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Research Paper

A PRELIMINARY PHYTOCHEMICAL STUDY OF SALVINIA MOLESTA, NORTH PARAVUR, ERNAKULAM, KERALA, INDIA

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Abstract

Salvinia molesta D. S Mitchel belonging to the family Salviniacea is potentially serious aquatic weed that is indigenous to South East and Brazil, but has been widely distributed to many parts of the world. The study aimed at a quantitative phytochemical screening of plant extract. Phytochemical component study included total carbohydrates, total soluble protein, tannin, total carotinoids, alkaloids, falavonoids, terpinoids, saponin and phenol. Among the studied components carbohydrates showed the highest in quantity where as phenol is the lowest.

Key words: Screening, phytoconstituents, quantitative, water fern.

INTRODUCTION

Salvinia molesta D. S Mitchel (Salviniaceae) is a potentially serious aquatic weed that is indigenous to. South eastern Brazil, but has been widely distributed to many parts of the world. (Mitchell *et al*. 1975; Mitchell *et al*, 1980). Under favorable conditions, this floating water fern can become a devastating aquatic nuisance disrupting native species as well as human activities by rapidly covering large areas. (Forno *et al* 1979). Dense mats of giant salvinia interfere with rice cultivation, dog fishing nets, and disrupt access to water for humans, livestock, and wildlife (Mitchell, 1979) and recreation, transportation, irrigation, hydroelectric generation and flood control are also hampered (Jolm *et al* 1977). Common name of *Salvinia molesta D. S Mitchel* include Giant salvinia, African payal, Kariba weed, butterfly weed, and aquarium water moss. (Mitchell *et al*, 1972).

The medical properties of the plant is due to the presence of some special compounds like alkaloids, flavanoids, phenols, tannins and saponins. These active principles usually remain concentrated in the storage organs of the plants viz roots, leaves etc. Considering all these facts, present investigation is designed to find out phytochemical analysis of *salvinia molesta D. S Mitchel*.

Morphology

Salvinia molesta D. S Mitchel is a free floating aquatic fern, up to 20cm long. Horizontal rhizome lies below the water surface. Fronds are of two types, buoyant or submerged, light

green to medium green, with brownish edges when mature, with a distinctive fold in the center. Floating leaves are boat shaped, up to 2.5cm long and 3.5cm wide upper surface has even rows of papillae, each with a tuft of hairs at the distal end, joined together at the tips into a form similar to an invested egg beater. The cage like structure of the end hairs gives the plant bnoyancy in water (Sota, 1962, Mitchell *et al*, 1972, Forno, 1983). The primary form occurs as isolated plants in the initial invading stage of an infestation, that are with oval leaves less than 15mm wide and lie flat on the water surface. The secondary form occurs when plants have been growing over open water for some time, either freely or on the edge of stable mats. The entire lower leaf surface is in contact with the water. Their internodes are longer, with larger boat shaped (slightly keeled) leaves that have rounded apices and are variable in size, but are normally between 20mm and 50mm wide. The tertiary form occurs when plants are growing in crowded mat conditions associated with mature infestations. Their internodes are short with large heart shaped or oblong and deeply keeled leaves up to 60mm in width when fully opened. The undersides of adjacent leaves are in contact with each other (Julien *et al*. 1986).

Distribution

Salvinia molesta D. S Mitchel continued to be spread by man to other warm regions of the world. In the Sepik river flood plain of Papua New Guinea, a few plants introduced in 1972 grew in 8 years into mats covering 250km^2 and weighing 2.2 million tons. The lives of about 80,000 people who were almost entirely dependent on canoes for transport and food were severely affected (Thomas *et al* 1986). Giant Salvinia has been introduced to other parts of the world as an aquarium plant (Austral Nat. Parks Wildl. Servo 1992) and has become established in India (Cook, 1976); Austalia (Creagh, 1991, 1992) and Papua New Guinea; Major infestations and problems have occurred in the Chobe-Linyata Kwando river system, the Zambezi river, and lake Naivash in Africa, Lake Moondara in Australia. The Sepik river in Papua New Guinea and the Kakki reservoir in India (Mitchell, 1979). Giant salvinia is on the U.S department of Agriculture (USDA), included in the noxious weed list and the Florida Department of Environmental protection in the prohibited Aquatic plant list (Nelson, 1984).

Giant *Salvinia* is one of the most serious plant management problems in the world and in particular our country's most pressing ecological problem. *Salvinia* reduces the concentration of nutrients and oxygen, and raises carbon dioxide and hydrogen sulfide concentrations of water leading to the decrease in water quality. The need of this study is of identify, isolate and quantify, some of the medically useful phytocompounds in existing invasive species and subsequent development of these species as medical or pharmaceutical crops would stimulate harvest and utilization and also to assess the possible environmental impacts of an integrated approach to eradicate and prevent the spread of giant *Salvina*. Other attempts to control eradicate *salvinia* through chemical and mechanical means have failed and may lead to an environmental backlash caused by the introduction of chemicals or bio agents into the ecosystem. Phytochemical investigations on this plant will enhance its utilization on a larger scale which in turn will help in controlling the species to some extent.

MATERIALS AND METHODS

The whole plant was collected from canals, ponds, and wells of North Paravur, Ernakulam district. The plant was washed thoroughly 2-3 times with tap water and distilled water to remove the soil and dirt particles. Preliminary Quantitative phytochemical analysis for the presence of various compounds like total carbohydrates total soluble protein, tannin, total carotenoids, alkaloids, flavanoids, terpenoids, saponin and phenol were performed by standard methods by Hodge & Hofreite., 1962, Lowry and Resebrough., 1951, Makkar *et al*., 1993, Zakaria *et al*., 1979, Anjanal *et al*., 2012, Zhisen *et al*., 1999, Ferguson., 1956, Hiai *et al*., 1976, Asis.,. 1989.

The primary objective of the present study was to affirm that this plant, one of the most noxious invasive species in the world, has promising medical potential that could provide a novel approach to controlling the species as pernicious weed with the further objective of evaluating

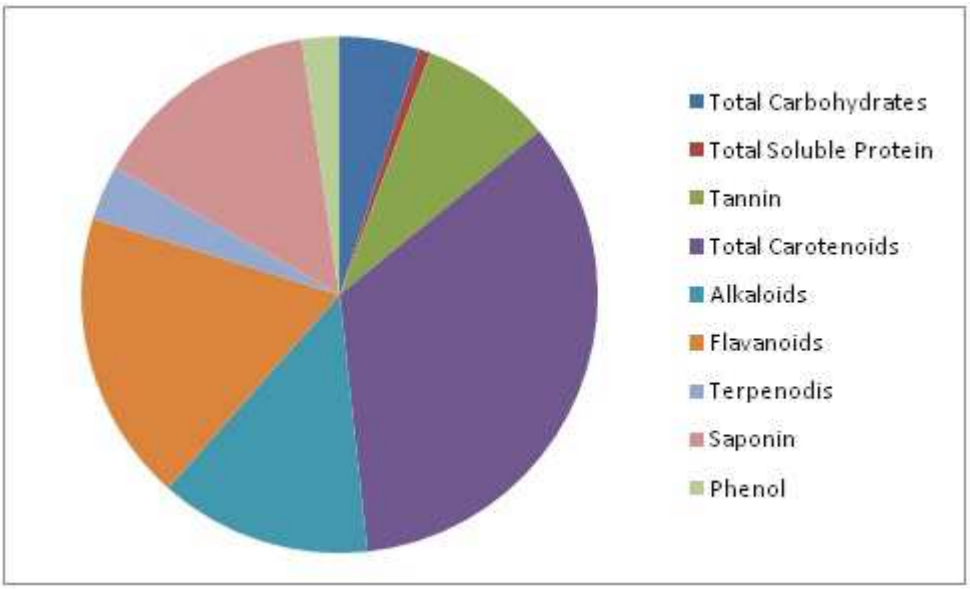
the efficacy of this plant, when compared with the known phytochemical and modern research based pharmacological activity studies on this plant.
This research was important because the plant is an aquatic weed causing environmental havoc and study of the plant itself is an effective and environmental approach. The present study revealed that there are a number of biologically active compounds in this plant which could be of medicinal and pharmacological value. Exploring the possibilities of utilizing the plant for medicinal use and application would help in reducing the impact on the ecosystems.

RESULT AND DISCUSSION

Plants produce secondary metabolites not simply to adapt to their environment but also to resist themselves against several environmental stresses and also for the process of co-evolution with various interacting organisms (Zakaria *et al*., 1979). The secondary metabolites produced against the various adverse environmental condition s are flavonoids, alkaloids, polyphenols, terpenoids, quiones, steroids and polysaccharides (Zhishen *et al*.,1999). The pteridophytes, comprising ferns and fern allies like the *salvinia molesta*, are one of the oldest land plant group on work and constitute a vast group of vascular cryptogams. Many ferns were used for medicinal purposes by the early Greeks and Romans and through the middle ages. (Shakoor A Mir *et al*., 2013). Literature studies had revealed that *salvinia* has promising medical potential that could provide a novel approach to controlling the species. Recently a team of Researchers at Stephen F Austin state university discovered that extracts of giant *salvinia* can effectively inhibit the growth of human tumor cells with minimum damage to normal cells (Suvarnalatha Devi *et al*., 2015). Studies carried out also revealed the antioxidant and determined its efficiency in phytoremediation to remove water pollutants and heavy metals. Studies further manifested that environmentally, economically and socially destructive invasive plant species in the world could also be one of the potential drugs in solving many health related problems. In addition a quantitative analysis of the presence of alkaloids, phenols, tanins, and saponins were also performed. In the present investigation a quantitative analysis of phytochemicals such as total carbohydrates, total soluble protein, tannin, total carotenoids, alkaloids, flavanoids, terpinoids, saponin and phenol has been done. Numerous evidences gathered in earlier studies also confirmed the presence of bioactive phytochemicals in *Salvinia molesta D. S Mitchel*. The results obtained in the present study are encouraging and will give impetus for further research in phytochemical screening and extraction.

Table 1. Phytochemical analysis of *Salvinia molesta D. S Mitchel*

Sl. No.	PHYTO CONSTITUENTS	RESULT IN UNITS	TEST METHOD
1	Total Carbohydrates	13.2 Mg/g	Hodge & Hofreite, 1962
2	Total Soluble Protein	1.86 Mg/g	Lowry and Resebrough, 1951
3	Tannin	22 g /g	Makkar et al., 1993
4.	Total Carotenoids	90 g /g	Zakaria et al., 1979
5.	Alkaloids	35 g /g	Ajanal et al., 2012
6.	Flavanoids	48 g / g	Zhisen et al., 1999
7.	Terpenodis	9g /g	Ferguson, 1956
8.	Saponin	38 g /g	Hiai et al., 1976
9.	Phenol	6.2 Mg/g Expressed as pyrogallic acid	Asis, 1989



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