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BRYOPHYTES AS CANDIDATES FOR ANTIBIOTIC DISCOVERY: A REVIEW WITH EMPHASIS ON INDIAN SPECIES

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Abstract: Bryophytes are second-largest group of terrestrial plants, comprising more than 24,000 species. They occupy nearly every terrestrial habitat except the sea. Although they lack the physical barriers of vascular plants, they are rarely damaged by herbivores or pathogens. This resilience is attributed to their production of a wide range of secondary metabolites that also protect them against abiotic stresses. Several extracts and isolated compounds from bryophytes have been reported to inhibit fungi and both Gram-negative and Gram-positive bacteria. Bryophytes have long been used medicinally in China for diseases of bacterial origin; their use elsewhere, however, is uncommon and the chemical and pharmacological profiles of most species remain undisclosed. In India, bryological research has traditionally concentrated on systematics and the antimicrobial research is comparatively recent. This review examines the antimicrobial evidence for bryophytes, with emphasis on studies of Indian species. The review also assesses what is required to move from crude-extract screening to validated leads. In vitro inhibition by crude extracts is an initial screening result, not evidence of therapeutic efficacy and bryophytes are therefore best considered as candidates for further study rather than as established antibiotic sources.

Keywords: Antimicrobial activity, Antibiotic, Bryophytes, Secondary metabolites

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A MODIFIED CTAB-BASED PROTOCOL FOR EFFICIENT ISOLATION OF HIGH QUALITY RNA FROM SECONDARY METABOLITE RICH RHIZOMES OF *CURCUMA ZEDOARIA* ROSCOE

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Abstract: Presence of high concentration of secondary metabolites in *Curcuma zedoaria* rhizomes hampers the extraction and purification of high quality total RNA, which is pre-requisite for transcriptome and gene expression studies. The main challenge is with its rhizome tissues which are rich in polyphenolics, polysaccharides and tannins, that results in poor RNA yield both in quality and quantity, due to their co-precipitation and enzymatic degradation that further limits their use in molecular processes. Thus, development of a simple, convenient and affordable approach for RNA isolation from *Curcuma zedoaria* rhizomes is necessary to facilitate its molecular studies. In the present study, four different isolation protocols were compared to access the quality and quantity of total RNA isolated from fresh and frozen rhizomes of *Curcuma zedoaria*, where a modified Cetyltrimethylammonium bromide (CTAB) based protocol resulted in distinct and intact 28 S and 18 S rRNA bands. RNA isolated from fresh rhizomes exhibited A260/A280 and A260/A230 ratios of 1.98± 0.11 and 1.94± 0.02 respectively while RNA isolated from frozen rhizomes showed corresponding ratios of 2.08± 0.08 and 2.03± 0.04. The total RNA yield obtained from fresh and frozen rhizomes was 670.1± 0.07 µg/g and 630.8± 0.09 µg/g respectively. The results demonstrated that modified CTAB method minimizes the interference of secondary metabolites and enables the recovery of high quality RNA from *C. zedoaria* rhizomes. To best of our knowledge, this the first report describing a modified CTAB based protocol optimized for RNA isolation from *C. zedoaria* rhizomes for facilitating studies related to gene expression analysis and various molecular processes.

Keywords: *Curcuma zedoaria*, Polyphenols, RNA isolation, Secondary metabolites

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CHARACTERIZATION OF WEED FLORA AND EVALUATION OF CHEMICAL WEED CONTROL STRATEGIES FOR IRRIGATED WHEAT IN THE MIDDLE SENEGAL RIVER VALLEY

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Abstract: The objective of this study was to characterize the weed flora of irrigated wheat and to evaluate the efficacy, selectivity, and agronomic performance of chemical weed control strategies in Fanaye, Senegal, in 2022 and 2023. A randomized complete block design comprising five treatments and four replicates was used. The flora inventory identified 35 species belonging to 20 botanical families, including 26 broadleaf weeds, six Poaceae, and three Cyperaceae. Three treatments combining pendimethalin at 1.5 L/ha with different doses of 2,4-D were compared to manual weeding and an untreated control. Treatment T3 provided the best weed control but caused greater phytotoxicity. Treatment T1, with 1 L/ha of 2,4-D, offered the best balance between efficacy, selectivity, and yield, reaching 2,321 and 2,430 kg/ha, respectively.

Keywords : Irrigated wheat, Weed flora, Chemical weed control, Phytotoxicity, Yield

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CASSIA AURICULATA (L.) BASED HIGH-DENSITY PLANTATION: AN IDEAL APPROACH FOR AUGMENTATION OF NATIVE MEDICINAL PLANT DIVERSITY IN CHAMBAL RAVINES OF RAJASTHAN

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Abstract: One of the key environmental benefits of sustainable resource management strategies in any type of ecosystem is the revival of biodiversity. Due to substantial biotic and abiotic interference from open grazing and falling, the natural vegetation of non-rehabilitated degraded ravine lands was extremely limited in distribution and diversity. Despite this, there is a dearth of information on the variety of medicinal plants found in rehabilitated ravine regions, both treated and untreated. The goal of the current study is to investigate the native flora under the Cassia auriculata-based land-use system in the Chambal ravines in the Kota district (Rajasthan) in terms of plant diversity, distribution, and ethnomedical applications. An account of 67 species observed denoting 38 families of plant kingdom in the rehabilitated study area. The documented indigenous plant species mostly belong to the plant families of Euphorbiaceae, Asteraceae, Apocynaceae, Solanaceae and Caesalpiniaceae, which have high drought tolerance capacity and the ability to grow under harsh environments. The maximum revival of native medicinal understory flora was observed in the *Cassia auriculata*-based rehabilitated lands. Rehabilitation/restoration/ woody shrubs may foster/facilitate revival/reappearance of valuable native medicinal flora through litter addition and residual moisture retention using soil moisture conservation measures in the study sites. Hence, crucial attention to proper woody plant species selection is essential for rehabilitation and enrichment of ravine biodiversity. Further, implementing appropriate conservation measures is highly needed to ensure the augmentation of indigenous medicinal flora under this resource poor region for sustainable ravine land utilization.

Keywords: Ravine, Rehabilitation, Diversity, Ethnomedicinal, Ethnovetetinary, Conservation

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NEMATODE COMMUNITIES OF MANGO AND GUAVA PLANTATIONS OF KASHIPUR, UTTARAKHAND: MORPHOLOGY AND MULTILOCUS MOLECULAR ANALYSIS

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Abstract: The nematode community is an essential part of the soil ecosystem, playing several trophic roles and taking part in plant health, decay processes, nutrient recycling and biocontrol. Nevertheless, there is no data concerning diversity and host specificity of nematodes occurring in the perennial fruit orchards of the Terai belt of Uttarakhand. In the present paper, the diversity, abundance, host specificity and taxonomic composition of nematodes occurring in mango (*Mangifera indica* L.) and guava (*Psidium guajava* L.) orchards of Kashipur, Udham Singh Nagar, Uttarakhand, India have been studied. Rhizosphere soil samples were collected from various locations, and nematodes were extracted by adequate techniques. Characterisation of representative nematodes was done by morphological and morphometric traits, such as body length, width, stylet, oesophagus, reproductive system, tail structure, etc. Special attention was paid to the analysis of plant-parasitic nematodes, especially root-knot nematodes, along with free-living and entomopathogenic nematodes. To ensure accurate species determination, representative nematode specimens were characterised at the molecular level by the analysis of ribosomal and mitochondrial gene loci (ITS, D2-D3 domain of 28S rRNA, 18S rRNA, COI). The present study presents an overall view of nematode communities in relation to two economically important fruits and provides the baseline information on nematode diversity, host preference and molecular affinities in the region of Kashipur. The results of the study will be helpful in the identification of important plant parasitic nematodes and also serve as the basis for future studies related to nematode ecology and management.

Keywords: Fruit orchards, Guava, Mango, Morphometrics, Phytonematodes