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SHORT COMMUNICATION

Allelopathic potential of mango leaves for weed management in rose (*Rosa hybrida* cv. Happiness) basins

P. CHALLA* and V. RAVINDRA

Division of Plant Physiology and Biochemistry
Indian Institute of Horticultural Research, Hessaraghatta, Bangalore - 560 089, India

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INTRODUCTION

Allelopathy plays a significant role in the cultivation of horticultural crops. In recent years, it is being explored as one of the means for weed management to reduce chemical inputs into the horticultural production systems. The allelochemicals released from cover crops or crop residues/ mulches provide weed control (4,6). Allelopathic suppression of weeds is receiving greater attention as a possible alternative weed management strategies (1). A comparison on the use of herbicides and horticultural crop wastes like dry leaves of mango and neem trees as mulches to manage weeds in rose (*Rosa hybrida* cv. Happiness) basins is reported in the present study.

MATERIALS AND METHODS

Pruned rose Cv. Happiness plants were planted in July, 1997 at a spacing of 1.0 × 1.0 m in 12m^2 plots having 12 plants each in the experimental field at the Indian Institute of Horticultural Research, Hessaraghatta. The treatments were : pre-emergence water sprays of diuron (@ 1.0 kg a.i./ha), Oxyfluorfen (@ 0.5 kg a.i/ha) in combination with sulfosate and glyphosate (8 ml/l), mango (*Mangifera indica* L.) and neem (*Azadirachta indica* L.) dry leaf mulching @ 20 kg/plot 15 days after planting, manual weeding and weedy check. The experiment was laid out in randomised block design with three replications. Observations were recorded on weed flora density and biomass and rose flower yield per plot.

Simultaneously, a laboratory experiment was conducted to test the effect of leaf leachates of mango on the germination and seedling growth of some cereals and vegetable seeds. The dry mango leaves were soaked for 24 h in distilled water @ 20 g/litre at ambient temperature (28°C) and filtered to collect the leachates. Petriplates (Dia. 9 cm) lined with Whatman No. 1 filter paper were used for conducting the germination test. Seven ml leachate was added to each petriplate and the same amount of distilled water served as control. The petriplates were kept at ambient temperature of 28°C.

*Correspondence author

RESULTS AND DISCUSSION

The weed flora density and biomass were significantly influenced by the differe treatments. The predominant weeds in the experimental area were : Monocots (*Cyperu Cynodon, Echinochloa* Spp, *Digitaria marginata, Panicum* and *Commelina benghalensi* and Dicots (*Amaranthus viridis, Tridax procumbens, Euphorbia hirta, Mimosa pudic Blumea mollis, Lagasca* Spp, *Phyllanthus niruri, Sonchus arvensis* and *coronopus didym* (Tables 1, 2).

Table 1. Effect of weed control treatments on weed profile in rose basins

Treatments	Monocot weed spp.		Dicot weed spp.	
	60 DAT	120 DAT	60 DAT	120 DAT
Weedy check	*Cyperus, Cynodon Echinochloa, Digitaria, Setaria, Commelina, Eleusine, Eragrostis*	*Cyperust, Cynodon, Echinochloa, Digitaria, Setaria, Commelina, Eleusine, Eragrostis*	*Euphorbia, Mimosa, Blunea ,Achyranthus Phyllanthus, Tridax, Amaranthus, Coronopus, Malvestrum, Urena*	*Euphorbia, Mimosa Blumea, Achyranthus, Phyllanthus, Tridax, Amaranthus , Coronopu Malvestrum, Urena*
Hand weeding (monthly)	*Cyperus, Cynodon, Echinochloa, Commelina*	*Cyperus, Cynodon, Commelina*	*Euphorbia, Blumea, Tridax , Lagasca, Bidens, Mimosa, Amaranthus*	*Euphorbia, Blumea, Tridax, Phylanthus*
Mango leaf mulch	*Cyperus, Cynodon*	*Cyperus, Cynodon, Commelina*	Nil	*Euphorbia, Blumea*
Neem leaf mulch	*Cyperus , Cynodon, Echinochloa*	*Cyperus , Cynodon, Commelina*	*Lagasca, Blumea*	*Euphoribia, Blumea, Mimosa, Tridax, Lagasca*
Radish live mulch	*Cyperus, Cynodon, Echinochloa, Commelina*	*Cyperus , Cynodon, Echinochloa , Echinochloa*	*Lagasca, Blumea, Amaranthus, Coronopus*	*Euphorbia, Blumea, Lagasca, Amaranthu Coronopus*
Diuron + Sulfosate	*Cyperus, Cynodon*	*Cyperus, Cynodon, Commelina*	*Euphorbia*	*Euphorbia, Blumea, Tridax, phyllanthus*
Oxyflurofen +glyphosate	*Cyperus, Cynodon*	*Cyperus, Cynodon, Commelina*	*Euphorbia*	*Euphorbia, Blumea, Tridax, Phyllanthus*
Oxyflurofen +glyphosate	*Cyperus, Cynodon*	*Cyperus, Cynodon, Commelina*	*Euphorbia*	*Euphorbia, Blumea, Tridax, Phyllanthus*

DAT = Days after treatment

Table 2. Effect of weed control treatments on *Cyperus* and *Cynodon* density in Rose during July pruning

Treatments	*Cyperus rotundus* (No/m²)		*Cynodon dactylon* (No/m²)	
	30 DAS	60 DAS	30 DAS	60 DAS
Weedy check	34.0	54.0	36.0	80.0
Hand weeding monthly	33.2	50.0	18.0	76.0
Mango leaf mulch	6.0	11.2	5.2	22.0
Neem leaf mulch	5.2	8.0	0.0	0.0
Radish live mulch	17.2	20.2	0.0	5.2
Diuron + sulfosate	20.6	20.2	6.0	20.2
Oxyfluorfen + glyphosate	20.6	33.2	9.2	5.2
Oxyfluorfen + sulfosate	30.0	30.0	12.0	12.0

DAS = Days after sowing

The observation of the experimental plots 60 days after treatment imposition, indicated that all the dicot weeds except *Euphorbia hirta* were controlled in the herbicide treated and mango leaf mulched plots. In the neem leaf mulched plots, *Blumea* and *Lagasca* were also present. After 120 days, the observations indicated that only *Euphorbia hirta*, *Amaranthus viridis* and *Lagasca* were present in the herbicide treated and mango leaf mulched plots. While in other pots, most of the dicot weeds were present (Table 1,2). The reduction in weed biomass was due to the reduction in the weed number and suppressed weed growth (Table 3).

Table 3. Effect of weed control treatments on Rose flower yield and weed dry weight during July, 1997 and January, 1998 pruned plots

Treatments	Rose flowers (No/plot)		Weed dry weight (g/m²*) Jan. 1998	
	July, 1997	Jan. 1998	Monocots	Dicots
Weedy check	26	86	34.9	19.4
Handweeding (monthly)	30	107	24.6	8.0
Mango leaf mulch	26	117	10.4	7.5
Neem leaf mulch	20	90	12.3	20.5
Radish live mulch	31	106	14.0	8.7
Diuron + sulfosate	38	118	18.8	8.0
Oxyfluorfen + glyphosate	29	107	21.2	7.4
Oxyfluorfen + sulfosate	26	89	30.0	9.2

* 60 days after treatment

The treatments did not affected the crop growth. The rose flower numbers wa marginally higher in herbicide treated and mango leaf mulched plots. Various organ mulches like straw, leaves, husks and crop residues have been successfully used in cult vated fields. In banana, use of organic mulches increased the yield (2,3). The benefici effects of mango leaf mulch on improving yield have also been reported in cauliflower (5

The mango leaf leachates did not affect germination of the finger millet, whea french bean, tomato, brinjal, pumpkin, onion, cowpea and chillies even at 2% concentratio (Table 4). However, the radicle growth in finger millet and french bean was reduced by 8 and 89%, respectively. In radish the cotyledonary leaves were etiolated and there was reduction in chlorophyll 'a' and 'b' by 50 and 75% respectively (Table 5).

Table 4. Allelopathic effect of mango leaf leachates on fingermillet and french bean seed germinatio and seedling growth in bioassay*

Leachate concentration (%)	Finger millet			French bean		
	Germination (%)	Root length (mm)	Shoot length (mm)	Germination (%)	Root length (mm)	Shoot length (mm)
Control (DW)	100	4.60	2.3	93	9.2	2.50
1.00	100	0.99	1.09	86	0.99	1.07
0.50	100	2.35	1.81	90	2.10	2.00
0.25	100	3.72	1.85	96	3.61	2.48

Control = Distilled water

*No adverse effect was seen on germination and seedling growth of brinjal, tomato, pumpkin, onion, cowpea and chillie

Table 5 . Effect of mango leaf leachates of leaf chlorophyll content of Radish Cv. Arka Nishant

Leachate concentration (%)	OD at 660 μ chlorophyll 'a'	OD at 645μ chlorophyll 'b'	OD at 645 μ Total chlorophyll
Control	0.30	0.12	0.18
1.00	0.15	0.03	0.07
0.50	0.24	0.06	0.14
0.25	0.27	0.10	0.15

Control = Distilled water, OD= Optical denesity

It is presumed that the high content of phenolics in mango leaves may be responsible for the inhibition of seedling growth in the laboratory bioassay. Further detailed studies are required to explore the bioherbicidal nature of mango leaves and the chemical nature of the allelopathins of mango leaf leachates.

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