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Short communication

Eupatorium [*Chromolaena odorata* (L.) King and Robinson] biomass as a source of organic manure in okra cultivation

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Abstract

Eupatorium [*Chromolaena odorata* (L.) King and Robinson] is a noxious weed that has the potential to produce large quantities of mineral nutrient-rich biomass, which may be used as a source of organic manure in crop production. In the present study, response of okra, an important vegetable crop of Kerala, to applications of eupatorium compost and green leaf manure, was evaluated along with four other sources of organic manures (vermicompost, coirpith compost, fresh poultry manure and farm yard manure) on equivalent N basis (12 t ha^{-1} of farmyard manure). The results clearly suggest the usefulness of composting the weed biomass before use. Indeed, eupatorium compost was similar to poultry manure in terms of crop performance and had the highest B:C ratio.

Key words: Allelochemicals, B:C ratio, bhindi, composting, net returns

Eupatorium [*Chromolaena odorata* (L.) King and Robinson] is a noxious weed in the humid tropics. It has the potential to produce considerable quantities of biomass. The luxuriant vegetative growth of this weed coupled with the spreading root systems extract large quantities of nutrient elements from the soil, and may act as a nutrient pump (Obatolu and Agboola, 1993). Farmers traditionally use the succulent biomass of this weed as a source of green manure in wetland paddy cultivation. But there are a few reports, which show that addition of fresh biomass may inhibit crop growth due to allelopathy (Ambika and Jayachandra, 1992). Yet, there are no reports on the application of eupatorium derived organic manures on vegetable crops from southern Kerala. Hence the potential of eupatorium as a source of green leaf manure and composted material was evaluated in a field study involving okra (*Abelmoschus esculentus* L. Moench).

The experiment was conducted in the garden land of the Instructional Farm, Vellayani, Thiruvananthapuram, Kerala during June 2001 to February 2002. The soil of the experimental site was a sandy clay loam, with low N, and medium P and K levels. The pH of the soil was 5.2. Composting was done using standard techniques for four months. Prior to that, the weed biomass was chopped and mixed with cowdung-soil-slurry in the proportion of 70:20:10 (eupatorium-cowdung-soil) on weight basis. Other organic sources compared included, eupatorium as green manure (fresh biomass), vermi-compost prepared using farm wastes, coirpith compost prepared using the fungal organism *Pleurotus* sp., fresh poultry manure and farm yard manure. The field experiment was laid out in randomized block design with six treatments (Table 1) and four replications; the test variety being 'Arka Anamika'. The quantity of organic sources was computed as equivalent to 12 t ha^{-1} of farmyard manure (KAU, 1996) on N basis and additional NPK was given at the rate of 50:8:25 kg ha^{-1}.

The data on response of okra to various organic materials revealed significant differences. Fruit yield was highest in the treatment receiving poultry manure, which however, was comparable with that of eupatorium compost and

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Table 1. Effects of different organic sources on yield and economics of okra in the sandy clay loam soils of Vellayani

Treatments	N (%)	Quantity applied (t ha^{-1})	Fruit yield (t ha^{-1})	Net income (Rs ha^{-1})	Benefit-cost ratio
Eupatorium compost	0.76	8.68	7.05	24345	1.97
Eupatorium as green manure	1.10	6.00	4.74	9075	1.38
Vermi-compost	0.78	8.46	6.08	5495	1.15
Coirpith compost	0.51	12.94	5.21	1395	1.04
Poultry manure	0.82	8.02	8.69	26189	1.76
Farm yard manure	0.55	12.00	6.75	18645	1.65
CD (0.05)	-	-	2.14	4287.51	0.47

farmyard manure. Conversely, coirpith compost, vermi-compost and eupatorium green manure recorded significantly lower yields. Indeed, fruit yield was lowest under eupatorium as green manure treatment.

Economic analysis showed that, poultry manure gave the highest net profit; nonetheless, eupatorium compost was on par with that treatment. Net profit was lowest for eupatorium as green manure while coirpith, vermicompost and farmyard manure were intermediate in this respect. Likewise, B:C ratio was highest for eupatorium compost followed by poultry manure and farmyard manure, while coirpith compost recorded the lowest B:C ratio.

The response pattern suggests that there is a good potential for utilizing eupatorium biomass as a source of organic manure in vegetable cultivation. The results, however, showed an apparent detrimental effect of fresh eupatorium green manure application to okra. A plausible explanation for this is the presence of inhibitory allelochemicals in the eupatorium foliage as postulated by Ambika and Jayachandra (1992). Nonetheless, when the composted material was applied, the yield level was at par with that of poultry manure, implying degradation of the potent allelochemicals during the composting process. This, in turn, suggests that allelochemicals may be a strong deterrent in using fresh eupatorium biomass; composting, however, may facilitate the safe use of such materials as organic manures in vegetable production.

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