IJART- Vol-2, Issue-1, February, 2017 Available online at http://www.ijart.info/
DOI: https://doi.org/10.24163/ijart/2017/2 (1):44-51

INTERNATIONAL JOURNAL OF APPLIED RESEARCH AND TECHNOLOGY
ISSN 2519-5115
RESEARCH ARTICLE

Effect of *Catharanthusroseus* Aqueous leaf Extract on Seed Germination of Some Legume Seeds

[1]Prabhat Soni
[2]Ravindra Singh
[3]Sadhana Chaurasia
[4]Jyotishikha Agrawal

[1,2]Department of Biological science, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot Satna Madhya Pradesh, India
[3]Department of Energy and Environment, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot Satna Madhya Pradesh, India
[4]M.L.B. College Bhopal Madhya Pradesh, India

Corresponding author:
Prabhat Soni
prabhatbioscience@yahoo.com

Received: February 21, 2017
Revised: February 27, 2017
Published: February 28, 2017

ABSTRACT

In the present study allelopathic effect of *Catharanthusroseus* aqueous extract on the seed germination of three pulses (*Cicerarietinum*, *Cajanuscajan and Pisumsativum*) was studied. The results shows directly proportion to the concentration of plant extract. If plant extracts concentration increases the percentage of germination decreases. The maximum germination percentages were found in control followed by 5% to 100% aqueous extract. The maximum in germination was found in *C. cajan* 100% (other pulses both are same germination 90%) and minimum *C. arietinum*, 20% germination. The root length and shoot length also showed the inhibitory effect. Maximum inhibitory effect was observed in (830.34 % shoot & 957.47% root over control) of *C. cajan* and minimum inhibitory effect was observed in (260% shoot & 266% root over control) of *C. arietinum.*

Keywords- *Catharanthusroseus*, *Cicerarietinum*, *Cajanuscajan & Pisumsativum*, Allelopathy and germination.

DOI: https://doi.org/10.24163/ijart/2017/2 (1):44-51

INTRODUCTION

Madagascar periwinkle (*Catharanthusroseus Don*.) is an ornamental, medical & perennial herb plant belonging to the *Apocynaceae* family sees plate -1. This family contains 114 genera and 4650 species that most of them are both ornamental with medical value (Simpson, 2006).Madagascar periwinkle is known as a medical plant which contains a number of terpenoidindole alkaloids with more than 130 separated and identified compounds (Van der hejden et al., 2004). It is categorized as a glycophyte plant (Jaleel et al., 2007). *C. roseus* has more than 400 known alkaloids. Some are used by the pharmaceutical industry for the treatment of Animal repellent, Anithyperglycemic, Antiascariasis, Antiinflamatory, Antimalarial, Antimitotic, Antibacterial, Antihyperglycemic, Antihypertensive, Antifertility, Antihypercholesterolemic, Antimutagenic, Antidiuretic, Antifungal, Antispasmodic, Antiviral, Cardiotonic, CNS depressant, Cytotoxic, Antispermatogenic, Antitumour & various type of Anticancerous activity.

Allelopathy is a phenomenon in which one plant in- hibits growth of other plants through release of al- lelo-chemicals. It is a phenomenon in which the second- dary metabolites, produced by plants, microorganisms, viruses, and fungi stimulate or suppress the growth and develop-ment of agricultural and biological systems (ex- cluding animals).It can reduce herbicide use to obtain eco-friendly and cost- effective weed control. Earlier, confirmed, a large num- ber of crops and trees has been found to possess allelo- pathic potential (Zeng et al., 2008).

Seed germination-

Germination is "the emergence and development from the seed embryo of those essential structures which, for the kind of seed in question, are indicative of the ability to produce a normal plant under favorable conditions." Many factors are evolving to the germination of seed such as: water, temperature, moisture, gases, macro& micro nutrients, enzymes & hormone.

C. arietinum, C. cajan and *P. sativum* belong to family *Fabaceae*. The legumes are next in importance to cereals as sources of human food. They contain more protein materials than any other vegetable product. The pulses are important part of food in India where the majority of the population is vegetarians. Carbohydrates and fats are also present in legumes. The protein occurs as aleuronic grains in the same cells with starch grains.

The purpose of this study was to determine the possible allelopathic effect of *C. roseos* on seed germination and seedling growth of some leguminous seeds.

Plate-1: *C. roseus*plant.

DOI: https://doi.org/10.24163/ijart/2017/2 (1):44-51

Plant material-
The plants of *C. roseus Don.*were collected from, kothi town in Satna district (M.P.) India.

OBJECTIVES OF THE STUDY-

1. To determine the effect of plant aqueous extract on seed germination.
2. To assess the tolerance limit of seeds to aqueous plant extract.

Fig-1: *C. arietinum*seeds.

Fig-2: *C. cajan*seeds.

Fig-3: *P. sativum*seeds.

MATHEDOLOGY

C. roseus plants leaves were used to make the aqueous extract. Firstly the leaves were washed thoroughly with tap water and dried in the wind. After two hour 1kg plant leaves were grind and filtered and finally make the volume 1 liter with distilled water. This is our stock solution. After that 5%, 25%, 50%, 75%, 100% solutions were using stock solution. 10 seeds in triplicate of *C.arietinum*, *C. cajan* and *P. sativum*, were placed in separate petri-dishes for germination in different concentration of solution. The germination test was carried out in sterile petri-dishesof 12cm. in size placing whatman number 3 filter papers on petri-dishes. The extract of each concentration was added to each Petri-dish of respective treatment daily to wet the seeds. The controls were treated with distilled water .Germination test and seedling growth was done in normal room temperature condition. The experiment was extends over a period of 12 days to allow the last seed germination. The germination was recorded on daily basis.

$$\text{Germination Percentage} = \frac{\text{Number of seeds germinated}}{\text{Total Number of seed sown}} \times 100$$

RESULT

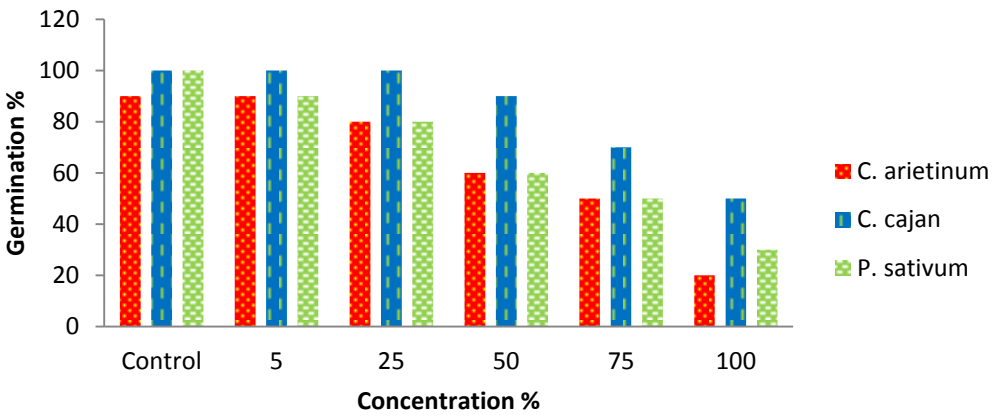
The seed germination of different crops *C.arietinum*, *P. sativum*, *C. cajan*were affected by aqueous extract of *C. roseus* result shows significant decrease in percentage germination. In general, the rate of germination delayed and decreased with the increase of aqueous extract concentrations at each observation. The results were revealed that aqueous extract application significantly reduced the seed germination over control in applied treatment (Table-1).

DOI: https://doi.org/10.24163/ijart/2017/2 (1):44-51

Table-1: Effect of C. *roseus* aqueous plant leaves extract on seed germination of selected pulses.

S.no.	Concentration in %	*Germination % in C. arietinum*	*Germination % in C. cajan*	*Germination % in P. sativum*
1	Control	90	100	100
2	5	90	100	90
3	25	80	100	80
4	50	60	90	60
5	75	50	70	50
6	100	20	50	30

Graph-1: Effect of *C. roseus* aqueous plant leaves extract on seed germination % of selected pulses.



DOI: https://doi.org/10.24163/ijart/2017/2 (1):44-51

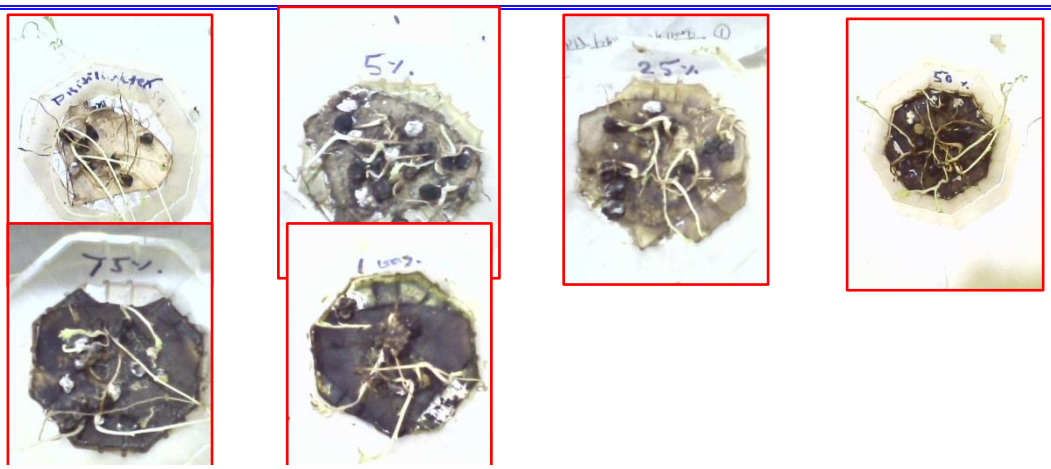


Fig-4: Effect of C. *roseus,* aqueous plant leaves extract on seed germination of *C. arietinum*.

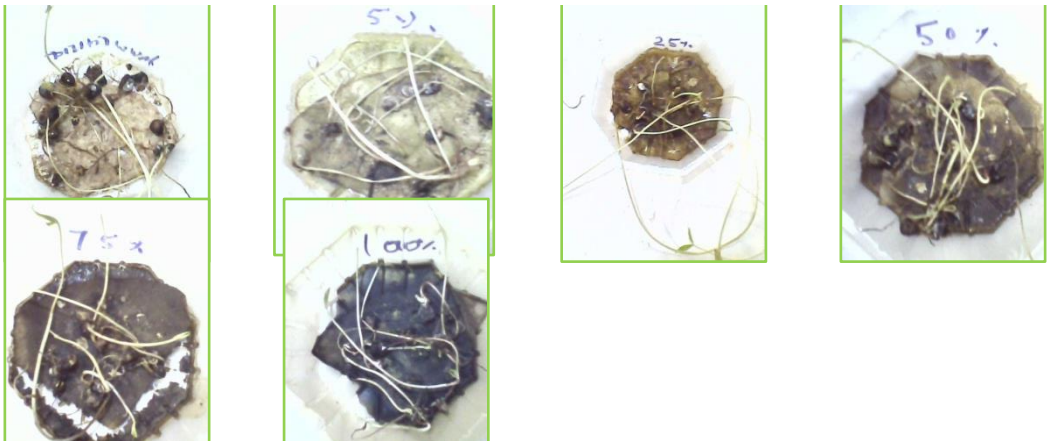


Fig-5: Effect of *C. roseus*, aqueous plant leaves extract on seed germination of *C. cajan*.

Fig-6: Effect of *C. roseus* aqueous plant leaves extract on seed germination of *P. sativum*.

DOI: https://doi.org/10.24163/ijart/2017/2 (1):44-51

Germination % of *C. arietinum*: The maximum germination percentages were found in control followed by 5% to 100% aqueous extract. The maximum in germination was found in 90% and minimum in 20 % concentration.

Germination % of *C. cajan*: The maximum germination percentage were found in control followed by 5% to 100% aqueous extract. The maximum in germination was found in 100% and minimum in 50% concentration.

Germination % of *P.* sativum: The maximum germination percentages were found in control followed by 5% to 100% aqueous extract. The maximum in germination was found in 90% and minimum in 30% concentration.

Decrease % of shoot and root in *C. arietinum*: Maximum percentage decrease of *C. arietinum*over control found in *C. roseus* (100% conc.) 435.78% (shoot), 677% (root*)* and minimum percentage decrease (5% conc.) 113.94% (shoot), 139.24% (root).

Decrease % of shoot and root in *C. cajan*: Maximum percentage decrease of *C. cajan* over control found in *C. roseus* (100% conc.) 337.34% (shoot), 291.08% (root*)* and minimum percentage decrease (5% conc.) 180.64% (shoot), 97.51% (root) .

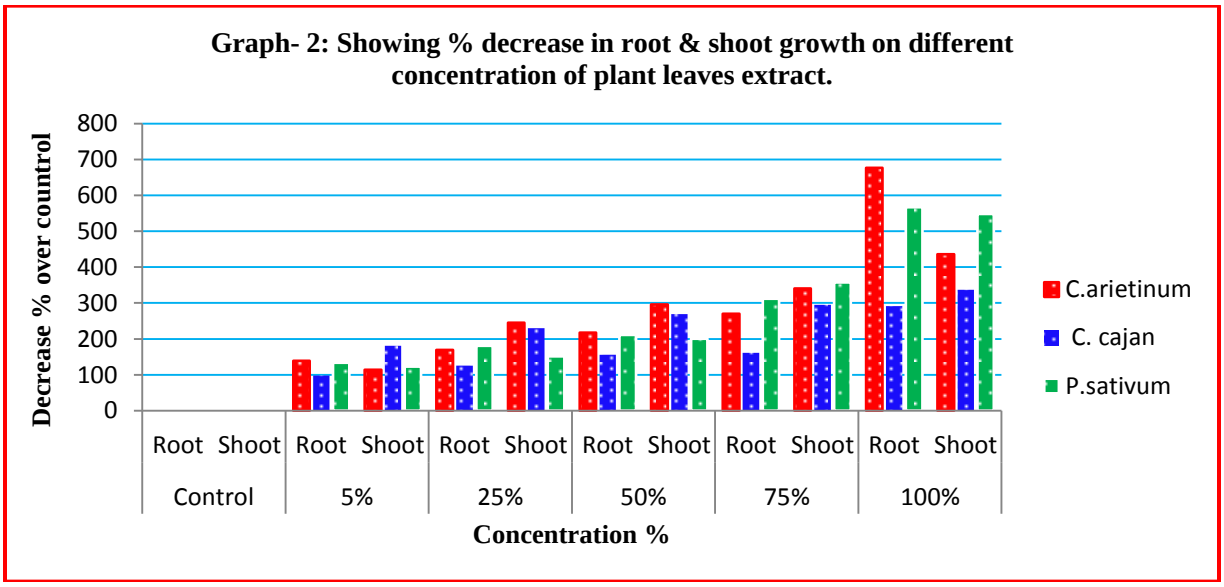
Decrease % of shoot and root in *P. sativum*: Maximum percentage decrease of *P. sativum* over control found in *C. roseus* (100% conc.) 548.66% (shoot), 567.27% (root*)* and minimum percentage decrease (5% conc.) 122.83% (shoot), 133.37% (root) .

Table-2: Effect of *C. roseus*aqueous plant leavesextract on plant growth (cm.).

S. No.	Treatment	Parts	Average length (cm) in *C.arietinum*	% Decrease over control	Average length (cm) in *C. cajan*	% Decrease over control	Average length (cm) in *P.sativum*	% Decrease over control
1	Control	Root	6.77	-	5.88	-	6.24	-
		Shoot	13.42	-	14	-	8.23	-
2	5%	Root	4.79	139.24	6.03	97.51	4.68	133.37
		Shoot	1.09	113.94	7.75	180.64	6.7	122.83
3	25%	Root	3.95	168.86	4.69	125.37	3.45	180.86
		Shoot	5.05	245.34	6.1	229.5	5.45	151
4	50%	Root	3.07	217.26	2.77	155.96	2.95	211.52
		Shoot	4.2	295.71	5.2	269.23	4.1	200.73
5	75%	Root	2.47	270.47	3.65	161.09	2	312
		Shoot	3.65	340.27	4.75	294.73	2.3	357.82
6	100%	Root	1	677	2.02	291.08	1.1	567.27
		Shoot	2.85	435.78	4.15	337.34	1.5	548.66

DOI: https://doi.org/10.24163/ijart/2017/2 (1):44-51

Fig-7: Experimental setting during research work.



DISCUSSION

The study revealed that the aqueous plant extract significantly suppressed the germination and the severity of effect was to proportional to the extract concentration. The maximum seed germination percent was shown in the control where no extract use in all the plant receptor. The highest inhibitory effect (20 %) was recorded in *C. arietinum* at 100% concentration, while lowest (90 %) was recorded in *C. arietinum* & *P. sativum*at 5% concentration table-1. The decrease percent over control (root 677% highest) at *C. arietinum* (root97.51% lowest) at *C. cajan* and (shoot 548.66% highest) at *P. sativum* (shoot 97.51% lowest) at *C. cajan* in all legume seeds table-2.Maximum inhibitory effect was observed in root length and shoot length (567.27% and 548.66% over control) of *P. sativum* and minimum inhibitory effect was observed in root length and shoot length (291.08% and 337.34% over control) of C. cajan (Graph-2). Increased concentration of extracts resulted in decreased germination percent, root & root length of all seeds.

DOI: https://doi.org/10.24163/ijart/2017/2 (1):44-51

CONCLUSION

Present study shows allelopathic effect of C. roseus plat on three legume seeds. Allelopathic chemicals can be present in any part of the plant. They can be found in leaves, flowers, roots, fruits, or stems. They can also be found in the surrounding soil. Target species are affected by these toxins in many different ways. The toxic chemicals may inhibit shoot/root growth, they may inhibit nutrient uptake, or they may attack a naturally occurring symbiotic relationship thereby destroying the plant's usable source of a nutrient. Maximum inhibition found in *Cicerarietinum* seed because toxic chemical concentrations are very high followed by other species. These studies are indicating that less cost & labor effective use of natural herbicides.

REFRRENCE

Allolli, T.B. and Narayanareddy P. (2000). Allelopathic effect of Eucalyptus plant Extract on germination and seedling growth of cucumber. Karnataka J. Agric. Sci., 13 (9): 947-951.

Choudhary, S. & Gupta, K. (1995). Studies on the germination mechanism of Catharanthusroseus (L.) G. Don cv. Alba seeds: effect of temperature and promoters. Seed Science and Technology 23: 831-842.

Choudhary, S. & Gupta, K. (1995): Studies on the germination mechanism of Catharanthusroseus (L.) G. Don cv. Alba seeds: effect of temperature and promoters. Seed Science and Technology 23: 831-842.

Kumar M, Malik V, Joshi M (2009) Allelopathic effects of Meliaazaderach, Morus alba and Moringaoleifera on germination, radical and plumule growth of Glycine max. Range Management and Agroforestry 30:167-168.

Labouriau, L.G. &Agudo, M. (1987): On the physiology of seed germination in Salvia hispanica L. I. Temperature effects. Anais Academia Brasileira de Ciências, 59: 3756.

Labouriau, L.G. & Valadares, M.E.B. (1976): On the germination of seeds of Calotropisprocera (Ait.) Ait.f. Anais Academia Brasileira de Ciências, 48: 263-284.

Simpson, M.G., (2006). Plant systematics. Elsevier, Amsterdam, the Netherlands.

Suman, A., Shahi, H.N., Singh, P. and Gaur, A. (2002) Allelopathic influence of *Vignamungo* (black gram) seeds on germination and radical growth of some crop plants. Plant Growth Regulation, 38: 69-74.

Sunil Christudas, Kulathivel TM, Agastian P. (2012): Phytochemical and antibacterial studies of leaves of *Tridaxprocumbens L*. *Asian Pac J Trop Biomed*, 2: S159-61.

Swaminathan, C., Vinayrai, R.S. and Suresh, K.K., (1989). Allelopathicproctivities of *Acacia nilotica*. *Journal ofTropical Forest Science*, 2:56-60.

Van der hejden, R., D.J. Jabos, W. Snoeijer, D. Hallard and R. Verpoorte, (2004). The Catharanthus alkaloids: Pharmacognosy biotechnol. Curr. Med. Chem., 11: 1241-1253.

Zeng, R.S., Mallik, A.U. and Luo, S.M. (2008) Allelopa- thy in forested ecosystems. In: Zeng, R.S., Mallik, A.U. and Luo, S.M., Eds., Allelopathy in Sustainable Agricul-ture and Forestry, Springer, New York, 363-377.