Allelopathic Effect of *Lantana Camara* on Germination and Growth of Chickpea and Green Gram

Lovely Sharma¹, Dr Anjali Khare², Dr. Mohd. Aslam Siddiqui³

¹PG Student, Deptt. of Botany, BFIT Group of Institutions, Dehradun, India
²Dean, Deptt. of Botany, BFIT Group of Institutions, Dehradun, India
³Deptt. of Chemistry, BFIT Group of Institutions, Dehradun, India

**Abstract**—An experiment was conducted in Department of Botany, BFIT, Dehradun, Uttarakhand during the months of February and March to understand the allelopathic effects of different concentrations taken through the leaf powder of *Lantana camara* leaf on germination percentage and early growth of two pulse crops i.e. chickpea and green gram. The test was conducted in petridishes. Results showed that different leaf powder concentration cause great inhibitory effect on germination and growth of both the pulse crops. Results indicates that the allelochemicals were released from the leaf powder and inhabit the germination and growth of germinated crops.

**Keywords**—*Lantana Camara, Allelopathy, Chickpea, Green Gram.*

I. **INTRODUCTION**

According to Dobhal et al. (2010) *Lantana* can also interfere growth of nearby plants by outcompeting for soil nutrients and altering microenvironment (e.g. light, temperature) by forming dense thickets (Sharma and Raghubanshi, 2007). Several researches have so far been done on the allelopathic effect of *Lantana* on various agricultural crops throughout the world (Bansal 1998). The present investigation was carried out to further test the allelopathic nature of *Lantana camara* against two pulse crops to determine the allelopathic effect of its leaf powder on these pulse crops.

II. **MATERIAL AND METHODS**

The experiment was conducted in Botany Lab of BFIT College, Dehradun. It was carried out in completely randomized block design (CRBD) with different concentrations of leaf powder i.e. control, 10%, 20%, 50% and 75% and labeled as T₁, T₂, T₃, T₄ and T₅.

**Preparation of leaf powder:** Leaves of *Lantana camara* was collected along the sides of agricultural fields of various agricultural crops. The leaves were washed and allowed to dry at room temperature. After that the leaves were powdered by using blender in a fine powder. The leaf powder was measured to 10, 25, 50 & 75g using digital balancer. Loamy soil was collected from the agricultural fields & weighed 1000g for every treatment (10, 25, 50, 75g) of powder.
The soil is kept in containers for subsequent experiments. The allelopathic effect of plant powder was evaluated by mixing 10, 25, 50 and 75 in 1000g of soil. Healthy seeds are sown in containers containing different soil amendments, in every container 6 seeds were sown and allowed to germinate and grow for three weeks. 2ml of water was given to each petridishes everyday and the germination and growth of pulses was recorded at regular interval. The seeds were considered as germinated when their radicles emerge out, germination percentage was calculated by counting the seeds germinated in each petridish. The experiment was set for 21 days in the laboratory.

III. RESULTS AND DISCUSSIONS
The mean germination percentage of chickpea and green gram was recorded. The experimental results obtained suggests that leaf powder of *L. camara* exhibit profound inhibitory effects on germination. Among the five treatments, germination percentage of chickpea (77%) was maximum in T₁ and it was decreased in all the remaining four treatments (10, 25, 50& 75%) compared to control (100%). In green gram maximum percentage of germination was recorded in T₁ (88.66%) and it was minimum in T₅ (50%) compared to control (88.66%).

**Table 1: Germination % of Chickpea & Green gram**

| Treatments | Germination % of Chickpea | Germination % of Green Gram |
|------------|---------------------------|----------------------------|
| T₁         | 77.66                     | 88.66                      |
| T₂         | 83                         | 77.33                      |
| T₃         | 77.33                     | 83                         |
| T₄         | 55                         | 66                         |
| T₅         | 55                         | 50                         |

The average shoot length (cm) recorded from the germinated seedlings (Fig. 4) after 22 days are presented in Table 1. Results indicate that shoot development of chickpea was maximum (12 cm) in control (T₀). The application of *L. camara* leaf powder at 10, 25, 50 & 75 g (T₂T₃T₄T₅) is significantly reduced shoot development. In green gram, maximum (12.65 cm) shoot development was observed in T₁ and it was minimum (5.38cm) in T₃. The inhibitory effect was significantly increased when the application of *L. camara* leaf powder was increased.

**Table 2: For growth parameters of chickpea:**

| Treatments | Root length | Shoot length |
|------------|-------------|--------------|
| T₁         | 12.06±3.9   | 12±3.17      |
| T₂         | 12.68±2.8   | 7.56±1.90    |
| T₃         | 7.44±2.68   | 2.46±1       |
| T₄         | 11.66±3.9   | 5.57±2.20    |
| T₅         | 9.8±3.33    | 5.1±3.7      |

![Fig.1: Germination percentage of Chickpea & Green gram](image-url)
Development of root growth was greatly reduced with increased amount of plant powder mixed soil. In chickpea plant, maximum (12.68 cm) root length was observed in control (T2) and it was minimum (7.44 cm) in T3. In comparison to control all the treated plant showed less growth due to inhibitory effect of Lantana. In green gram plant, maximum root development of (7.14cm) was recorded in control (T1) and it was minimum (3.68 cm) in T3. The mean root development was varied significantly within the treatments compared to control. Leaf powder of Lantana camara also have inhibitory effect on total number of leaves per plant of chickpea and the in green gram the leaves colour changes into yellow.

Table 2: for growth parameters of green gram

| Treatments | Root length | Shoot length |
|------------|-------------|--------------|
| T<sub>1</sub> | 7.14±2.40 | 12.65±2.5 |
| T<sub>2</sub> | 4.90±1.43 | 7.41±2.72 |
| T<sub>3</sub> | 3.79±2.0 | 5.38±2.72 |
| T<sub>4</sub> | 3.68±1.38 | 5.5±2.49 |
| T<sub>5</sub> | 3.92±1.05 | 5.4±2.64 |

The present study suggests that Lantana camara have strong allelopathic effect on the germination and growth of various pulse crops. It was noticed that all the concentrations of leaf powder considerably reduced the yield efficiency of the test pulses compared with their respective control plants. These recordings showed that there is a negative impact of leaf powder on all the treated plants in various treatments. This negative impact is due to the various phenolic compounds which interfere the normal functioning of various metabolic activities and this findings lines the previous experiments in which it was proved that leaf powder of Lantana camara has inhibitory impact on various pulse crops.

IV. CONCLUSIONS

The result of the study showed allelopathic potential of leaf powder of Lantana on growth of green gram and chickpea. The leaf powder had differential effect on germination, root length, shoot length and leaf growth of pulse crops. Green gram is more sensitive to Lantana leaf powder than chickpea.

It is therefore required to control the growth of this weed so as to protect the diversity. Further studies shall be carried out to search the probable methods for control of this weed.

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