



## Allelopathic potential of *Coleus* on water hyacinth

I. Gnanavel and R.M. Kathiresan

Department of Agronomy, Annamalai University, Annamalainagar, Tamil Nadu 608 002

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Water hyacinth (*Eichhornia crassipes* (Mart.) Solms - Laubach: Pontederiaceae) is one of the most troublesome aquatic weeds in India. This affects water quality, water traffic, fishing potential, hydro electricity generation, water use *etc.* The Veeranum lake and its distributaries in Tamilnadu in India, forms the major irrigation source that covers large rice tract of the state with a command area of 18,000 ha. The weed severely invaded Veeranum distributaries (Kannan and Kathiresan 1999). The physical removal is not cost effective and sustainable which may be realized that Tamil Nadu state Government spent Rs.1.74 crores for cleaning water hyacinth from Ooty lake during single season (The Hindu 2003). The lake was again infested with the weed. The use of herbicides is associated with risk such as water quality deterioration, residual effect *etc.* Biological control using insects offers satisfactory control but takes long time usually 2 to 4 years. An Indian medicinal herb *Coleus amboinicus/ aromaticus*, (*Coleus* spp.) showed remarkable allelopathic inhibition of *E. crassipes* (Kathiresan 2000). Based on this observation, the present study was undertaken to compare the allelopathic potential of different parts of *Coleus* spp. on *E. crassipes*.

The experiment was conducted at Annamalai University, Tamil Nadu, India during 2004 to compare allelopathic potential of different part of *Coleus* spp. on water hyacinth. Different parts of *Coleus* spp., *viz.* leaf, stem, whole plant along with leaf and stem were collected separately; shade dried and ground to fine powder in Willey mill. Leaf, stem and whole plant powders were applied alone and in combination (Table 1) on medium growth stage of water hyacinth (weight 100-120 g). The plastic pots were used in the study and on an average each pot accommodated five plants of *E. crassipes*. The experiment was conducted in completely randomized design with five replications. Percentage reduction in fresh weight and chlorophyll content of water hyacinth was recorded at 3 days intervals (in comparison with initial fresh weight of plants in the same treatment). Chlorophyll content of *E. crassipes* was estimated at 3 days interval by extracting

the leaf tissue using dimethyl sulphoxide (DMSO) (Hiscox and Israeltam 1979). The experimental data were statistically analyzed.

The magnitude of inhibition varied with varying combination of different parts of *Coleus* spp. as well as with varying duration of exposure (Table 1). Among the different parts of *Coleus* spp., leaves showed higher maximum inhibition with 100% reduction in chlorophyll content and fresh weight on 6 and 9 DAT (days after treatment), respectively compared to the stem and whole plant powders. This could be due to higher content of active allelopathic principles such as carvacrol, thymol and others as demonstrated by Vasquez *et al.* (1999). This was followed by the combination of 3/4<sup>th</sup> of dried leaf powder (18.75 g/l) + 1/4<sup>th</sup> of dried whole plant powder (6.25 g/l). Dried stem powder (25 g/l), imparted only 19.61 and 16.98% reduction in fresh weight and chlorophyll content, respectively on 9 DAT. However, 100% reduction in fresh weight and chlorophyll content of the weed was observed with other treatments comprising 3/4<sup>th</sup> of dried leaf powder (18.75 g/l) + 1/4<sup>th</sup> of dried stem powder (6.25 g/l), 3/4<sup>th</sup> of dried leaf powder (18.75 g/l) + 1/4<sup>th</sup> of dried whole plant powder (6.25 g/l), 1/2 of dried leaf powder (12.5 g/l) + 1/2 of dried whole plant powder (12.5 g/l) on 12 and 6 DAT, respectively.).

With increase in period of exposure, *viz.* 12, 15, 18 and 24 DAT, all the treatments except full dose of stem powder registered 100% reduction in fresh weight and chlorophyll content of the weed. The stem powder exhibited least allelopathic potential with a chlorophyll content and fresh weight reduction of 29.87 and 38.49% on 15 and 24 DAT, respectively. Accordingly, the whole plant powder also showed a lesser magnitude of inhibitory response, compared to leaf powder. Result showed that all plant parts possessed allelopathic principles capable of controlling *E. crassipes*, however, leaves possessed high allelopathic activity. If adequate quantities of leaf are not available, even whole plant of *Coleus* spp. may be used as this also offered reduction in chlorophyll content and fresh weight of the weed within 21 DAT. However, care need to be taken that either three fourth or at least half of the quantity of plant product is constituted by the leaf powder.

\*Corresponding author: ignanavel@gmail.com

**Table 1. Allelopathic potential of different parts of *Coelus* spp. on *Eichhornia crassipes***

Treatment	Percentage reduction in fresh weight					Percentage reduction in chlorophyll content					
	1 DAT	6 DAT	12 DAT	18 DAT	24 DAT	1 DAT	3 DAT	6 DAT	9 DAT	12 DAT	15 DAT
Leaf powder (25 g/l)	38.5	72.7	100.0	100.0	100.0	53.7	78.8	100.0	100.0	100.0	100.0
Stem powder (25 g/l)	4.8	15.1	23.4	31.2	38.5	5.0	11.2	17.0	20.9	26.7	29.9
Whole plant (25 g/l)	16.0	32.9	58.4	84.4	100.0	14.7	51.1	81.1	100.0	100.0	100.0
3/4 <sup>th</sup> of leaf powder + 1/4 <sup>th</sup> of stem powder	27.8	58.8	100.0	100.0	100.0	49.0	70.6	100.0	100.0	100.0	100.0
3/4 <sup>th</sup> of leaf powder + 1/4 <sup>th</sup> of whole plant powder	28.9	63.8	100.0	100.0	100.0	49.9	69.0	100.0	100.0	100.0	100.0
1/2 of leaf powder + 1/2 of stem powder	15.0	38.2	77.1	100.0	100.0	18.0	54.5	69.0	81.7	100.0	100.0
1/2 of leaf powder + 1/2 of whole plant powder	27.0	56.9	100.0	100.0	100.0	47.1	68.2	100.0	100.0	100.0	100.0
1/4 <sup>th</sup> of leaf powder + 3/4 <sup>th</sup> of stem powder	14.0	30.0	55.5	77.9	100.0	13.6	28.1	49.9	68.2	81.0	100.0
1/4 <sup>th</sup> of leaf powder + 3/4 <sup>th</sup> of whole plant powder	14.7	38.6	74.4	100.0	100.0	16.4	53.0	68.4	80.0	100.0	100.0
Untreated control	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LSD (P=0.05)	2.12	3.18	3.11	5.08	3.28	2.51	3.24	3.80	4.28	2.71	2.03

DAT- Days after treatment

### SUMMARY

Among different parts of *Coleus* spp., dried leaf powder (25 g/l of water) was found most effective in reducing the fresh weight and chlorophyll content of *E. crassipes* and showed 100 reduction on 9 and 6 days after treatment, respectively. Combination of 3/4<sup>th</sup> of dried leaf powder (18.75 g/l) + 1/4<sup>th</sup> of dried whole plant powder (6.25 g/l) was also found effective next to 25 g/l dried leaf powder. Dried stem powder (25 g/l) showed minimum reduction in fresh weight and chlorophyll content.

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