Karnataka J. Agri. Sci.,17 (2):(324-326) 2004

Allelopathic Effect of Casuarina Litter on Germination and Seedling Growth of Cereal Crop Seeds*

Of late, agroforestry has been considered as an alternate land use system and special attention has been focused on tree component in the system approach. The trees contribute to sustainability of food production and are essential for the survival of rural lot (Palmberg, 1989). The success or failure of any system depends on several interactions going on between components of system. Phytotoxic substances exuded by many tree species are known to retard the growth of associated crop species (Suresh and Rai, 1987) and this type of influence of one plant on other through release of allelochemicals or phytotoxins is termed as allelopathy. Systematic research approach in allelopathy has started only recently in the last two decades and allelopathic influence of multi purpose tree species (MPTS) on crops are being investigated under different agro-eco systems. Hence, this investigation was carried out to study the allelopathic potential of *Casuarina equisetifolia* litter on three cereal crop seeds.

Dried needles along with seeds failing on the soil surface of *Casuarina equisetifolia* were collected and soaked in distilled water in the ratio of 110 (w/v base) for 24 hours. The leaf leachates were filtered through muslin cloth to get 10 per cent extract. This was further diluted to 5.0, 2.5 and 1.0 per cent concentration. Treatments consisted of three extract concentrations (1, 2.5 and 5 %) and distilled water as control and three cereal crop seeds (wheat, fodder maize and sorghum). Bioassay study was conducted in petriplates of 10 cm diameter replicated four times. Twenty uniform viable seeds of each crop was placed in petriplates with filter paper at the bottom and 5 ml extract of each of three concentrations and distilled water as control was applied to their respective petriplates. This was repeated at regular interval to keep the filter paper always in wet condition to provide favouarble condition for germination of seeds. The petriplates were kept at room temperature and the experiment was continued for 11 days. Observations on germination per cent at 6th and 11th day after placing seeds, shoot and root length, shoot and root dry weight per seedling only after 11th day were recorded and presented / discussed in this paper.

Germination of all the three test crops remained unaffected at one per cent leaf extract concentration when compared to control, which recorded 100 per cent germination (Fig. 1). However, five per cent extract concentration significantly inhibited the germination. The germination inhibition at five per cent concentration after 11th day ranged from 73.75 per cent in fodder maize to 66.25 per cent in sorghum. Further, shoot and root growth was also severely affected in sorghum to the maximum extent followed by wheat and fodder maize (Table1). Shoot and root dry biomass per seedling remained unaffected at lower concentration (1%) but, at higher levels (2.5 and 5.0 %) inhibition increased (Table 1). The study clearly indicated the existence of allelochemicals in the extract of casuarina litter and their inhibitory action on germination and further growth/biomass accumulation. Among the three crops, sorghum was found to be most sensitive followed by wheat and fodder maize. June (1976) reported the presence of phytotoxins, phenolics, terpenoides and organic cyamides in casuarina leachate that cause ailelopathic effect. Swaminathan (1996) found that the bark leachates of eight tree species including casuarina inhibited germination of test

* Part of Ph.D. thesis submitted by the senior senior to the Univrsity of Agricultural Sciences, Dharwad-580 005

Table 1. Shoot and root lengh and dry matter after 11th day as influenced by different concentration of Casuarina litter leachate

Treatmenst	Shoot length (cm)				Root length (cm)			
concn.	Wheat	F.maize	Sorghum	Mean	Wheat	F.maize	Sorghum	Mean
Control	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	(2086)	(20.50)	(7.75)		(23.64)	(6.94)	(4.81)	
1.0%	99.55	101.16	101.45	100.72	101.09	100.88	100.08	100.68
	(20.64)	(20.72)	(7.84)		(23.88)	(6.95)	(4.82)	
2.5%	54.10	84.30	48.88	62.42	36.11	49.52	89.77	58.46
	(11.15)	(17.22)	(3.78)		(8.38)	(3.44)	(4.32)	
5.0%	12.41	0.24	12.70	8.45	4.49	15.16	1.04	6.90
	(2.55)	(3.98)	(0.98)		(1.05)	(1.05)	(0.05)	
Mean	66.51	71.42	65.76	-	60.42	66.39	72.72	-
		S.Em±	C.D at 5%			S.Em±	C.D at 5%	
Crops (A)		1.78	5.01			2.12	5.97	
Concn (B)		1.45	4.09			1.72	4.87	
Ax B		3.55	10.02			4.23	11.94	
	Shoot weight (mg/seeding)				Root weight (mg/seedling)			
concn.	Wheat	F.maize	Sorghum	Mean	Wheat	F.maize	Sorghum	Mean
Control	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	(22.36)	(62.25)	(6.92)		(18.45)	(276.00)	(6.92)	
2.0%	97.04	99.53	101.17	99.24	98.94	97.92	102.25	99.70
	(21.50)	(61.45)	(7.00)		(18.25)	(270.00)	(7.08)	
2.5 %	46.03	86.68	43.16	58.52	35.14	43.96	80.70	53.26
	(10.20)	(53.50)	(2.98)		(6.56)	(121.25)	(5.58)	
5.0%	8.68	0.08	7.50	5.42	5.10	16.14	0.72	7.32
	(1.91)	(0.05)	(0.51)		(0.94)	(44.62)	(0.05)	
Mean	62.94	71.57	62.96	-	59.80	64.50	70.92	
		S.Em±	C.D at 5%			S.Em±	C.D at 5%	
Crops (A)		1.73	4.80			2.97	8.39	
Concn (B)		1.41	3.99			2.42	6.85	
AxB		3.46	9.78			5.94	16.78	

* Figures in parenthesis indicate the original values before percentage transformation for statistical analysis

crops. He reported the inhibition was due to phytoxins present in the extracts. Similarly, Jacob and Nair (1999) reported inhibitory effect of casuarina leaf leachates on germination, plumulse growth and radicle growth in rice and cowpea.

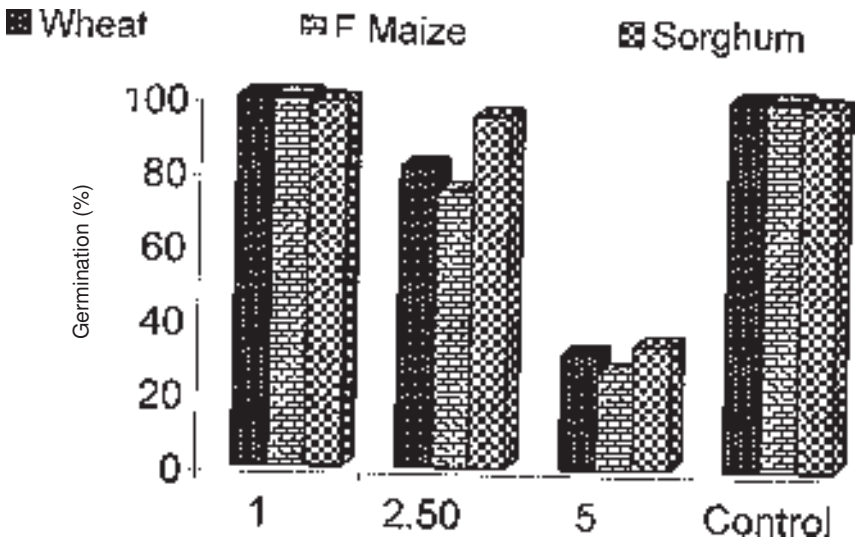

Figure 1. Germination of different crop seeds after 11th day as influenced by concentrations of Casuarina litter leachate

Department of Agronomy
University of Agricultural Sciences, Dharwad

R.H. PATIL
C.S. HUNSHAL

(Received: March, 2003)

References

JACOB,J. AND NAIR, A.M., 1999, Allelopathic effect of leaf leachates of multipurpose trees. *Allelopathy Journal*, **6** (1): 81-86.

JUNE, S.R., 1976, Investigation on allelopathy in a red leach forest. *Mauri Ora* **4**: 87-91.

PALMBERG, C.,1989, Research needs in forest tree breeding and improvement in developing countries. *Agroforestry Systems*, **9**: 29-35.

SURESH, K.K. AND RAI, R.S.V. 1987, Studies on the allelopathic effect of some agroforestry tree crops. *International Tree Crop Journal*, **4**: 109-115.

SWAMINATHAN, C.,1996, Influence of bark leachates of multi purpose tree species on the germination and seedling growth of maize, pigeonpea and sesame. *Agriculture Journal*, **3** (1): 65-70.