EFFECT OF ALLELOCHEMICALS FROM *CRESSA CRETICA* L. ON *IN VITRO* POLLEN GERMINATION OF *CAJANUS CAJAN* (L.) MILL SP

Kumbhar B. A.[1] and Patel G. R. [2]

[1]Department of Biotechnology, Sheth M.N. Science College, Patan (Gujarat) India.
[2]Department of Chemistry, Sheth M.N. Science College, Patan (Gujarat) India.
grpatel21@gmail.com

ABSTRACT

Cressa cretica L. belonging to family Convolvulaceae, commonly known as Boknu is a erect, small, dwarf shrub, usually grows in sandy or muddy saline habitats. Brew baker and Kwack's basal medium was used for germination of pollen grains. At low concentration (5% and 10%) of water extract of *Cressa cretica* plant (WEC) reported minimum inhibitory effect i.e., 57.84% 42.78% respectively on *in vitro* pollen germination of *Cajanus cajan*. The maximum reduced pollen germination was observed under 75% concentration of leaf extract (8.69%) and pollens were no germinated on 100% of WEC as compared to control (70%) after 15 minutes. The aerial parts of *Cressa cretica* L. yielded five flavonoids that were identified.

Key words: *Allelochemicals, Germination, Boknu, Pollen, Pigeon pea.*

INTRODUCTION

Chemicals that originate from plants or microorganisms impact many organisms in the ecosystem, but the term allelopathy has most often referred to the activity of these chemicals on other plants or microorganisms (Enhellig, 2002). Many of the phytotoxic substances suspected of causing germination and growth inhibition have been identified from plant tissues and soil. A wide array of these compounds is released into the environment in appropriate quantities *via* root exudation and as leachates during litter decomposition. Most of these are phenolic compounds and are implicated in allelopathy, a process which includes the direct or indirect detrimental effect of one plant on the germination, growth and development of another plant (Zaprometov, 1992). Plants produce a large variety of secondary metabolites like phenols, tannins, terpenoids, alkaloids, polyacetylenes, fatty acids and steroids, which have an allelopathic effect on the growth and development of the same plant or neighboring plants. Considerable knowledge has been obtained concerning the chemicals involved in allelopathy (Rice, 1984; Narwal and Tauro, 1994).

In vitro germination techniques have been used extensively on a variety of pollen systems. Such studies have provided considerable information the physiology and biochemistry of pollen germination and pollen tube growth (Shivanna and Johri, 1985, Heslop and Harrison, 1987, Steer and Steer, 1989). *Cajanus cajan* commenly known as Pigeon pea, Tur belonges to family papilionaceae which is small, erect shrub, leaves are imparipinnate stipules awl-shaped Flowers (Dec-Jan) yellow marked with redish blue, stamens 10, diadelphous. Ovary sub sessile, ovules 3-4, with maroon, biconvex. *Cressa cretica* commonly known as Bokno belongs to family convolvulaceae which is small, hairy, erect herb, leaves ovate, acute, hairy, flowers (Nov-Dec) white or pink in axillary clusters, bracts , stamens 5, exerted. Ovary 2-celled, ovules 4, styles 2, free.

MATERIALS AND METHODS

The powder of sun dried root, stem and leaves of *Cressa cretica* weed plant were used to prepare the aqueous extracts. The extracts were filtered through Whatman No. 1 filter paper. A concentration series of 5%, 10%, 25%, 50%, 75% and 100% for each extract was prepared by taking powder of dried weed material and DDW in different ratio W/V (Weed material : DDW). The extracts were filtered and stored in room temperature at 25 °C $\pm$ 5 °C) prior to use.

During the peak of flowering period of *Cajanus cajan* belonging to Papilionaceae polliniferous material was collected in large quantity from cultivated fields of Patan district. Pollen culture media was prepared according to standard method of Brewbaker and Kwack, 1963.

The pollen grains were germinated by suspension method. The germination was scored after 15 minutes at room temperature in humid chambers using different concentration of *Cressa cretica* water extract (Weed plant). Data reveled at each stage of pollen germination and tube growth were an average of three replicates.

RESULTS AND DISSCUSSION

Pollen viability of *Cajanus cajan* (Papilionaceae) has been examined in different conditions as 2%, 4% and 6% concentration of weed plant parts (root, stem and leaves) water extract. In control medium 70% of pollen germination has been observed. Out of three weed plant parts in 5% and 10% concentrations of stem extract reported minor inhibitory effect (57.84% and 42.78%) whereas in 75% concentration of leaf extracts showed maximum decline (8.69%) on the pollen germination.

It has also been observed that as the concentration of all the extracts of *Cressa cretica increases*, the pollen germination is regularly decreased in *Cajanus cajan*. The following **table** and **figure** represents the percentage of pollen germination in different concentration of weed plant in *Cajanus cajan*.

Table 1: The percentage of pollen germination in different concentration of *Cressa cretica* on *in vitro* pollen germination of *Cajanus cajan*

Weed plant parts	Root	Stem	Leaf
Concentration	% Pollen germination		
Control (0%)	**70**	**70**	**70**
5%	56	57.84	49
10%	38.22	42.78	27.78
25%	35	31.84	22
50%	20.71	20.93	11.52
75%	16	12.63	8.69
100%	2.34	1.08	0

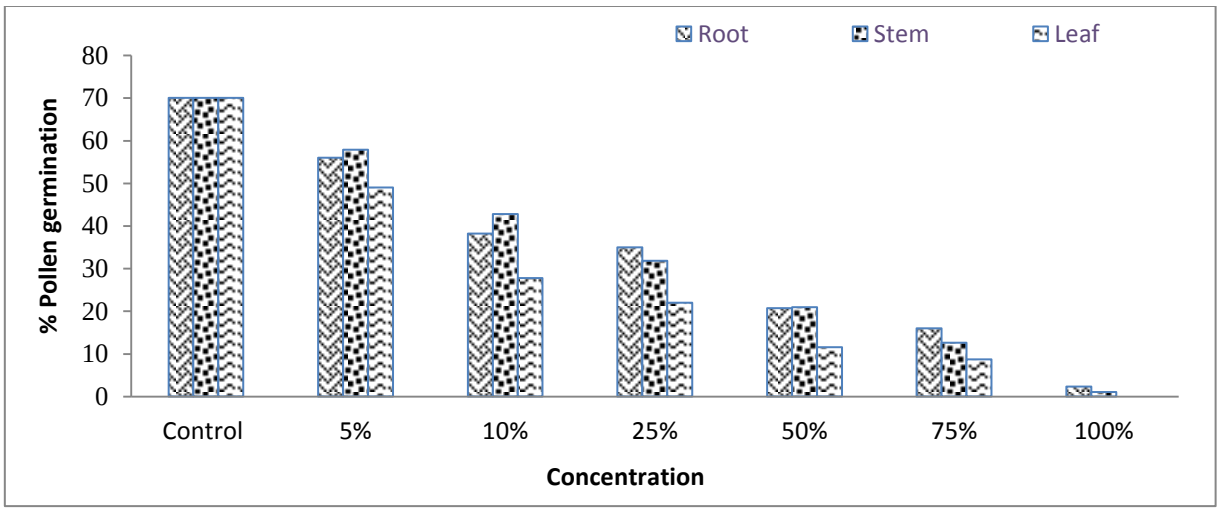

Fig. 1: The percentage of pollen germination in different concentration of *Cressa cretica* on *in vitro* pollen germination of *Cajanus cajan.*

In low concentration of all extract showed almost negligible effect a compare to the control but after that germination percentage decreased slowly when extract concentration was increased and in 75% concentration of root and stem extracts observed higher inhibitory effect (16% and 12%) on the pollen germination of *Cajanus cajan* after 15 minutes. Pollen grains were no germinated at 100% concentration of all extracts of *Cressa cretica*. In various concentration of stem extract influence lower inhibitory effect whereas leaf extract showed higher inhibitory effect on pollen germination of *Cajanus cajan*.

It was observed that culturing of pollen allelochemicals treatment resulted in low germination percentage which might be due to considerable leakage of metabolites. Earlier this view was opined by Hoekstra and Bruinsma (1975 a), Sivanna, Heslop, Harisson (1981) and Sivanna *et al.,* (1984). They reported that none of the 3-celled system so far germinated in vitro required special condition like controlled hydration or special nutrients for germination. Similar studies in 3-celled taxa were also reported by Pfahlar (1965), Rao and Ong (1972), Ferrari and Wallace (1975) in Cecale cereal, *Asclepias currasavica* and*Brassica oleracia* respectively.

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