

# ALLELOPATHY OF *Limonia acidissima* L on *Raphanus sativus* L (Japani)

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## ABSTRACT

The effects of aqueous leaf root and stem leachates of different concentrations (2.5%, 5% and 7.5%) of plant parts of *Limonia acidissima* L (Rutaceae) from 'Garbhagiri hills of pathardi Tahsil (longitude 19° 09'N, latitude 75° 10'E) were tested on germination and seedling growth of *Raphanus sativus* L (Var Japani) Family Brassicaceae. Leachates of 7.50% concentration of *Limonia acidissima* L. inhibited seedling growth parameters of 'Japani' variety of *Raphanus sativus* L. in an order of: **Stem > Leaf > Root.**

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## Introduction

Molisch (1937) introduced the word '**Allelopathy**' (Greek words: '*allelon*' means reciprocal and '*pathos*' means that happens to one) for harmful as well as beneficial, biochemical and reciprocal interactions among plants including microorganisms. Allelopathy is defined as "any direct or indirect harmful/useful effect by one plant on another through the synthesis and secretion of chemicals into the environment." Allelopathy is a current area of research. It may be useful in agriculture to increase yield, minimize some problems related to multiple cropping systems, soil productivity and availability of nutrients in soil. Allelopathy, a multidisciplinary subject and research in it will definitely establish a boon in agricultural and forestry production (Narwal and Tauro, 1994).

Leaves of *Feronia limonia* Linn contain tannins, phenols, proteins, aminoacids, flavanoids, triterpinoids, vitamins and glycosides (Syed *et al*, 2011). Leaves of *Feronia limonia* (L) Swingle are analgesic in effect (Khare *et al* 2011).

## Material & Methods

10% stock solutions of aqueous leachates were obtained by soaking cut plant parts of *Limonia acidissima* L (Leaves, root and stem) in distilled water for 24h. Stock leachate solutions were filtered, and diluted to 2.5 %, 5 %, and 7.5 % concentrations (Narwal, 1994). Effect of these three concentrations on seedling growth parameters viz. seed germination (Ger), Shoot growth (Sg), Root growth (Rg) and Total seedling growth (TSg) of test crop plants viz. *Raphanus sativus* L. 'Japani' were recorded after 5<sup>th</sup> day. Seeds of test plants were surface sterilized with 0.01% Mercuric chloride followed by thorough washing with distilled water before use. Ten seeds/ plastic container were germinated in sterilized containers of 12cm diameter, using germination paper or

Whatman No.1 filter paper. Triplicates of the containers were maintained. 10 ml of extract was added in the Petri dishes/containers containing 10 seeds each. The slight emergence of radical was considered as a sign of germination. Germination percentage was calculated. Photographs were taken with digital camera ('Sony' make). Percentage inhibition or stimulation of 'Ger' (seed Germination), 'Rg' (Root growth), 'Sg' (Shoot growth) and 'TSg' (Total seedling growth) over control was calculated from which graphs were drawn.

Effects of leachates on Sg, Rg and TSg were statistically analyzed (single factor ANOVA followed by CD at 0.05% and Tukey's HSD test) for finding out any correlation in between extract concentration and seedling growth and denoted by alphabets (a, b, c, d).

## Result and Discussion

### 1. Effect of stem leachates on 'Japani' variety:

Stem leachates of *Limonia* exerted promotory as well as inhibitory effect. Lower stem leachate concentrations **promoted** 'Rg', 'Sg' and 'TSg' by 2.24%, 13.43% and 8.26% over control respectively. Higher (5.00 to 7.50%) leachate concentrations **inhibited** 'Rg', 'Sg' and 'TSg' by 36.32 to 52.02%, 11.22 to 14.23%, and 22.99 to 31.99% over control respectively (Table NO 1, Graph NO. C).

### 2. Effect of root leachates on 'Japani' variety:

With an exception, root leachates 2.50% conc. **promoted** of 'Rg' by 5.87%. Root leachates of *Limonia* **inhibited** seedling growth parameters viz. 'Rg', 'Sg' and 'TSg' by 19.02 to 29.35%, 4.13 to 6.11% and 0.09 to 16.12% over control respectively. Inhibition was not significant and concentration correlated (Table NO 1, Graph NO. B).

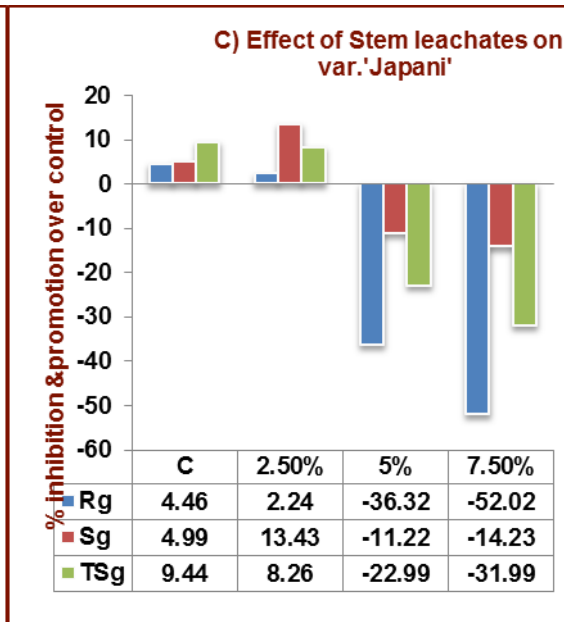
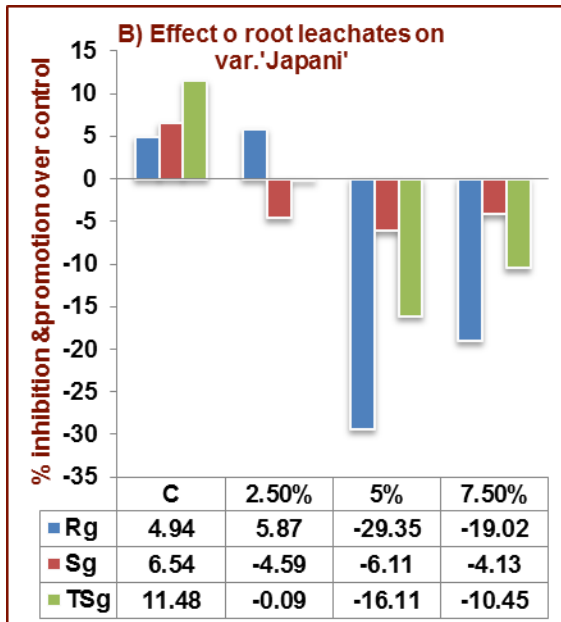
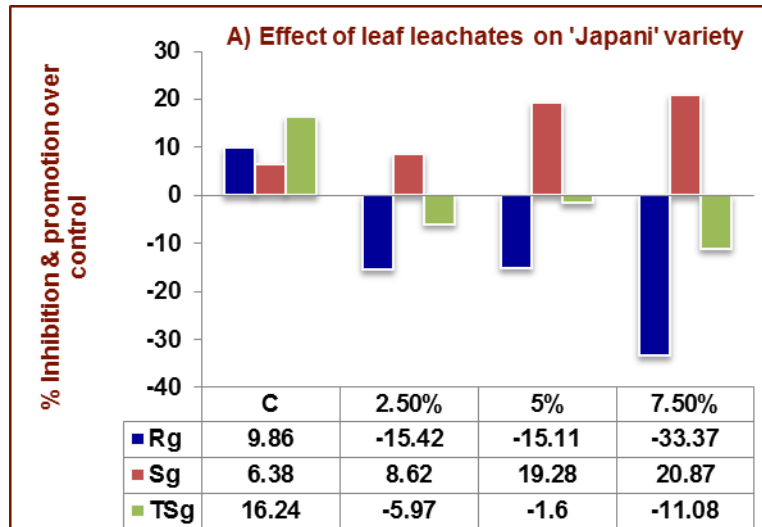
**3. Effect of leaf leachates on ‘Japani’ variety:**

Leaf leachates of *Limonia* exerted **promotory** effect on shoot growth, 8.62 to 20.87% over control. ‘Ger’, ‘Rg’ and ‘TSg’ were **inhibited** by 3.33%, 15.11 to 33.37 %, and 1.60 to 11.08% over control respectively. ‘Rg’ was significantly inhibited ( $P < 0.05\%$ ) (Table NO 1, Graph NO A).

**Summary conclusion**

Leachates of 7.50% concentration of *Limonia acidissima* L. inhibited seedling growth parameters of. ‘Japani’ variety of *Raphanus sativus* L. in an order of: **Stem >Leaf >Root.**

**Graph No: 1 Effect of Leaf root & stem leachates of *Limonia acidissima* L on seedling growth of varieties of *Raphanus sativus* Linn.**



[Where Rg: root growth, Sg: shoot growth, TSg: total seedling growth, Figures indicate % inhibition (-) and % promotion (+) over control ( C), 2.50 to 7.50% : Extract concentration ]

Table NO: 1 Effect of leachates of *Limomia acidissima* L. on germination & seedling growth of varieties of *Raphanus sativus* Linn.

Leachate	R.sativusL. Variety	Growth Parameters	Control	Leachate concentration			CD at 0.05%	P-value at 0.05%
				2.50%	5%	7.50%		
Stem	Japani	Rg	4.46a ± 0.56	4.56a ± 0.62 (2.24)	2.84b ± 0.39 (36.32)	2.14b ± 0.40 (52.02)	0.94	0.002
		Sg	4.99a ± 0.58	5.66ab ± 0.66 (13.43)	4.43a ± 0.65 (11.22)	4.28a ± 0.73 (14.23)	1.24	0.52
		TSg	9.44a ± 1.07	10.22ab ± 1.21 (8.26)	7.27a ± 0.98 (22.99)	6.42ac ± 1.09 (31.99)	2.04	0.1
		Ger %	96.7	83.30 (13.86)	100.00 (3.41)	93.30 (-3.40)		
Root	Japani	Rg	4.94a ± 0.51	5.23a ± 0.53 (5.87)	3.49b ± 0.38 (29.35)	4.00b ± 0.43 (19.02)	0.87	0.03
		Sg	6.54a ± 0.60	6.24a ± 0.64 (-4.58)	6.14a ± 0.63 (-6.11)	6.27a ± 0.64 (-4.13)	1.18	0.72
		TSg	11.48a ± 1.05	11.47a ± 1.07 (-0.09)	9.63a ± 0.94 (16.12)	10.28a ± 0.98 (10.45)	1.89	0.78
		Ger %	93.33	96.70 (3.61)	90.00 (-3.57)	93.33 (0.00)		
Leaf	Japani	Rg	9.86a ± 0.76	8.34b ± 0.65 (15.42)	8.37b ± 0.62 (15.11)	6.57c ± 0.43 (33.37)	1.17	0.005
		Sg	6.38ab ± 0.42	6.93a ± 0.42 (8.62)	7.61a ± 0.50 (19.28)	7.87a ± 0.40 (20.87)	0.81	0.07
		TSg	16.24ab ± 1.06	15.27a ± 0.88 (-5.97)	15.98a ± 0.93 (-1.60)	14.44a ± 0.69 (11.08)	1.68	0.49
		Ger %	100	96.67 (-3.33)	96.67 (-3.33)	100 .00 (0.00)		

Data presented are means of three replicates; values within the same row with different letters are significantly different at 0.05% P-level by Single factor ANOVA test followed by CD & Tukey's test. [Figures in parentheses indicate % stimulation (+) and % inhibition (-) over control; Sg: shoot growth, Rg: root growth, TSg: total seedling growth and Ger: seed germination :]

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