Research Article

Growth Inhibitory Study of *Typha domingensis* Rhizome Aqueous Extracts on Gram Seeds.

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ABSTRACT

Typha domingensis is a plant available in areas. The present study was to ascertain the possible inhibitory effects of aqueous extracts of rhizomes of *Typha domingensis* on the germination of gram seeds. This study showed that preliminarily at certain particular concentration there was good germination of seeds where as the germination is hindered at lower or higher doses. It was concluded that the aqueous extract of *Typha domingensis* does have some inhibitory effect on the germination of gram seeds.

Keywords: *Typha domingensis,* Rhizomes, Germination, Gram Seeds, Inhibitory effect.

INTRODUCTION

Typha is common in the warm temperature and tropical regions of the world always found in or near water, in marshes, ponds, lakes and depressions. In Florida public waters, *Typha domingensis,* is the most dominant emergent aquatic plant species.[1] Several factors allow *Typha domingensis* to accomplish this opportunistic expansion, including size, growth habit, adaptability to changes in their surroundings, and the release of compounds that can prevent the growth of other species.

It is known that some chemical compounds that this plant releases into surrounding waters. Cattail phytotoxins include fatty acids (linoleic and a-linolenic acid) and phenolic compounds (caffeic, *p*-coumaric and gallic acid).[2] Both extracts and phytotoxins isolated from extracts have the potential to inhibit the growth and chlorophyll production of several species. Prindle and Martin (1996) found that aqueous extracts from different portions of cattail inhibited growth of lettuce and radish seeds, the same extracts also inhibited oxygen production by *Lyngbya majuscule*.[3]

It was also shown that aqueous cattail extracts inhibit the growth of Salvinia (*Salvinia minima* Baker and reduce its rate of oxygen production.[4] A short-term exposure bioassay showed that oxygen production by *Valisneria Americana* Michx., *Elodea canadensis* Rich., and *Myriophyllum spicatum* L. was also inhibited by exposure to aqueous cattail extracts.[5]

A closely related cattail species (*T. latifolia*), which produces similar phytotoxins, has been shown to inhibit algal growth *in vitro*.[6]

In order to further clarify the mode of action of cattail-derived substances on ecological targets, Maria investigated the cellular effects after exposing germinating roots to cattail extracts and further microscopy studies have been a very useful tool to elucidate the mode of action of natural toxins at the cellular level.[7]

Comparison of affected and unaffected tissue can easily reveal subtle changes, including loss of membrane integrity, changes in starch allocation, degradation of ribosomes, and protrusion of mitochondrial membranes.[8] A limited number of sensitive, diagnostic bioassays are available to characterize and define the mode of action of compounds produced by aquatic weeds. The present study also involves in identifying the role of the aqueous extracts of *Typha domingensis* in germination of gram seeds.

MATERIALS AND METHODS

Collection of samples

The medicinal plants used for the experiment were whole plants of *T.domingensis* collected from the nearby marshy areas near Sholinganallur, Chennai (Figure 1, 2, 3). The plants were identified and a herbarium is deposited at Sidha central research Institute at Chennai, India, was and authenticated by Dr. Sasikala, Scientist, in TamilNadu.

Figure 1: *T.domingensis*

Figure 2: rhizome of *T.domingensis*

Figure 3: *T.domingensis*

Effects of Aqueous extract of T.domingensis on germination of gram seeds

The rhizomes of T domingesis was collected from perennial marshy areas near Sholinganallur, Chennai. The rhizomes were cleaned several times with water and then with Distilled water. The rhizomes were cut in to small pieces and about 10 gm. of these pieces were ground in 10 ml mixture of distilled water and phosphate buffer thoroughly. This mixture was than centrifuges and the supernatant was collected and filtered twice with Whattman filter paper No.1. This filtrate was used to find out whether it supported the germination of gram seeds at different proportions as mentioned below:

a. Raw filtrate alone.

b. Raw filtrate 9 ml+1 ml Distilled water

c. Raw filtrate 8.5 ml + 1.5 ml water

d. Raw filtrate 8 ml + 2 ml water

This method was followed as it was not possible to ascertain the concentration of raw extract by weight. The results indicated that at the proportion of 8.5 ml extract the germination was supported. At 8 ml extract proportion seed coats were removed and there was swelling of the seeds. All other proportions of extract did not show any germination activity and the seeds started getting spoiled. The results of the germination of gram seeds after treatment with various concentrations of aqueous extracts is tabulated in Table 1, and in Figure 4.

RESULTS AND DISCUSSION

Figure 4: Photographs representing the seed germination profiles due to treatment with *T. domingensis* aqueous extract

From the above results the following conclusions could be drawn.

The germination experiment indicates that at certain concentration only the aqueous extract supports germination and seed growth whereas in others concentrations whether higher or lower it inhibits the growth and germination of the gram seeds.

Our results differ with similar report by Maria in which it was shown that the root caps growth was severely inhibited.[7]

This difference could be attributed to the fact that we have taken the entire gram seed and studied the results whereas they have exposed only the root tip.

It could also indicate that the metabolic reactions at the root tips and that of the whole seed might differ and thus this difference of results.

Table 1: Seed germination profiles due to treatment of *T. domingensis* rhizome extract.

Serial number	Extract proportion Extract : distilled water	Parameters examined	Green gram (*Vigna radiata)*	White gram *(Phaseolus lunatus)*
1.	Crude extract (10ml)	➢ Swelling ➢ Seed coat removal ➢ Germination	_ _ _	_ _ _
2.	9ml:1ml	➢ Swelling ➢ Seed coat removal ➢ Germination	_ _ _	_ _ _
3.	8.5 ml:1.5ml	➢ Swelling ➢ Seed coat removal ➢ Germination	+ + +	+ + +
4.	8 ml:2 ml	➢ Swelling ➢ Seed coat removal ➢ Germination	+ _ _	+ _ _

Further work is warranted to prove the reasons for the different behaviour of the plant extract on the germination of gram seeds.

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