Research Article

# Allelopathic Effects of Fencing Plants on Cereals and Pulses

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**ABSTRACT**

Allelopathic effects of two fencing plants were studied on seed germination and sprouting of seedlings of Local Rice, Scented rice, Zea mays, local gram, mung bean and cowpae. for this study 1% leaf extracts of Vitex negondo and Gliricidia sepium were used. Percent germination as well as seedling growth of test crops was significantly lowered by the aqueous leaf extracts of fencing plants. While on an average Rice, Scented rice, Zea mays and gram were equally sensitive to toxic response. The extract of fencing plants significantly inhibited the seeding growth of Rice, Zea mays, mung bean and cow pea, while the extract was stimulatory to seedling growth of gram.

**Key words:** Allelopathy, Vitex and Gliricidia.

## INTRODUCTION

Although live fencing systems are very old and traditional, the extent of the many potential benefits and the tribal systems are currently not documented. We can learn a lot from tribes who have been using only live fences in their various fields. Wayanadu, being an agrarian district with rich biodiversity, wide ranging agroclimates and in- habited by many indigenous communities experienced in agroforestry, supports a variety of live fence species and systems. Studies on live fence in Wayanadu have been restricted to isolated trials of promising fence species or characterization of species with ability to be used as fence Hegde . However, very little effort has been made to document this unique fencing practice existing in this district.

Allelopathy as a natural phenomenon in plant – plant interaction plays an important role in agroecosystem. Rice (1984) defined allelopathy as ability of one plant to stimulate or inhibit the growth and development of neighbouring plants by secreting secondary compounds in to the environment. Allelopathic effect is a complex and can involve the interaction of different classes of chemicals like phenolic compounds, flavonoids, terpenoids, alkaloids, steroids and amino acids. With mixture of different compound sometimes having a greater allelopathic effect than individual compound these compounds are known as allelochemicals. Yamane (1992) have reported plant residues, leachates and root extracts can be the main source of allelochemicals. The plants selected for present work are Vitex negondo and Gliricidia sepium which are used for fencing the crop field to protect crops from domestic and wild animals. In many parts of Wayanadu fencing plants have been reported by farmers to inhibit seedling growth in field crops and hence this study on allelopathic effect on crop plants was planed. Elakovich and Wooten (1996) state that dried leaf aqueous extract of vitex negondo contain P-29adical29 bezoic acid, P- coumeric acid, furalic acid, vanillic acid, syrengic acid and 10 of flavonoids.

Allelochemicals from *Gliricidia sepium* were extracted, identified, and quantified using HPLC by Ramamoorthy and Paliwal 1993. Fifteen toxic compounds, namely gallic acid, protocatechuic acid,*p*-hydroxybenzoic acid, gentisic acid, *B*-resorcyclic acid, vanillic acid, syringic acid, *p*-coumaric acid, *m*-coumaric acid, *o*-coumaric acid, ferulic acid, sinapinic acid (*trans* and *cis* forms), coumarin, and myricetin were identified and quantified.

The crops selected for the present study are pulse crops – mungbeen (Vigana radiata), cowpea (Vigna unguiculata) local gram (Cicer arietinum).Cereals include

Rice (Oryza sativa), scented rice (Oryza sativa sps) and zea mays. These crops are grown in many parts of Wayanadu and hedged

by the Glyricidia and vitex. These fencing plants remain for many years on crop fields sides and their foliages are continuously add organic matter in soil of field sides hence efforts have been made to study allelopathic effects of fencing plants on crop plants the experiments were conducted to study the effect of aqueous extract of dried leaves of these fencing plants on the germination and seedling vigour of six test crops.

## MATERIAL AND METHODS

Allelopathic study of two fencing plants was done on six major crops. To observe effect of leaf exract on germination of seed and seedling growth sheded senescent leaves of fencing plants lantana camera and vitex negundo were collected from the crop field sides. Collected leaves were washed with tap water to remove soil particles and rewashed with distilled water and dried at 60˚ c for 24 hours in ovan. The dried leaves were finely powdered in electric grinder and used for preparation of extract. One gram of powder of senescent leaves of each plant was mixed separately in to 100 ml sterilized distilled water in conical flask and kept for 24 hours. The solutions were then filtered through double layer muslin cloth. The filtrates were used as extract of 1% concentration for allelopathic studies. The extraction was done according to Nelson *et. al* (1960).

Seeds of test crops cereals and pulses were obtained from seed lots of farmers. Seeds of crops were first treated with surface sterilent 0.1% mercuric chloride solution and repeatedly rinsed in distilled water. Sets of 20 seeds each were arranged for each crop. The germination studies were carried out by standered petriplate method. Surface sterilized seeds of test crops were placed in 10cm dia petridishes autoclaved, lined with two filter papers and 5ml extract of each plant was used to moisten the paper in respective petridishes, 5ml distilled water was used to moisten the control set. These petridishes then kept in germinator at normal temperature. After 48 hours incubation observations were made for germination percentage and result were recorded. The emergence of radical was considered as criterion for seed germination. The seedling growth (root and shoot length fresh and dry weight ) was recorded after 8 days of sowing. The seedling growth was determined from ten randomly selected seedlings per petridish and their mean values were recorded after measuring root and shoot length and fresh weight their biomass was dried in oven at 60˚c overnight and dry weight was recorded.

## RESULTS AND DISCUSSION

The purpose of this study was to evaluate the effect of aqueous extract of vitex and Glyricidia on seed germination and seedling growth of Rice, Scented rice, Zeamays, mungbean and cowpea. To know the allelopathic effect 1 % aqueous leaf extract of each fencing plant and control were used. Percent germination of test crop was significantaly lowered by the aqueous leaf extract of fencing plants while on an average Rice, Scented rice and Zeamays, were equally sensitive to toxic response of fencing plants and cowpea and mungbean germination was stimulated. The extract of vitex negondo significantly inhibited the seeding growth of Rice, Scented rice and Zeamays,, while the extract was stimulatory to seedling growth of cowpea and mungbean The extract was more inhibitory to root length as compared to shoot. In all test crops and dry weight significantaly reduced. The Glyrecidia extract was stimulatory to mungbean seedling only. The extract was more inhibitory to seedling growth of Rice, Scented rice and Zeamays, dry weight of cereals was increased while in pulses dry weight was reduced.

**Table 1: Germination percentage of test crop seeds in aqueous leaf extract of Fencing plants**

| crop | Control | Vitex germination | Glyrecidia germination |
|---|---|---|---|
| Rice | 95.00 | 37.00 | 55.00 |
| Scented rice | 98.00 | 85.00 | 86.00 |
| Zea mays | 90.00 | 90.00 | 76.00 |
| Mung bean | 28.00 | 36.00 | 46.00 |
| Cowpea | 38.00 | 53.00 | 46.00 |
| Local gram | 38.00 | 16.00 | 27.00 |

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