



ORIGINAL ARTICLE

Morpho-Anatomical Changes Due to the Impact of *Pistia stratiotes* Linn. Var. *Cuneata* Engl on Maize Stem**K.K. Singh**

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Email: kksinghdr@yahoo.co.inReceived: 5th Jan. 2017, Revised: 15th Jan. 2017, Accepted: 18th Jan. 2017**ABSTRACT**

Morphoanatomical changes caused by growth promoting substance *P. stratiotes* extracts on of maize (T-44) stem has been studied by pre-soaking treatment. The observation show that twenty four hrs. treatment with 1 per cent ether extract suspended in water and 5 per cent water extract exercise maximum increase in diameter of stem, number of vascular bundles, diameter of phloem, diameter of tracheids in metaxylem and protoxylem. Results are highly significant statistically.

Key words: *Pistia stratiotes*, Anatomical Changes, Maize

INTRODUCTION

Globally aquatic weeds are a big problem but no where it occupies greater relevance as in South-East Asia, Moreso, India. India is particularly vulnerable due to wide spread of aquatic weeds. Utilization of aquatic weeds for benefit of mankind has been explored with special reference to agriculture (Pandey 1979).

Growth promoting substances in various plant materials has been known and their extraction for utilization in agricultural application has been reviewed earlier (Shukla 1982, 1985). Works of Torrey (1953), Roberts (1960), Kennedy and Farrar (1965), Cronshaw and Morey (1965) and Morey and Cronshaw (1966) on influence of growth promoting substances on anatomical structures have been recorded elsewhere. However, there is dearth of literature concerned with the influence of extracts of plant material to the anatomical structures.

MATERIALS AND METHODS

Seeds of maize variety T-44 were obtained from economic botanist, C. S. Azad University of Agriculture and Technology, Kanpur. Seeds of approximately same size were selected for experiment. Healthy plants of *Pistia stratiotes* Linn. Var. *cuneata* Engl. were washed with distilled water to remove adhering debris and algae.

The extraction of *P. stratiotes* were made in water and solvent ether. As ether is injurious to plant growth it was allowed to evaporate and growth promoting substances were suspended in water. Five milliliter of *P. stratiotes* by volume was taken and ground in a clean porcelain mortar with water or ether. In case of water extract sufficient water was added to make it 100 ml. to have a five percent extract. In case of ether extract ether was first allowed to evaporate and the suspension was then made to 100 ml. in distilled water. Two and one per cent extracts were made by further dilutions with distilled water. Fifty seeds were soaked in sterilized petridishes in different concentrations (1, 2 and 5 per cent) of water and ether extracts of *P. stratiotes* and distilled water (control) for 6, 12 and 24 hours.

The effect of pre-soaking treatment was studied under field conditions in the garden beds. Each bed was sown with 3 rows containing 9 seeds spaced 25 cm. in rows of 60 cm apart. Two beds of each treatments and normal untreated control were laid to raise 50 replicates. Seeds of maize variety T-44, 5 per cent water and one per cent ether extracts were chosen for observation under normal field conditions because these concentrations were found to be beneficial to the maximum extent. Seeds soaked in distilled water were sown and served as control. Stem pieces of 5 cm were cut after 105 days and were preserved in FAA. The material was then dehydrated and was microtomed using senior Rotary Microtome Model MT 1090A. Slides of T.S. of maize stem were

prepared and were stained by double staining method proposed by Johansen (1940) using safranin and fast green stains.

RESULTS AND DISCUSSIONS

The diameter of stem, number of vascular bundles per microscopic field, diameter of xylem tissue, diameter of phloem tissue and diameter of tracheids in metaxylem and protoxylem have been recorded in Table I. Twenty four hours treatment exercises maximum increase in diameter of stem, number of vascular bundles, diameter of xylem, diameter of phloem diameter of metaxylem and diameter of protoxylem with one percent ether extract as compared to 5 Percent water extract. Twenty four hours treatment shows that ether extract is more effective than water extract treatment with 24 hours treatment increased 1.8, 28.5, 11.8, 22.2, 51.7 and 30.7 percent in diameter of stem, number of vascular bundle, diameter of xylem, diameter of phloem, diameter of metaxylem and diameter of protoxylem respectively in case of 5 per cent water extract and 26.9, 50.0, 19.2, 34.4, 87.5 and 56.4 per cent in diameter of stem, number of vascular bundle, diameter of xylem, diameter of phloem, diameter of metaxylem and diameter of protoxylem respectively in case of 1 percent ether extract. Lowering as well as increase in concentration of extracts gradually reduces the effect. Results obtained were statistically analysed following "Analysis of variance" method to pin point significance of treatment at 5 percent error probability.

Effect of *Lemna paucicostata* extract on barley plants has been reported elsewhere (Pandey 1979). Results of present investion on are in conformity with those of *P. stratiotes* extracts on wheat stem (Maurya 1983). This synoptical background about development of tracheids is indicative of the fact that development of xylem is linked with auxin level in the stem of maize plants. Auxin deficiency stimulates development of xylem (Morey 1966a, Morey and Cronshaw 1966). Exogenous supplies of certain growth substances block the polar transport of auxins and create deficiency of auxin in areas just above the region of blockade (Cronshaw and Morey 1965). During present investigation exogenous supply of growth substances in extracts of *P. stratiotes* through pre-soaking seed treatment appears to set in some kind of competition with the endogenous auxin levels and displaces auxins through polar transport to the extremities of maize stem to initiate apical growth, and in the process create condition of auxin deficiency in the order regions of stem, thereby stimulating development of xylem in the shoot. This may explain increased formation of xylem, phloem and diameter of tracheids during present investigation.

In view of large quantities of water lettuce infestations and availability of material prospects of its utilization as a source for obtaining extracts containing growth promoting substances to boost growth of stem appear promising .

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