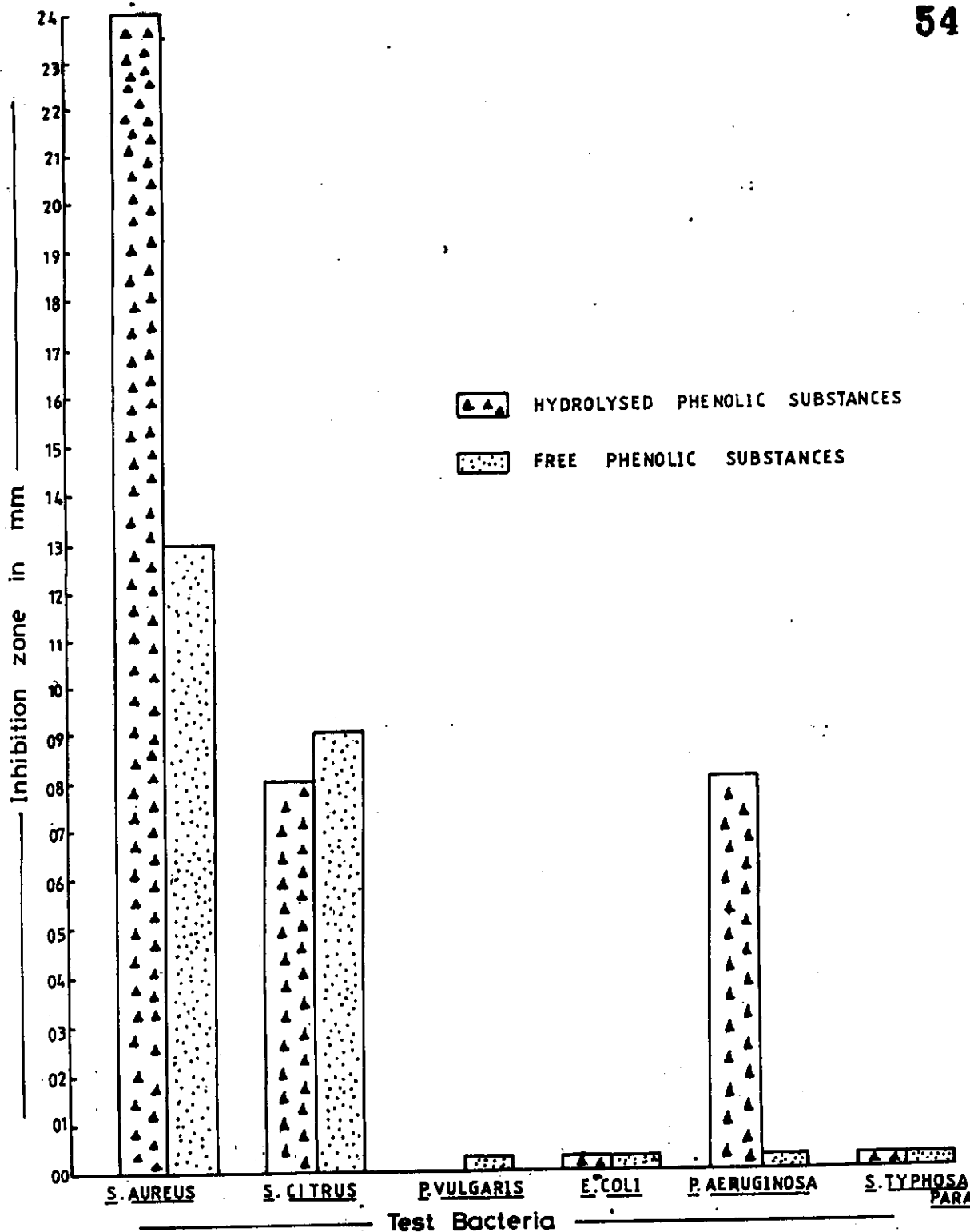


FIG. ANTI BACTERIAL ACTIVITY BY THE PHENOLIC SUBSTANCES OBTAINED FROM SARGASSUM JOHNSTONII

Materials and Methods

Healthy and mature samples of *Sargassum johnstonii* found in tide pools were collected during low tide. Later the seaweed samples were washed, cleaned and dried throughly under shade and ground.

Phenolic substances were extracted from the powdered seaweed following the methods described by Glombitza *et al* (1973).

Seaweed extraction was carried out with 80% methanol. The methanol extract was concentrated and shaken with petroleum ether to remove pigments and other soluble substances. The ether extract was then discarded and the remaining aqueous phase was washed with carbon tetrachloride. The CCl_4 was discarded and the remaining aqueous phase was washed with chloroform and followed by an addition of ethylacetate to the aqueous part. This yielded hydrolysed phenolic substances while the organic solvent part which contains ethyl acetate fraction, was evaporated and 0.1 N HCL was added to obtain free phenolic substances. Bioassay test was conducted by agar diffusion method using both the phenolic substances against pathogenic microorganisms.

Nutrient agar medium was sterilised and poured into petridishes. Nutrient broth was made and inoculated with test bacteria. The pathogenic bacteria used were *Staphylococcus aureus*, *S. citrus* (gram - positive) *Escherichia coli*, *Pseudomonas aeruginosa*, *Proteus vulgaris* and *Salmonella typhosa para B* (gram - negative bacteria) supplied by Haffkine Bio-pharmaceutical Corporation Ltd., Bombay. The bioassay was conducted as described by Padmini (1986) using hydrolysed and free phenolic substances.

After 10-12 hours, the zone of inhibition produced around the paper disc was measured. Controls did not show inhibition zones.

Results and Discussion

Hydrolysed phenols exhibited highest antibacterial activity. Both the phenolic substances inhibited the growth of gram-positive bacteria. *S.aureus* was highly sensitive to hydrolysed phenolic substances. Out of gram-negative test bacteria, only *Pseudomonas aeruginosa* was a little sensiive to hydrolysed phenols. Both the phenolic substances showed trace or no activity against all gram-negative bacilli used (Fig).

Phloroglucinols, acrylic acids, phlorotannins, polyphloroglucinols, diphenylether, polyphenolic ethers and bromophenols were isolated and identified (Globitza *et al*. 1973, 1974 & 1976) from Fucales, Laminariales and Rhodomeleaceae. All these

compounds possess antimicrobial properties. Thus the above mentioned studies support the present investigation as *S. Johnstonii* exhibited antibacterial activity. However a detailed comprehensive study is required on this aspect.

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