



Allelopathy of some forest trees from vriddheswar, pathardi tahsil, ahmednagar

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ABSTRACT

The effects of aqueous leaf extracts of different concentrations of *Butea monosperma* (Lam) Taub (Fabaceae), *Limonia acidissima* L. (Rutaceae) *Semecarpus anacardium* L. (Anacardiaceae) from Pathardi Tahsil (longitude 19° 09' N, latitude 75° 10' E) Dist Ahmednagar were bioassayed in August 2008 on germination and seedling growth of *Raphanus sativus* L. var. 'Hybrid 11'. Seed germination was promoted 13 to 21% by *Butea*, 3.58% by *Limonia* while *Semecarpus* inhibited by 10.71% at 10⁻¹ concentration. Data was analyzed by appropriate statistical method. Inhibition at higher and stimulation at lower extract concentrations were recorded. Pot culture experiments will be arranged.

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Introduction

Allelopathy is any direct or indirect harmful effect by one plant (donors) on another (recipient) through production of chemical compounds secondary metabolites. The word "Allelopathy" (Greek words: 'allelon' means reciprocal, mutual, among each other, and 'pathos' means grief, sorrow or that happens to one) reveals beneficial as well as harmful (detrimental) reciprocal biochemical interactions among plants including microorganisms (Molisch, 1937). Patil (1994) worked on a common bund grown green manure plant *Glyricidia maculata* L. Leaf extracts showed inhibitory effect on seedling growth of green gram, black gram, sunflower, rice etc but promoted root and shoot growth in ground nut.

Material and methods

Plant parts of *Butea monosperma* (Lam) Taub (Fabaceae), *Limonia acidissima* L. (Rutaceae) *Semecarpus anacardium* L. (Anacardiaceae) from Pathardi Tahsil (longitude 19° 09' N, latitude 75° 10' E) Dist Ahmednagar were collected in month of August 2008, washed with tap water, blotted and then used.

Preparation of leaf extract: 10g of leaves were cut into pieces, ground in a grinder and with distilled water 10% stock solution was prepared, filtered through many layers of muslin cloth, centrifuged to remove debris and serially diluted to 10⁻¹ to 10⁻⁵ concentrations. Seeds of test crop plant *Raphanus sativus* L. var. 'Hybrid 11' collected from local market were surface sterilized with 0.1% mercuric chloride and washed thoroughly. 30 seeds were placed in three Petri dishes. Germinating paper was used. 5 to 10 ml extract was added in every Petri plate. Seeds were allowed to germinate in the laboratory conditions. Measurements on 5th day were taken. Percentage inhibition or stimulation over control and ANOVA variance was calculated.

% Inhibition or stimulation: (C-T / C) X100 (Where C: control, T: treatment).

Graph 1 : Effect of leaf extracts of *Butea*, *Limonia* and *Semecarpus* on Seedling growth of *Raphanus sativus* L var 'Hybrid 11'

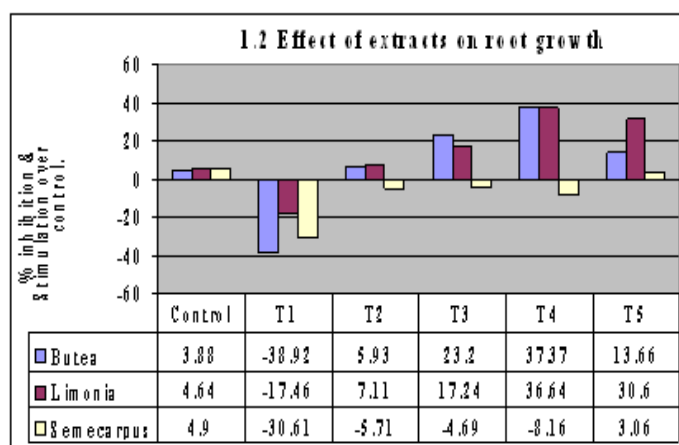
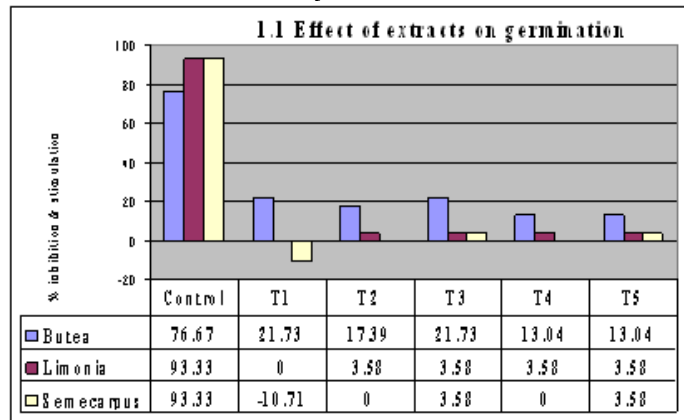
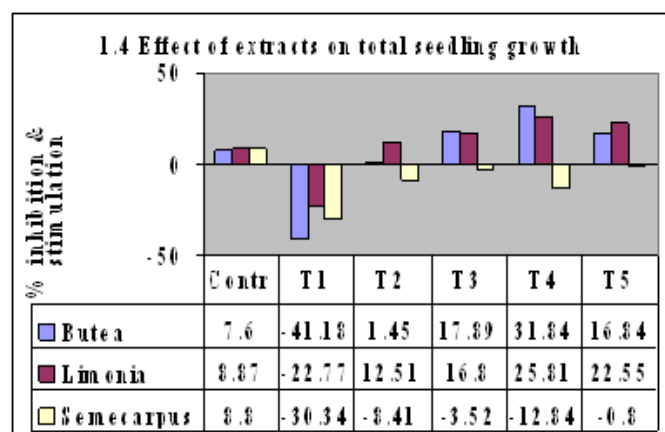
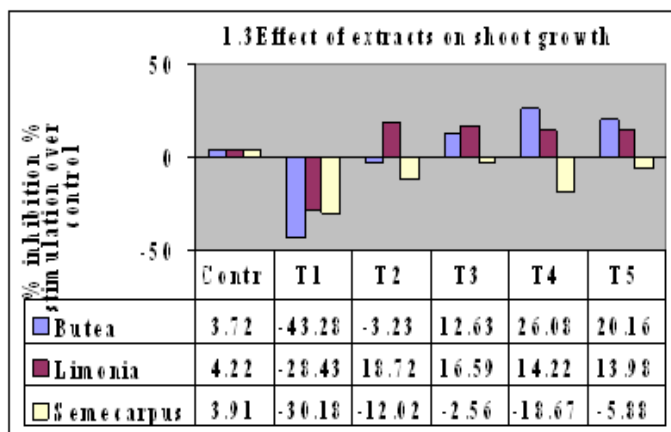


Table 1: Effect of aqueous leaf extracts of *Limonium*, *Semecarpus* and *Butea* on germination & seedling growth of *Raphanus sativus* L.'Hybrid 11'.

Plant source	Conc.	Rg	Sg	TSg	Ger
	Control	3.88a	3.72a	7.6a	76.67
	10 ⁻¹	2.37b	2.11b	4.47b	93.33
		(-38.92)	(-43.28)	(-41.18)	[21.73]
	10 ⁻²	4.11c	3.6c	7.71c	90
<i>Butea monosperma</i>		[5.93]	(-3.23)	[1.45]	[17.39]
(Lam)Taub	10 ⁻³	4.78d	4.19d	8.96d	93.33
(Palas)		[23.2]	[12.63]	[17.89]	[2173]
	10 ⁻⁴	5.33e	4.69e	10.02e	86.67
		[37.37]	[26.08]	[31.84]	[13.04]
	10 ⁻⁵	4.41f	4.47f	8.88f	86.67
		[13.66]	[20.16]	[16.84]	[13.04]
	Control	4.64a	4.22a	8.87a	93.33
	10 ⁻¹	3.83b	3.02b	6.85b	93.33
		(-17.46)	(-28.43)	(-22.770)	0
	10 ⁻²	4.97c	5.01c	9.98c	96.67
<i>Limonia acidissima</i> L.		[7.11]	[18.72]	[12.51]	[3.58]
(Kauoth)	10 ⁻³	5.44d	4.92d	10.36d	96.67
		[17.24]	[16.59]	[16.8]	[3.58]
	10 ⁻⁴	6.34e	4.82e	11.16e	96.67
		[36.64]	[14.22]	[25.81]	[3.58]
	10 ⁻⁵	6.06f	4.81f	10.87f	96.67
		[30.6]	[13.98]	[22.55]	[3.58]
	Control	4.9a	3.91a	8.8a	93.33
	10 ⁻¹	3.4b	2.73b	6.13b	83.33
		(-30.61)	(-30.18)	(-30.34)	(-10.71)
	10 ⁻²	4.62c	3.44c	8.06c	93.33
<i>Semecarpus</i>		(-5.71)	(-12.02)	(-8.41)	0
<i>anacardium</i> L.	10 ⁻³	4.67d	3.81d	8.49d	96.67
(Bhelva)		(-4.69)	(-2.56)	(-3.52)	[3.58]
	10 ⁻⁴	4.5e	3.18e	7.67e	93.33
		(-8.16)	(-18.67)	(-12.84)	0
	10 ⁻⁵	5.05f	3.68f	8.73f	96.67
		[[3.06]	(-5.88)	(-0.8)	[3.58]

All values in a row followed by different letters are significantly different at 0.5% P-level.

ANOVA multiple range test. {figures in parentheses indicate % inhibition or stimulation over control, where Sg:shoot growth, Rg:root growth, TSg:total seedling growth }



(Where T1 to T5 : leaf Extract concentrations 10^{-1} to 10^{-5})

Results and discussion

Effect of leaf extracts of *Butea*, *Semecarpus* and *Limonia* on root, shoot and total seedling growth of *Raphanus sativus* L.var. 'Hybrid 11'.

Aqueous leaf extracts of *Butea*, *Limonia* exerted inhibition of root growth of the test plant at 10^{-1} (higher) concentration by

38.92% and 17.46% respectively. However at lower extract concentrations showed stimulation. *Semecarpus* leaf extracts (10^{-1} to 10^{-5}) inhibited root growth of the test plant. Inhibition decreased with dilution of the extract. (Table 1, graph 1.2).

Butea, *Limonia* exerted inhibition of shoot and total seedling growth of the test plant at higher and promoted growth at lower leaf extract concentrations. *Semecarpus* exerted inhibition that went on decreasing with decrease in leaf extract concentration.

Seed germination of the test plant was promoted by 13.04% to 21% by *Butea* extract, 3.58% by *Limonia*. *Semecarpus* exerted inhibition by 10.71% at 10^{-1} concentration.

Summary and conclusion

The multipurpose forest trees viz. *Butea*, *Limonia* and *Semecarpus* are allelopathic. They are stimulatory as well as inhibitory to the crop plants.

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References

- Kaletha, M.S. Bhatt, B.P. and Todaria, N.P. (1996). Tree-crop interactions in traditional Agroforestry systems of Himalayas. I. Phytotoxicity effects of farm trees on food crops. *Allelopathy Journal* 3 (2): 247-250.
- Mohmed-Saleem, M.A. and Fawusi, M.O.A. (1983). Agri. Ecosyst. Environ. 10, 347-352 in Narwal, S.S. 2004. *Allelopathy in Crop Production*. Scientific Publisher, Jodhpur (India).
- Molisch Hans (1937). "The Influence of one plant on another: Allelopathy". Edited by Narwal S.S., (2001) Translated by L.J. La Fleur & M.A. Bari Malik. Scientific Publisher, Jodhpur (India).
- Narwal S.S. and P. Tauro (1994). *Allelopathy in Agriculture and forestry*. Scientific Publisher, Jodhpur (India).