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MINERAL COMPOSITION IN RESPONSE TO HERBICIDAL TREATMENT OF DIQUAT AND PARAQUAT IN *PARTHENIUM HYSTEROPHORUS* LINN.

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ABSTRACT

Minral composition in reponse to foliar application of bipyridylium herbicides, diquat (10 ppm) and paraquat (25 ppm) on *Parthenium hysterophorus* Linn. was studied. Herbicidal treatment resulted in increased nitrogen and potassium which decreased due to paraquat treatments. The herbicides diquat and paraquat failed to exert any influence on copper content.

Key words : Herbicide, Minerals, *Parthenium hysterophorus*.

The overall growth and metabolic performance of any plant largely depends on various mineral elements present in soil and their absorption by plants in soluble form. It is well known that fundamental physiological or biochemical processes are affected / regulated by mineral nutrients (Marschner, 1986). It was, therefore, thought worthwhile to evaluate the nutrient status in the foliar tissue of *Parthenium hysterophorus* under the influence of bipyridylium herbicides viz. diquat and paraquat.

The plants were grown in pots under natural conditions. Foliar application of diquat (10 ppm) and paraquat (25 ppm) was given just before flower initiation, to the drip-drain point at 10 A.M. with manually operated air pneumatic sprayer. Untreated plants were sprayed with distilled water. For mineral analysis, randomly sampled leaf tissue was harvested 72 h after herbicide application.

The oven dried leaf powder was acid digested (Toth, *et.al.*, 1948) and acid extract was used to determine different elements by using Atomic Absorption Spectrophotometer (Perkin Elmer -3030). Similarly nitrogen (Hawk *et.al.*, 1948) and phosphorus (Sekiñe, 1965) contents were determined spectrophotometrically.

The contents of macro and microelements in the foliar tissue of *P. hysterophorus* under the influence of herbicides are given in Table 1. Nitrogen content in leaf tissue enhanced due to the application of both herbicides. Increase (Dean *et.al.*, 1987) in foliar nitrogen due to foliar application of a variety of herbicides has been well documented. Phosphorus content exhibited decreasing trend over control. This lowering of phosphorus can be attributed to the reduction of reproductive growth and increased anthocyanin content. Phosphorus deficient plants show these symptoms (Marscher, 1986). Both herbicides enhanced the level of potassium content over control to withstand against herbicidal treatment by increasing potassium uptake. The present data reveals that paraquat reduced the sodium content marginally while diquat did not exhibit any change.

Calcium content was greatly affected by both the herbicides, however, the effect was more pronounced due to diquat. According to Waisel *et.al.* (1966) transpiration stream leads to continuous uptake of calcium. Thus the reduction in calcium content might be due to low transpiration rate in diquat and paraquat treated *P. hysterophorus* (Kore and Patil, 1995). In higher plants the average value of manganese is approximately 0.05% on dry

Table 1 : Effect of foliar application of paraquat and diquat on mineral content in the leaves of *Parthenium hysterophorus* analysed 72 h after application.

Treatment	Mineral Content (% of Dry weight)										
	N	P ⁵⁺	K ⁺	Na ⁺	Ca ²⁺	Mn ²⁺	Mg ²⁺	Fe ³⁺	Zn ²⁺	Co ²⁺	Cu ²⁺
Contol	1.08	0.22	1.58	1.60	4.26	0.006	0.15	1.60	0.007	0.001	0.006
Paraquat (25 ppm)	1.27	0.21	1.98	1.52	3.56	0.006	0.91	1.40	0.006	0.001	0.006
Diquat (10 ppm)	1.60	0.19	1.88	1.60	2.18	0.010	0.51	2.88	0.01	0.001	0.007

weight basis (Epstein, 1972). Though the values exhibited in present investigation were lower, increase in manganese content due to diquat treatment was observed. Manganese content exhibited about 6 and 3 fold increase due to paraquat and diquat treatment over control. Magnesium accumulation in the herbicide treated leaves possibly rescue the weed from herbicidal action or help to hasten metabolic processes. Diquat favored accumulation of iron when compared with the values for control.

It is well documented that zinc stabilizes biomembranes. During present investigation paraquat treatment caused reduction while diquat increased the zinc level in leaf tissues over control. The chlorotic patches observed, due to paraquat treatment may be attributed to senescence (Pauls and Thompson, 1984). The cobalt content decreased due to paraquat, while accelerated due to diquat. No significant change was observed in copper content in the leaves of *P. hysterophorus* under herbicidal influence.

The overall results thus indicate that diquat and paraquat treatments altered mineral composition of foliar tissue of *P. hysterophorus* and further it can be concluded that the imbalance of nutrient content might have altered the normal physiological processes that lead to drying up, desiccation, chlorosis, severe deformation of foliage and finally death of the noxious weed.

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