Original Article **Asian J Agri Biol, 2015, 3(2): 79-82.**

INFLUENCE OF SOIL APPLIED MORINGA LEAF EXTRACT ON VEGETATIVE GROWTH OF *CYPERUS ROTUNDUS*

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ABSTRACT

Allelopathy refers to the beneficial or harmful effects of one plant on another plant through the release of secondary metabolites from plant parts in both natural and agricultural systems. Moringa leaf extract (MLE) is generally considered to have enhancing or suppressing effect on the plant growth in a dose dependent manner. Therefore, the current study was planned to evaluate the effects of MLE on the growth of purple nutsedge (*Cyperus rotundus*). MLE was added into pots three days after transplanting with 25, 50, 75 and 100% concentrations (v/v) whereas distilled water was used as control. Application of MLE at 100% concentration notably improved the root and shoots lengths, shoot fresh and dry weights. MLE application had non-significant effect on root fresh and dry weights, number of nodes and node weights of purple nutsedge. It was concluded that MLE improved the growth of purple nutsedge even higher concentrations rather to suppress it.

Keywords: *Moringa oleifera*, leaf extract, purple nutsedge, root shoot weight

INTRODUCTION

Purple nutsedge (*Cyperus rotundus* L.) is amongst the most serious and troublesome weeds occurring in many parts of the world (Travlos et al., 2009; Shabana et al., 2010) including Pakistan (Riaz et al., 2009). It reproduces mostly through tubers (Sharma and Gupta, 2007; Lati et al., 2011). The spread of the plant in the short term is accomplished through rhizomes, which may extend upward, downward or horizontally (Stoller and Sweets, 1987). Purple nutsedge is difficult to control with herbicides (Gilreath and Santos, 2004).

Allelopathy plays an important role in regulating plant diversity (Chou and Lee, 1991). In the beginning most of the allelopathic research was conducted to investigate the effect of weeds on crops and one crop on another. In crop science, mechanism of allelopathy is exploited successfully by exogenous application of plant extracts for weeds suppression and crop growth enhancement (Farooq et al., 2011). Cheema et al. (1997) found that aqueous extracts of sorghum and sunflower have the potential to suppress the weed infestation in wheat crop. Moradshahi et al. (2003) found that aqueous extracts of *Eucalyptus camaldulensis* (Schlecht.) has the potential to suppress growth of *Echinochloa crus-galli* (L.) Beauv., *Avena fatua* L. and *Rumex acetosella.*

Moringa (*Moringa oleifera*) is an important plant of Moringaceae family having tremendous allelopathic potential either to suppress or stimulate the neighboring crop. *M. oleifera* is widely cultivated plant of tropical as well as subtropical areas and is native to sub-Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan (Nikkon et al., 2003). Having medicinal value, it has been used by all civilizations as a source of medicines since ancient times. It is used as human food, medicine and in oil production (Anwer et al., 2007). The plant growth is controlled by certain growth substances such as auxins, gibberellins, and cytokinins, which are organic in nature and produced in minute concentrations (Taiz and Zeiger, 2010). MLE is a rich source of growth regulators such as zeatin (a cytokinin), ascorbate, phenolics, and many essential plant minerals such as Ca, K, Mg, Mn, P, B, Zn, and Fe (Fuglie, 1999; Anwar et al., 2007; Basra et al., 2011; Hussain et al., 2013) and therefore can be used either as foliar spray or seed priming agent for growth promotion (Hussain et al., 2013; Nouman et al., 2012). Moringa leaf extract application also

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enhanced the seed germination of sorghum crop (Phiri, 2010).

It is documented that diluted MLE (20 times with water) has the potential to perk up the growth and grain yield of crops and vice versa (Basra et al., 2009b). Keeping in view the above studies, it was imperative to conduct a study that that how the soil applied MLE application at different concentrations affects the growth of *C. rotandus.*

MATERIALS AND METHODS

Well-nourished nursery of purple nutsedge (*C. rotundus*) was raised by using bulbs as a seed. Ten days after sowing it was transplanted into the plastic pots filled with soil. MLE was added into pots three days after transplanting with 25, 50, 75 and 100% concentrations (v/v), while distilled water (0% MLE) was used in control one. To prepare MLE, fresh leaves of *M. oleifera* were collected and ground in a blender for juice extraction. The extracted juice was filtered with sieve and then mixed with distilled water to prepare 25, 50, 75 and 100% concentrations (v/v) of MLE. The pots were arranged in completely randomized design having three replications. Data regarding root and shoot length, root and shoot fresh and dry weight, and number of nodes (seeds) and weight of nodes (seeds) per pot were collected 30 days after transplanting (DAT) by using standard procedures. The collected data were analyzed statistically at 5% level of significance and Bartlett test was used to compare its means at 5% level of probability (Steel et al., 1997).

RESULTS

Application of 100% MLE significantly improved the shoot length of purple nutsedge compared with all other treatments including control, however the minimum shoot length was observed in control (Table 1). Maximum root length of purple nutsedge was recorded at 50% MLE application but it was at par with all other treatments except control which recorded the minimum root length. It was also at par with all other MLE applications except of 50% MLE (Table 1). Moreover, application of MLE had non-significant effect on root fresh and dry weight of purple nutsedge (Table 1). MLE application at 75 and 100% concentrations enhanced the shoot fresh and dry weight against the minimum shoot fresh and dry weight as observed in control (Table 1). Nonetheless, MLE application had non-significant effect on the number of nodes and weight of nodes per pot of purple nutsedge (Table 1).

Table 1.Effect of various doses of moringa leaf extract on vegetative growth of *Cyperus rotundus*

MLE levels No. of pods/pot	SL	RL	RF wt.	SF wt.	RD wt.	SD wt.	Wt. of nodes per pot	No. of nodes/pot
Control	12.00c	15.00b	0.71^{NS}	0.40d	0.37^{NS}	0.25b	2.55^{NS}	7.25^{NS}
25%	16.75b	21.50ab	0.67	0.71cd	0.37	0.29b	3.37	7.75
50%	19.00b	26.75a	0.75	0.91bc	0.53	0.30b	3.78	8.50
75%	19.50b	21.50ab	0.80	3.81	8.75	1.28ab	0.51	0.41ab
100%	23.75a	19.75ab	0.71	1.44a	0.47	0.53a	3.18	9.75

SL, RL, RF Wt., SF Wt., RD Wt. and SD Wt. represent shoot length, root length, root fresh weight, shoot fresh weight, root dry weight and shoot dry weight, respectively.

DISCUSSION

MLE application has proven its worth as an excellent source of plant growth-promoting substances. MLE is either used as foliar spray or seed priming agent for growth promotion (Mehboob et al., 2011; Nouman et al., 2012) and behaves differently with change in its dilution (Basra et al., 2011). The higher concentrations of growth promoters including MLE are generally considered to suppress the plant growth. The present work indicated that MLE at higher concentrations had the promoting effect on *C. rotundus* rather to suppress its growth. In the current study, it was observed that MLE promoted the shoot growth more in comparison to root. MLE applied at higher doses significantly increased the shoot length and its weight. It had no prominent effect on root length and its weight. The similar

trend was observed for number of nodes and their weights. In a recent study Nouman et al. (2012) reported that seed priming with MLE (1:30) substantially increased the number of leaves, roots and tillers, shoot vigor, and root length and weight in three rangeland grasses including barnyard grass, blue panic grass, and buffalo grass. Seed priming with MLE diluted 20 times with water improved root length in sunflower (Basra et al., 2009b).

The growth promotion of plants owing to MLE application is due to containing the growth regulators and essential minerals (Fuglie, 1999; Anwar et al., 2007; Basra et al., 2011; Hussain et al., 2013). In conclusion, the exogenously applied moringa leaf extract may have promoting effect depending upon the nature of plant, even if its higher doses are applied.

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