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Effect of *Citrus limon* (L.) Osbeck Leaf extract on Seed germination and Seedling growth of *Sorghum bicolour* (L.) Moench.

Sharanabasav Amarappa[1], Shivashankar P N[2]

Department of Botany,
Veerashaiva College, Ballari, Karnataka, India[1]
Vijayanagara Sri Krishnadevaraya University, Ballari, Karnataka, India[2]

Abstract

North Karnataka is known for the horticultural crops like grapes, lemon, pomegranate etc. and also popular for the cultivation of cereals and pulses. These horticultural crops have allelophathic effects on seed germination and seedling growth of various crop plants. In the present study, the aqueous leaves extract of *Citrus limon* was used to test the efficacy of seed germination and seedling growth of prime cereal crop of north Karnataka *Sorghum bicolor*. 20%, 40%, 80% and 100% of aqueous leaf extract of *citrus limon* was treated to cereal crop. Treated seeds were incubated at blotter for seed germination and seedling growth. The study revealed that, the aqueous leaf extract has significant effect on seed germination and plant growth. In all concentrations inhibitory effect was observed on seed germination. The maximum inhibitory effect was observed in both the crops at 100% concentration. The Inhibitory effect was much pronounced in root development in all concentrations as compared to the seed germination. Shoot and root growth is inversely proportional to the concentrations of leaf extract.

Keywords: *Citrus limon*, *Sorghum bicolor*, Leaf extracts, Germination, Root length, Shoot length

INTRODUCTION:

In nature, plants species grow together and interact with each other by inhibiting or stimulating the growth and development through different interactions. A special form of competition and interaction between seed and its surroundings leads growth and germination (1). Any process involving secondary metabolites produced by plants, micro-organisms, viruses, and fungi that influence the growth and development of agricultural and biological systems including positive and negative effects (2). Allelopathic interactions are primarily based on the synthesis and release of secondary metabolites by higher plants that initiate a wide array of biochemical reactions, which induce several biological changes. They can also be found in the surrounding soil. Allelochemicals are released into the environment by root exudation and leaching from above ground parts and volatilization by decomposition of plant material (3). The toxic chemicals may interfere with germination of seeds, inhibit shoot or/ and root growth; they may inhibit nutrient uptake, or they may attack a naturally occurring symbiotic relationship there by destroying the plant's valuable source of nutrients. A variety of crop and

weed species have been reported to possess allelopathic activity on the growth of other plant species (4 and 5). The research and development in allelopathy are of urgency for the improvement of agriculture, forestry and the global environment, because allelopathy majorly deals with invasive or exotic and native weeds, and it was found that plants with allelopathic property can be potentially used as natural herbicides (6, 7, 8 and 9). Cereals are the major source of carbohydrates and protein respectively. These crops commercially cultivated using synthetic fertilizers this chance to affect the crop growth and productivity. Keeping the above point in view, in the present work was undertaken to test efficacy of *Citrus limon* (L.) Osbeck leaves extract on seed germination and seedling growth of *Sorghum bicolor* (L.) Moench.

MATERIAL AND METHODS

Seed Samples collection:

Fresh *Citrus Limon* (L.) Osbeck leaves and *Sorghum bicolor* (L.) Moench seeds were collected from Kolgal village in the Ballari taluka. They were taken to the laboratory of the Department of Botany at Veerashaiva College Ballari for additional research.

Preparation of Leaf extract:

The collected *Citrus limon* (L.) Osbeck leaves are dried in the shade after being surface sterilized. The dried leaves ground into a powder. 50 grams of leaf powder were soaked in 500 ml of distilled water for 24 hours. After that, plant extract was filter with Whatman No.1 filter paper then stored at 4° C in laboratory condition for further experimental work.

Plant extracts treatment:

Citrus limon (L.) Osbeck aqueous leaf extract was prepared in 4 different concentrations (Fig.1) i.e., 20%, 40%, 80% and 100%. *Sorghum bicolor* (L.) Moench seeds were collected, surface sterilized and then treated with different leaf extract concentrations of *Citrus limon* (L.) Osbeck and control (Distilled water).

Fig. 1: Different concentration of Aqueous Leaves extract of *Citrus limon* (L.) and control.

Blotter method:

The treated seeds of *Sorghum bicolor* (L.) Moench in different concentrations of *Citrus limon* (L.) Osbeck aqueous leaves extract were randomly placed at equal distance in petriplates contained blotting paper for the seed germination and seedling growth. The germination percentage of seeds and seedling growth were calculated in the time interval of five days.

RESULTS AND DISCUSSION:

Seed germination:

The seed germination of *Sorghum bicolor* was less effected at 20%, 40% and 80 % concentration of *Citrus limon* leaf extract. But it was much affected at 100% concentration. The result reveals that the germination was only 20%.

Results of seed germination experiment reveal that there is a significant effect of allelopathic concentration on seed germination in tested crops. Highest germination percentage was observed in control treatment and the lowest germination was observed at 100% concentration (Table-1).

Germination Test: Number of germinated seeds was noted daily by visual counting.

Crop names	**Seed germination in different concentration of plant extract**				
	Control	**20%**	**40%**	**80%**	**100%**
Sorghum bicolor (L.) Moench	**100%**	**80%**	**80%**	**40%**	**30%**

Table-1: Percentage of Seed germination in different concentration of *Citrus limon* Leaves extract.

Root length:

Root length in crop significantly influenced by treatments of *Citrus limon* aqueous leaf extract. In *Sorghum bicolor* there is a progressive decrease in the root length as concentration increases and maximum inhibition was observed at 100% concentration. The growth of root length at 80% concentration was only 20.6%. At 40% concentration the length is slightly more when compared to 20% concentration and the root growth was very less observed at 100% concentration of leaf extract (Table-2).

Crop names	**Root length in different concentration of leaves extract**				
	Control	**20%**	**40%**	**80%**	**100%**
Sorghum bicolor (L.) Moench	**3.94 cm**	**2.34 cm**	**1.04 cm**	**0.31 cm**	**0.03 cm**

Table-2: Effect of different concentration of *Citrus limon* Leaves extract on *Sorghum bicolor* root growth

Shoot length:

Similar to root, Shoot length also shows pronounced effect by treatments of *citrus limon* aqueous leaf extract. *Sorghum bicolor* there is a significant decrease in the shoot length as concentration increases and maximum inhibition was observed at 80% and 100% concentration. Our investigation shows the shoot length was drastically reduced at all concentrations of leaf extract in *Sorghum bicolor* (Table-3).

Crop names	**Shoot length in different concentrations of leaves extract**				
	Control	**20%**	**40%**	**80%**	**100%**
Sorghum bicolor (L.) Moench	**4.00 cm**	**2.34cm**	**1.07 cm**	**0.49 cm**	**0.23 cm**

Table-3: Effect of different concentrations of *Citrus limon* Leaves extract on *Sorghum bicolor* shoot growth

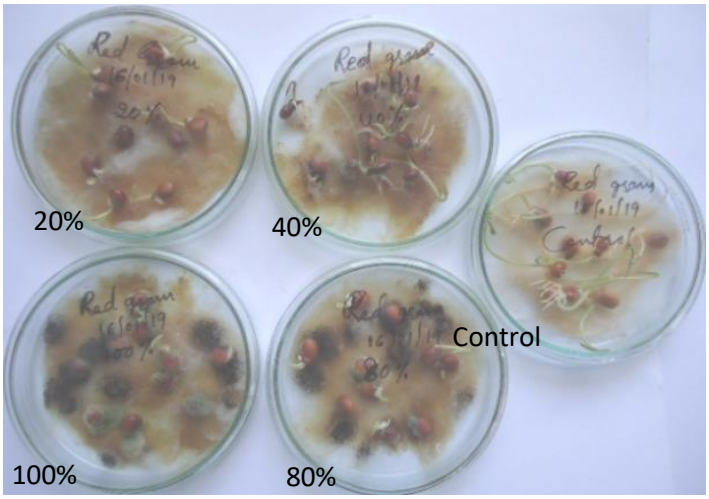

Fig 2: Shows Seed treatment in different concentration of *Citrus limon* aqueous Leaves extract

CONCLUSION:

Our study concludes that, the *Citrus limon* aqueous leaves extract has significant effect on seed germination and plant growth of *Sorghum bicolor*. In all concentrations inhibitory effect is observed on seed germination. But inhibitory effect was much pronounced in shoot and root lengths in all concentrations.

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