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RESEARCH ARTICLE

FRESH WEIGHT CHANGES ON *Vigna mungo* AND *Vigna radiata* BY ALLELOPATHIC EFFECT OF *Tectona grandis*

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ABSTRACT

In plant produced phytotoxic allelopathic effect of *Tectona grandis* investigated on *Vigna mungo* and *Vigna radiata*, dried leaves of *Tectona grandis* were collected from coastal area of Cuddalore District..50g powder of teak leaf was soaked in distilled water and after 24hrs filtered with help of WhatmannNo.1 filter paper used to prepare extract .Using this stock solution various concentrations (5,10,25,50,75 and 100%) were prepared and sterilized 50 seeds of *Vigna mungo* and *Vigna radiata* were placed in sterilized petridishes .Five seedlings from each replicate were selected for recording the fresh weight on 15th day after sowing. Influenced allelopathic effect was observed in 5% concentration of extract treatment than control and in all other concentrations it shows gradual inhibitory effect on both crop seedlings.

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INTRODUCTION

Organisms interact with their Biotic environment through secondary natural substances. Such substances are allelochemicals or semichemicals. These chemicals and their intra- and inter-specific functions such as chemical signals, toxins, attractants or allelopathics are very important for the diversity of life.Molisch (19) coined the term allelopathy which refers to biochemical or chemical interactions between all plant organisms including the fungi and bacteria. Allelochemicals may be produced by any part of the plant such as roots,leaves,pollens,seeds or fruits.Localization of inhibitors may be affect the rate and duration of their efflux and subsequently their allelopathic potential. The nature of allelochemics leached from seeds may change during emanation. Production of allelochemicals by plants through to be involved in interaction of higher plants with pathogens,insects,nematods and other organisms.Besides interspecific influences,some inhibitors also induce intraspecific effects or autoallelopathy.Many species of plants,which have been widely used in medicine and are known to have powerful medicinal effects,have pronounced allelopathic effects also.Grimmer and muller restricted it to the mutual ,mostly inhibiting and more rarely stimulating influence on higher plants.The cause for allelopathic effects is the release of potentially phytotoxic substances from a species of plants may be greately changed by micro organisms in the rhizosphere.

MATERIALS AND METHODS

Materials

The pulses *Vigna mungo*,L.(Black Gram) and *Vigna radiate* L. (Green Gram) have been selected for the present study.In this present investigation, the allelopathic effect of the leaf powder extract of *Tectona grandis* Linn.f. on the germination of *Vigna mungo* L. and *Vigna radiata* L. were studied. All the experiments were conducted in the Physiology laboratory of the Department of Botany,Annamalai University,Annamalai Nagar. The dried leaf of *Tectona grandis* was collected from the coastal area of Cuddalore district; and they were again dried and powdered with the help of powder willey machine.

Collection of Seed Material

The pulses seeds of *Vigna mungo* L and *Vigna radiata* L.were procured from Tamil Nadu Rice Research station,Aduthurai.Seeds with uniform size,colour and weight were selected and stored in metal tins as suggested by Rao(1976).

METHODS

Preperation of Extract

The 50g powder of Teak leaf was soaked in 500 mi of distilled water. After 24 hours, they were filtered with the help of What

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Mann No.1 filter paper and pure extracts of leaf were obtained.Using this stock solution, various concentration of extract (0,5,10,25,50,75,100%) were prepared by using distilled water and used for the present study.

Seeds germination

Fresh weight studies conducted with the Black gram Var.ADT-3 and Green gram Var.Co.3.The methods of germination studies were carried out as recommended by International Seed Testing Association (1979).The seeds were sterilized for two minutes in 0.2% mercuric chloride (HgCl 2) solution. The seeds were then thoroughly washed under tap water. The sterilized fifty seeds were arranged equi-specially in sterilized Petri dish lined with filter paper. In each Petri dish to uniform seeds were placed and irrigated. Each Petri dish was irrigated uniformly by different concentration of Teak leaf in the respective petri dishes. In addition to this, petri dishes containing seeds were irrigated with distilled water and maintained as control. Each treatment including control was replicated three times. The petri dishes were kept under diffused light at room temperature(28± 2°C).Five seedlings from each replicate were selected for recording the morphological parameter such as fresh weight by using electronic balancer on 15th day after sowing.

RESULTS AND DISCUSSION

Inhibition of fresh weight increment in Black gram and Green gram was caused by the aqueous leaf extract of *Tectona grandis*. Inhibitory effects of both Black gram and green gram seedlings are presented in charts 1, 2 and 3. The uptake of active compounds by plants of another species may induce more or less distinct inhibitory effects during the germination and development.It depends on the compounds involved,their concentration and stability in the given environment and plant response to the compounds or their microbial by-products. Kommedahl *et al.*(1959) reported that Fresh and dry weights of alfalfa were less when ground rhizomes of quackgrass or water extracts of the rhizomes,were added to soil.

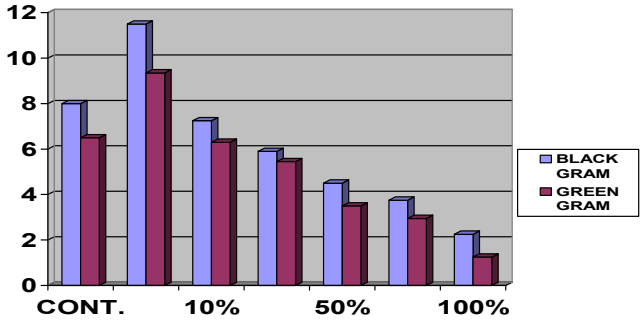


Fig. 1. Fresh weight changes on *Vigna Mungo* and green gram leaf by Allelopathic effect of *Tectona grandis* (The values are mean SE of 7samples

Beres and Kazinczi, (2000) reported that the aqueous shoot extract of *Rumex obtusefolius* and *Asclepias syriaca* reduced the fresh and dry weight of corn. In present investigation an attempt has been made to study the allelopathic effect of dry leaves of *Tectona grandis* on the germination and the seedling growth of Black gram and Green gram, which are commonly cultivated in the fields of Annamalai Nagar, Tamilnadu, during the month of November, December and January. In 5%

Table 2. Fresh weight changes on *Vigna mungo* and green gram stem by allelopathic effect of *Tectona grandis* (the values are mean se of 7samples)

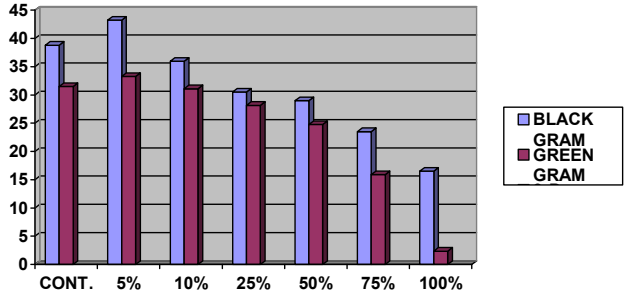
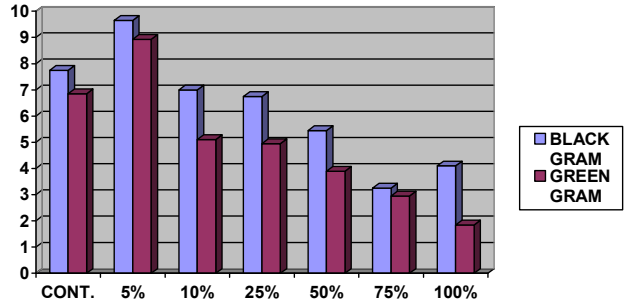


Table 3. Fresh weight changes on *Vigna mungo* and green gram root by allelopathic effect of *Tectona grandis* (the values are mean se of 7samples)



leaf extract treatment alone to increased the fresh weight. Fresh weight increased value in leaf (± 11.50), stem (± 43.25) and root (±9.65) of Black gram. In crop systems of agroecosystems, crop species are selectively cultivated but weeds themselves in crop fields and interact with the crop species in various ways, including reduction in crop yields. Allelopathic agents are changes in size and weight of test organisms. Bhowmik and Doll (1979,1982) found that water extracts of velvet leaf residues were slightly allelopathic to radicle and coleoptile growth of *Zea mays* and to hypocotyls growth of soybeans. Residues were highly allelopathic to height growth and fresh weight increase of shoots of both corn and soybeans in double-pot experiments. While in other concentrations(10,25,50,75%), the fresh weight was decreased over control .Very high inhibition of fresh weight value of leaf (±2.25), stem (±16.50) and root (±4.10) was observed in Black gram seedlings growing 100% concentrated treatment. The fresh weight of cucumber and Chinese cabbage seedlings were reduced by full strength mikania leaf extract (Ismail and Kumar,1996). Bhowmik and Doll (1979) supported the allelopathic potential of giant foxtail. The aqueous extracts of its residues reduced radicle and coleoptile growth of corn and residues incorporated in soil inhibited growth in higher and fresh weight of both corn and soybean seedlings. The same effect was noted in treated Green gram seedlings.But the inhibitory effect was higher than Black gram.The fresh weight increment shows increased value of leaf (±9.35), stem (± 33.25) and root (±8.93) in 5% treated

seedlings. This increment gradually decreased in other concentrations (10,25,50,75%).Very high decreased fresh weight value in leaf (±1.25),stem(±15.90) and root(±1.85) was observed in 100% treated seedlings of Green gram. Lucena and Doll (1976) investigated in experiments with living purple nutsedge plants and sourghum or soybean, the purple nutsedge significantly inhibite the higher and fresh weight increment of the crop plants. Bell and Koeppe 1972 reported that interference by giant foxtail in green house experiments using mixed culture treatments reduced height growth as well as fresh weight and dry weight increments of corn by as much as 90%.

Similar inhibition of fresh weight and dry weight by leaf extract has been reported in few species. The study of Kazinczi *et al.* (1997) revealed that the root residues of *Centaurea cyanus* inhibited (50%) the fresh weight of rape as compared to control. The results obtained from this study clearly revealed that the leaf extracts of *Tectona grandis* exhibited a promontory effects in fresh weight in 5% extract treatment and an inhibitory effect in all other concentrations employed over control. As the concentration of the teak leaf extracts increased the inhibitory effects also increased.The intensity of inhibition was directly proportional to the concentration of the extract employed. Molisch (1937) coined the term allelopathy includes both positive and negative influences of plants through secondary metabolism. Plant produced allelochemicals escape from the plants through exudation, leaching, volatilization and death and decay of plant parts. Allelochemicals range from simple aliphatic acids to complex Terpenoids. Phenolics, alkaloids and Steroids have different mechanisms and modes of action.

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