Short Communication

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INFLUENCE OF AQUEOUS LEAF EXTRACT OF PURPLE NUTSEDGE (*CYPERUS ROTUNDUS* L.) AND NaCl ON GERMINATION AND SEEDLING GROWTH OF WHEAT (*TRITICUM AESTIVUM* L.)

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Purple nutsedge is one of the ten worst weeds in the world (Holm 1969). Interference by purple nutsedge adversely affects the crop yield (William and Warren 1975). Water extract of purple nutsedge tubers inhibited the seed germination of 10 species and inhibition ranged from 0 to 65% and seedling growth was also inhibited (Friedman and Horowitz 1971). Aqueous extract of purple nutsedge significantly reduced the germination and seedling growth of tomato, pepper and sorghum (Saleem and Fawusi 1983).

Purple nutsedge has an allelopathic effect on the crop production (Elmore 1985). Lopes *et al* (1987) found that the extract of purple nutsedge shoot and root reduced germination and seedling growth of rice. Aqueous extract of fresh leaves at 0, 0.5, 1.0, 1.5 and 2.0% (w/v) of purple nutsedge reduced the germination of wheat seed and shoot and root growth was reduced upto 33% and 40% compared to control, respectively (Alam *et al* 1990). Some workers have reported that aqueous leaf extract of purple nutsedge and common lambsquarters and field bindweed alone and in combination with NaCl reduced the germination of wheat and rice (Alam 1996; Alam *et al* 1997, 1998). The most important aspect of the present study was to understand if the effect of salinity modifies the effect of aqueous leaf extract of purple nutsedge on the germination and seedling growth of wheat and vice versa.

Fresh leaves of purple nutsedge were collected from the Nuclear Institute of Agriculture farm, Tandojam, washed with distilled water and dried in an oven at 65 °C for 24 h. Dried leaf samples were ground in a Wiley mill to pass through a 20 mesh screen. The powdered material of 5 g quanitity was soaked in 100 ml of distilled water and stirred for 24 h. This material was filtered using Whatman filter paper no.42 and kept in a reagent bottle. Five ml of the aqueous extract were added to 0.8% agar prepared in distilled water and supplemented with 0.0 (control), 0.2 and 0.4% NaCl. Two other treatments having the same NaCl levels, but without aqueous leaf extract were also prepared. Fifty ml of each of the respective concentrations were poured into a series of glass bowls. The treatment with only agar i.e. containing no NaCl and/or aqueous leaf extract was considered as the control. Ten sterilized wheat seed (c.v. Pavon) were planted on the surface of agar contained in each bowl with the embryo side up and pointing inwards. The bowls were randomized within 3 replicates and incubated at 28 °C in the dark. The seedlings were harvested after 120 h. Germinated seeds were counted and their shoot and root lengths were measured.

Aqueous leaf extract of purple nutsedge alone and in combination with NaCl had no effect on seed germination. The effect of plant leaf extract on germination of other crops have been reported (Friedman and Horowitz 1971; Singh 1968). Saleem and Fawusi (1983) reported that aqueous leaf extract of purple nutsedge had inhibitory effect on the germination of tomato, pepper and sorghum, but contradictory results were obtained by Lopes *et al* (1987). Alam *et al* (1990) did not find any significant reduction in germination in wheat upto 0.5% concentration. It was only at the concentration of 1% and above that a reduction in germination was found. In the present study, a concentration of 0.5% only was taken which was much lower than the threshold required for inhibition of seed germination. The leaf aqueous extract alone slightly increased the shoot length (9%), but the effect was not significant compared to control. However, aqueous leaf extract in combination with NaCl and NaCl alone decreased both shoot and root lengths compared to control. The reductions in shoot length at 0.2 and 0.4% NaCl were 24 and 43 percent, respectively, while, leaf extract in combination with NaCl levels reduced the shoot length to 22 and 42 percent, respectively. Leaf aqueous extract alone reduced the root length to 29 percent compared to control (Table 1).

The leaf aqueous extract in combination with NaCl reduced the root length more than the reduction caused by NaCl levels alone. Root length was affected more than the shoot. This may be due to fact that they were in direct contact with the allelochemicals which may not have been translocated rapidly to the shoot and root. Other workers have reported that leaf extract caused inhibition if the extract was in contact with or present in the immediate vicinity of the plant roots (Alam *et al* 1996). Avers and Goodwin (1956) have showed that various phenolic compounds inhibited root cell division. One might also suspect salt toxicity or a low pH as the cause of

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Table 1

Effect of aqueous leaf extract of purple nutsedge and NaCl on germination and seedling growth of wheat

Treatment	Aqueous leaf extract		
	Germination (%)	Shoot length (cm)	Root length (cm)
Control	95 a	6.07 a (0.0)	6.61 a (0.0)
Leaf extract alone	90 a	6.66 a (+9.72)	4.71 cd (-28.75)
0.2 % NaCl alone	93 a	4.59 b (-24.39)	6.36 ab (-3.79)
0.2 % NaCl + leaf extract	95 a	4.73 b (-22.08)	4.34 cd (-34.35)
0.4 % NaCl alone	98 a	3.46 c (-43.00)	4.81 bc (-27.24)
0.4 % NaCl + leaf extract	90 a	3.52 bc (-42.01)	2.90 d (-56.13)

N.B. (i)Means in a column followed by same letter do not differ significantly at 5% level by DMRT; (ii) Value in parentheses indicates percent increase (+) or decrease (-) over control.

growth inhibinition of test species. Bieber and Hoveland (1968) found salt toxicity and pH to be of no significance in the allelopathic studies. It is, therefore, concluded that leaf extract of purple nutsedge alone or in combination with NaCl significantly reduced the shoot and root lengths of wheat under our experimental conditions.

Key words: Purple nutsedge, NaCl, Wheat, Growth

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