

Allelopathic Effect of *Lantana camara* L. on Moong Germination

Ranjan Kumar Dora^{1*}, Anita Tripathy²

Abstract

Allelopathy is a biological process where plants inhibit the growth and germination of surrounding species. This study examined the allelopathic effects of Lantana camara L. leaf extracts using concentrations of 25%, 50%, 75%, and 100% on Vigna radiata L., compared to a control group. Results showed that L. camara L. extracts significantly inhibited both growth and germination of Vigna radiata L., with increasing effects at higher concentrations. On the 10th day, the average root length was 3.1 cm, and the shoot length was 4.9 cm, while germination was 0% at 100% extract concentration compared to 100% in the control. In conclusion, L. camara L. has a strong inhibitory effect on Vigna radiata L., suggesting that its presence in the agricultural field could adversely affect their growth. Further studies on the phytochemical properties and herbicidal effects of Lantana camara L. are recommended. Understanding the mode of action of allelochemicals released by Lantana camara L. may help in developing eco-friendly weed management strategies. Additionally, evaluating the persistence of these compounds in soil and their impact on beneficial crops could provide valuable insights for sustainable agricultural practices and integrated weed control programs.

Keywords: *Lantana camera* L., seed germination, allelopathic, hedge plant, inhibitory effect

INTRODUCTION

Lantana camara L. is a fast-growing plant that can reach heights of up to 3 meters in just 3 to 4 years. It forms dense thickets that create effective barriers in various landscapes, thriving in open forests, plantations, farmlands, and neglected areas. *Lantana* is adaptable to diverse climates, whether arid or humid, and can grow in sandy, loamy, and clay soils. Its wide ecological tolerance allows it to flourish in different habitats and significantly impact local ecosystems [1, 2].

Lantana camara L. is a noteworthy ornamental plant belonging to the Verbenaceae family. This species is well-suited to environments characterized by moderate to high summer rainfall and is particularly effective in well-drained, sloped sites. While it demonstrates a preference for fertile, nutrient-rich soils, *Lantana camara* L. exhibits significant adaptability, thriving in siliceous sands and soils derived from sandstone, provided these substrates are moderately deep and maintain adequate moisture levels. Indigenous to tropical regions, *Lantana camara* L. consists of various strains, each featuring distinct and specialized characteristics. In India, it is known by several local names, highlighting its cultural significance and popularity [3, 4].

*Author for Correspondence

Ranjan Kumar Dora
E-mail: rk3573458@gmail.com

¹M.Sc. Scholar, Department of Life Sciences, Rayagada Autonomous College, Rayagada, Odisha, India

²Lecturer, Department of Life Sciences, Rayagada Autonomous College, Rayagada, Odisha, India

Received Date: July 14, 2025

Accepted Date: August 25, 2025

Published Date: August 26, 2025

Citation: Ranjan Kumar Dora, Anita Tripathy. Allelopathic Effect of *Lantana camara* L. on Moong Germination. Research & Reviews: Journal of Botany. 2026; 15(1): 36–41p.

Lantana camara L. is a resilient and swiftly growing woody shrub that has the potential to form dense thickets. Native to the tropical and subtropical regions of South and Central America, this species has successfully adapted and established itself in various countries worldwide, including Ethiopia. While its vibrant clusters of flowers add aesthetic value, it is essential to

recognise the ecological implications of its growth patterns, as it may present challenges in certain environments. Balancing its ornamental qualities with responsible management practices will be crucial in mitigating any potential impacts on local ecosystems [5, 6]

MATERIALS AND METHODS

- *Agronomic Features of Test Crop Cultivars:* The Moong bean, scientifically known as *Vigna radiata* L., is one of the most extensively cultivated crops worldwide, valued for its high nutritional content as a rich source of plant protein crucial for human diets. This adaptable legume originated in the Americas, where it was domesticated, but it has since become popular and is now grown on every continent, flourishing in a wide range of climates and soil conditions. Due to its significant contribution to global food security and nutrition, numerous research programs are focused on enhancing the genetic traits of the common bean to improve its yield, disease resistance, and overall nutritional quality.
- *Collection and Seed Selection:* Pure-line seeds from the designated cultivators were sourced from the District Agriculture Office in Rayagada. A comprehensive selection process was implemented to identify seeds that demonstrated optimal health and consistent uniformity in color, size, and shape. The selected seeds were found to be suitable for this investigation, aligning with the high-quality standards requisite for thorough research.
- *Plant Materials Collection:* Fresh leaves of the *Lantana camara* L. plant were systematically collected from the campus of Rayagada Autonomous College in Rayagada, Odisha. This meticulous collection process was conducted to ensure the highest standards of quality and integrity for the samples, which are intended for extensive research and analytical studies. The selection criteria for the leaves included factors such as maturity, absence of disease, and environmental conditions, all of which are critical for the accuracy of subsequent experiments and evaluations.
- *Preparation of Lantana Camara L. Aqueous Leaf Extract:* The process began by collecting *Lantana camara* L. leaves, which were washed, air-dried for seven days, and ground into a powder. For extraction, 100 grams of the powder were mixed with 1 litre of distilled water and stirred. After sitting for 24 hours, the mixture was filtered, resulting in a concentrated stock solution. This solution was then diluted with additional distilled water to create 25%, 50%, and 75% concentrations for experimentation, while distilled water served as a control (Figure 1).



Figure 1. Aqueous leaf extract of *Lantana camara* plant.

- *Preparation of Selected Crop Species for Laboratory Study:* The seeds were organised for an experiment using five 10 cm Petri dishes lined with two layers of Whatman filter paper No. 1 to maintain moisture. Five concentration levels of leaf extract were tested on each plant species alongside a control group with distilled water. A total of twenty carefully selected moong seeds, each demonstrating uniform size and quality, were meticulously arranged in individual dishes. Each dish was thoughtfully assigned 10 ml of either a nutrient-rich plant extract or pure distilled water. To differentiate the treatment groups, the dishes were clearly labelled, ensuring easy identification throughout the duration of the experiment. This setup aimed to create a controlled environment,

allowing for precise observation of the effects of the extract versus water on seed growth and development (Figure 2).



Figure 2. Preparation of selected crop for germination.

- *Germination and Bioassay Studies:* We investigated the impact of varying concentrations on seed germination rates by assessing germination percentages and measuring shoot and root lengths on the tenth day of incubation. We randomly selected ten seedlings from each treatment group for accuracy. The methods for calculating germination ratios and growth reductions were carefully employed.

RESULTS

The study on the effect of leaf extract on *Vigna radiata L.* seed germination shows a clear trend related to increasing concentrations. In the control group with no extract, there was a 100% germination rate. At 25% extract, the rate dropped slightly to 84%, indicating mild inhibition. At 50%, germination fell to 66%, reflecting significant inhibition at 34%. The 75% concentration shows germination plummets to 41%, with 59% inhibition noted. Finally, at the 100% concentration, 20% seeds germinated, and 80% seeds were inhibition. This demonstrates a strong inverse relationship between leaf extract concentration and seed viability, highlighting the detrimental effects of the extract on germination (Tables 1, 2 and 3 and Figures 3 and 4).

Table 1. Effect of *L. camera L.* Leaf extract on germination and seedling growth of *Vigna radiata L.* on the 10th day after sowing.

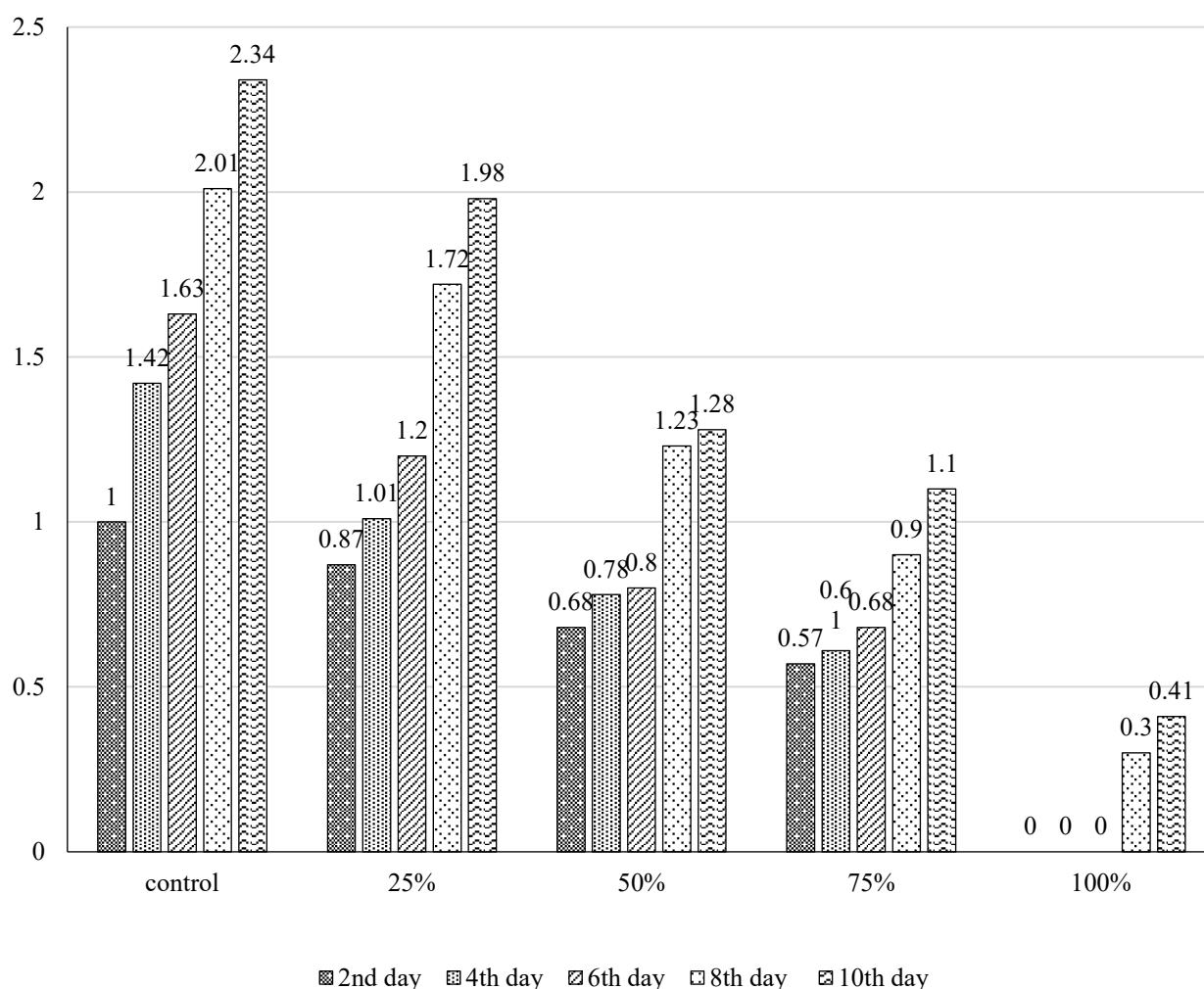
Treatment	% Germination	% Inhibition in germination
Control	100	–
25%	84	16
50%	66	34
75%	41	59
100%	20	80

Table 2. The effect of leaf extract of *Lantana camera* L. on the shoot length of *Vigna radiata* L. after 10 days of treatment.

Concentration	2 nd day	4 th day	6 th day	8 th day	10 th day	Mean
Control	1.0	1.42	1.63	2.01	2.34	1.68
25%	0.87	1.01	1.20	1.72	1.98	1.35
50%	0.68	0.78	0.80	1.23	1.28	0.95
75%	0.57	0.61	0.68	0.9	1.1	0.22
100%	0	0	0	0.3	0.41	0.14

Table 3. The effect of leaf extract of *Lantana camera* L. on the root length of *Vigna radiata* L. after 10 days of treatment.

Concentration	2 nd day	4 th day	6 th day	8 th day	10 th day	Mean
Control	0.49	0.96	1.08	1.21	1.41	1.03
25%	0.10	0.27	0.42	0.93	1.07	0.55
50%	0.08	0.24	0.36	0.85	0.98	0.50
75%	0.05	0.17	0.28	0.73	0.83	0.41
100%	0	0	0	0.2	0.29	0.25

**Figure 3.** Graphical representation of the effect of leaf extract of *Lantana camera* L. on the shoot length of *Vigna radiata* L. after 10 days of treatment.

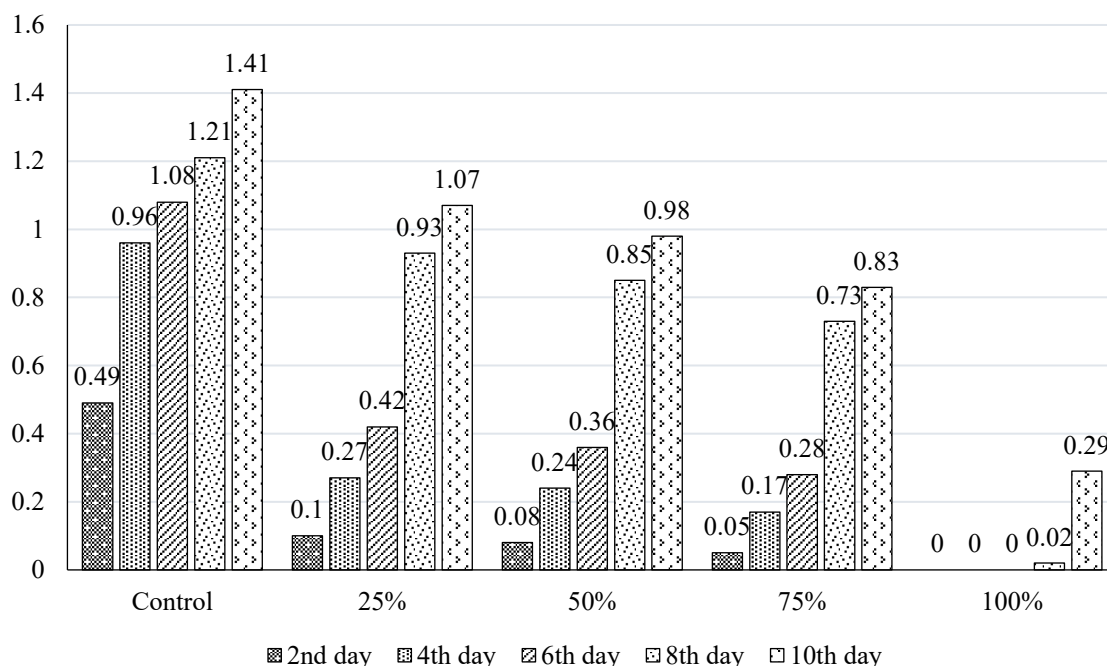


Figure 4. Graphical representation of the effect of leaf extract of *Lantana camara L.* on the root length of *Vigna radiata L.* after 10 days of treatment.

DISCUSSION

Aqueous leaf extracts and leachates from *Lantana camara L.* have been shown to inhibit the metabolic processes necessary for common bean seed germination. This suggests that certain compounds in the extracts may disrupt key physiological functions. Similar findings by Nandi and Dalal highlight the potential negative effects of *Lantana camara L.* on agricultural practices and crop cultivation [7, 8].

Seed germination can be significantly inhibited by allelochemicals, which are compounds released by certain plants that affect neighbouring seeds. These chemicals hinder access to essential resources like water and nutrients during germination [9]. Specifically, some phenolic compounds can disrupt the synthesis and activity of gibberellic acid, a crucial hormone that regulates physiological processes, including amylase production. Amylases break down starches into sugars, providing energy for the seed. Impaired gibberellic acid activity results in reduced amylase production, leading to decreased germination and poor seedling establishment [10].

CONCLUSION

The study indicates that leaf extract from *Lantana camara L.* significantly inhibits the growth of roots and shoots in germinated *Vigna radiata*. This suggests that *Lantana camara L.* could interfere with seed regeneration and early growth, highlighting its potential as an allelopathic species that suppresses plant growth in agricultural fields. The allelochemicals released by *L. camara L.* may hinder the regeneration processes of native plant species, thereby contributing to the establishment of this plant as an invasive species. So, it is recommended that *Lantana camara L.* be periodically removed from the agricultural field.

Acknowledgment

We want to express our heartfelt gratitude to the principal for granting us her invaluable permission, which has been instrumental in our project's progress. Additionally, we would like to extend our sincere appreciation to the Head of the Department of Botany for his generous support and collaboration, which played a crucial role in the successful completion of our research work.

Conflict of Interest

No one have any conflict of interest.

REFERENCES

1. Binggeli P, Desalegn D. Lantana, the invasive shrub that threatens to drive people out of their land. Newsletter of the Ethiopian Wildlife and Natural History Society. 2002;.2002:4–6.
2. Sharma GP, Raghubanshi AS, Singh JS. Lantana invasion: an overview. Weed Biol Manag. 2005;5(4):157–165.
3. Ganesh T, Sen S, Thilagam E, Thamocharan G, Loganathan T, Chakraborty R. Pharmacognostic and anti-hyperglycemic evaluation of *Lantana camara* (L.) var. *aculeata* leaves in alloxan-induced hyperglycemic rats. Int J Res Pharm Sci. 2010;1(3):247–252.
4. Kumar G, Karthik L, Rao KVB. <http://jprsolutions.info>. J Pharm Res. 2010;3(3):539–542.
5. Priyanka N, Joshi PK. A review of *Lantana camara* studies in India. Int J Sci Res Publ. 2013;3(10):1–11.
6. Nandi S, Dalal T. Evaluation of allelopathic potential of *Lantana camara* L. on seeds of *Raphanus sativus* L. and *Spinacia oleracea* L. Plant Archives. 2012; 12(1):459–462.
7. Mawal S, Patil S. Assessment of allelopathic potential of *Lantana* species on some selected agricultural crops. Assessment. 2019 Jan;4(1):15.
8. Chauhan PS, Suman B, Naila C. Allelopathic Effects of *Lantana camara* on *Triticum aestivum*. Int Res J Biol Sci. 2016;5(12):43–8.
9. Tadele D. Allelopathic effects of *Lantana* (*Lantana camara* L.) leaf extracts on germination and early growth of three agricultural crops in Ethiopia. Momona Ethiopian J Sci. 2014 Apr 10;6(1):111–9.
10. Kar I, Ram V, Panda P. Allelopathic effect of *Lantana camara* on germination and seedling growth behavior of garden pea (*Pisum sativum* L.). World J Agric Sci. 2014;10(5):243–6.