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## Effect of *Casuarina equisetifolia* J. R. leaf litter leachates on germination and seedling growth of rice and cowpea

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### INTRODUCTION

*Casuarina equisetifolia* J. R. is a commonly grown legume tree in coastal regions of Maharashtra. It is an evergreen tree fixing atmospheric nitrogen and sheds the needles at maturity. Therefore, nutrients absorbed by tree from lower zone of soil are recycled to the top (2). *Casuarina* has been planted in large areas under agroforestry programme but information regarding the effects of its leaf leachates on germination of field crops is meagre, therefore, the present investigations were conducted.

### MATERIALS AND METHODS

To prepare leachates, 200 g dried powdered needles of *Casuarina equisetifolia* J. R. were soaked in 1.0 l tap water for 4, 8, 12, 16, 20 and 24 h (1). Tap water as control and filtrate was used in bioassay studies on rice (*Oryza sativa* L.) 'Palghar 1' and cowpea (*Vigna unguiculata* (L.) Walp.) 'Konkan Sadabahar' in completely randomised design with three replications. One hundred seeds of rice and cowpea were placed in 15 cm diameter petridishes containing filter paper. Leachates or tap water was added as per treatment. These were allowed to germinate at room temperature (23°C, 86% RH). Germination percentage, plumule length, radicle length and dry matter were recorded at 11 days after sowing (DAS).

### RESULTS AND DISCUSSION

The different leaf leachates of *C. equisetifolia* significantly decreased the germination, plumule and radicle growth of rice and cowpea. The inhibition increased progressively with an increase in the soaking period of leachates (Table 1). Maximum inhibition in germination and seedling growth of both rice and cowpea was recorded after 24 h in leachate treatment. However, the germination of both rice and cowpea was above 80% under all the treatments at 11 DAS. Similar response in germination

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TABLE 1. Effect of *Casuarina equisetifolia* leaf leachates on germination, length and dry matter of plumule and radicle of rice and cowpea at 11 days after sowing

Soaking period of leachate (h)	Germination (%)	Plumule length (cm)	Radicle length (cm)	Dry matter/plant (mg)	
				Plumule	Radicle
<b>Rice</b>					
Control	99.6 (100)	6.68 (100)	8.92 (100)	18.85 (100)	28.99 (100)
4	96.0 (96.3)	5.07 (75.8)	1.74 (19.5)	14.50 (83.1)	11.30 (38.9)
8	96.0 (96.3)	5.01 (75.0)	1.46 (16.3)	13.95 (74.0)	11.11 (38.3)
12	93.6 (93.9)	4.55 (68.1)	1.21 (13.5)	11.94 (68.3)	9.91 (34.2)
16	92.6 (92.9)	4.35 (65.1)	1.17 (13.1)	11.82 (62.7)	8.79 (30.3)
20	84.6 (84.9)	4.20 (62.8)	1.06 (11.8)	11.16 (59.2)	5.69 (19.6)
24	82.6 (82.9)	3.89 (58.2)	0.77 (8.63)	8.19 (43.4)	3.69 (12.7)
S. E. $\pm$	1.04	0.05	0.03	0.04	0.04
C. D. at 5%	3.19	0.16	0.05	0.12	0.10
<b>Cowpea</b>					
Control	99.3 (100)	16.64 (100)	6.81 (100)	310.6 (100)	85.1 (100)
4	95.3 (95.6)	6.90 (41.4)	3.78 (55.5)	263.6 (84.8)	76.4 (89.7)
8	94.0 (94.6)	5.97 (35.8)	3.75 (50.0)	239.7 (77.2)	75.7 (88.9)
12	92.6 (93.2)	5.90 (35.4)	3.54 (51.9)	223.8 (72.0)	73.4 (86.2)
16	92.6 (93.2)	5.73 (34.4)	3.48 (51.1)	220.8 (70.8)	60.3 (70.8)
20	89.3 (89.9)	5.69 (34.1)	3.35 (49.1)	216.3 (69.9)	56.5 (66.4)
24	84.0 (84.56)	5.60 (33.6)	3.18 (46.6)	201.8 (64.9)	44.3 (52.1)
S. E. $\pm$	2.35	0.14	0.04	0.38	0.27
C. D. at 5%	7.23	0.44	0.12	1.16	0.83

Figures in parentheses indicate percentage of control.

of sorghum and sunflower to the extracts of *Casuarina equisetifolia* leaf leachates have been reported (3). Singh (3) stated that cowpea was less susceptible than sorghum to the phytotoxins in leaf extracts of leucaena, casuarina and eucalyptus.

Radicle length than plumule length in rice was affected more by the leachates but reverse was true in cowpea. Such differential effects have been reported with aqueous leaf leachates of casuarina (3), which greatly affected rice radicle length than plumule length. Likewise sorghum and sunflower radicle lengths were affected more by leaf leachates of casuarina than plumule length (3). Suresh and Vinaya Rai (4) also observed inhibition of cowpea radicle development by *C. equisetifolia* leaf leachates.

The different soaking periods with leaf leachates significantly affected the plumule and radicle dry matter of rice and cowpea. This progressively decreased with an increase in leachate soaking period. The plumule dry matter of both the test species was reduced by the same magnitude by the allelochemicals present in the leaf leachates. But the leaf leachates showed differential effect on accumulation of dry matter in radicle of cowpea and rice. Such differential sensitivity in sorghum and sunflower to leaf leachates has also been reported (3). This differential inhibition by leaf leachates may be because of differential response of cells in presence of allelochemicals (4). Accumulation of dry matter in rice radicle was severely decreased at all the soaking periods of the litter leachates than cowpea radicle.

It was concluded that leaf leachates significantly affected germination and dry matter production in rice 'Palghar 1' and cowpea 'Konkan Sadabahar'. Dry matter accumulation progressively decreased with increase in time of soaking. Casuarina leaf leachates were inhibitory to the rice than the cowpea.

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