



STATUS AND FORMS OF SELENIUM IN THE SOILS OF MUZAFFARNAGAR DISTRICT OF UTTAR PRADESH UNDER DIFFERENT FODDER CROPS

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ABSTRACT

Total selenium content in soils of Muzaffarnagar district varied from 0.15 to 0.84 ppm with a mean value of 0.455 ppm. The soils under guar showed highest total selenium, followed by soils under berseem, jowar, labia and oat. The amount of available selenium in the soils ranged between 0.014 to 0.089 ppm. The soils under guar fields had relatively more available selenium than those under other fodder crops. The amount of residual selenium in the soils of Muzaffarnagar district varied from 0.148 to 0.748 with an average value of 0.422 ppm. The soils under berseem sites possessed highest residual selenium followed by guar, jawar, oat and lobia.

Key words : Selenium, Fodder crops, Residual.

INTRODUCTION

Selenium is some what unique among the essential nutrient provided by plants as part of animal diets. In some areas native vegetation can contain levels that are toxic to animals whereas in other locations, feed can be deficient in selenium, causing animal health problems. The study of selenium status of soil and its interaction with various nutrients is therefore, necessary for determining the possibilities of its accumulation in toxic levels or deficiency in plants.

Soils of Muzaffarnagar district are neutral to alkaline in reaction and contains free lime or gypsum or high salt content. They may contain toxic levels of selenium. However, no information on this aspect is available for the soils of Muzaffarnagar district. Keeping in view investigations have been carried out to assess the status and different form of selenium in the soils of

Muzaffarnagar district.

MATERIALS AND METHODS

The present study consisted survey of Muzaffarnagar district with a view to delineate selenium deficiency and toxicity in soils, a brief description of climate and soil of this district alongwith sampling and analytical procedures are as under.

The climate of Muzaffarnagar district is hot and dry with mean annual rainfall is around 80 cm. The soils are deep and are not often fully mature. They are basic in reaction, usually light textured and highly productive.

Collection of soil samples

Soil sample of 0-15 cm depth was collected with the help of tube auger from each selected site. They were put in separate polythene bags, labelled properly and were brought to the laboratory. The collected soil samples were

air dried and sieved through 2 mm sieve and stored in separate polythene bags. These samples were subjected to chemical analysis.

Chemical analysis of soil samples

Soil pH – 1 : 2.5 soil water suspension by pH meter.

Electrical conductivity – 1 : 2.5 soil water suspension by conductometric method(Jackson, 1967).

Organic Carbon – By modified Walkley and Black’s method as outlined by Jackson (1967).

Calcium Carbonate : By rapid titration method of Piper (1950).

Mechanical analysis : Soil texture was determined following International pipette method (Piper, 1950).

Total Selenium – Five gram soil was extracted with 60 percent Perchloric acid (Jackson, 1958) and selenium was determined in the aliquot by Cummins *et al.* (1964) method.

Available selenium : Available selenium was extracted by refluxing the 20 gram soil in 1 : 2 soil – water ratio on

a hot plate. After filtration aliquot was taken for selenium determination.

Residual Selenium : It was computed by difference method between total and available selenium.

RESULTS

Forms of selenium in soils of Muzaffarnagar district

Total selenium : Data given in table 1 shows the status of different forms of selenium in the soils of Muzaffarnagar district. Total selenium content ranged between 0.15 to 0.84 ppm with the mean value of 0.45 no marked variations in total selenium content was observed in soils of Muzaffarnagar district in respect of various fodder crops grown on these soils.

Available selenium : It is evident from the data (table 1) that quantities of available selenium ranged of available selenium for the soils was 0.049 ppm. Soil under different fodder growing showed no marked difference in the available selenium.

Residual selenium : Perusal of the table 1 reveals that the quantity of residual selenium present in the soils

Table 1 : Forms of selenium in soils of Muzaffarnagar district.

Fodder crops	Tehsil	Total Se (ppm)		Available Se (ppm)		Residual Se (ppm)	
		Range	Mean	Range	Mean	Range	Mean
Berseem	Budhana	0.20-0.76	0.47	0.019-0.076	0.043	0.181-0.684	0.442
	Jansath	0.15-0.80	0.45	0.014-0.080	0.045	0.140-0.720	0.430
	Kairana	0.20-0.78	0.46	0.018-0.078	0.044	0.182-0.702	0.442
	M. Nagar	0.18-0.78	0.47	0.016-0.078	0.045	0.164-0.700	0.421
Guar	Budhana	0.27-0.79	0.47	0.021-0.082	0.049	0.240-0.708	0.417
	Jansath	0.23-0.78	0.46	0.020-0.089	0.054	0.210-0.691	0.450
	Kairana	0.29-0.80	0.47	0.027-0.086	0.049	0.263-0.714	0.423
	M. Nagar	0.24-0.76	0.47	0.024-0.080	0.047	0.216-0.680	0.408
Jowar	Budhana	0.24-0.80	0.47	0.025-0.081	0.048	0.200-0.700	0.440
	Jansath	0.25-0.74	0.46	0.024-0.080	0.049	0.189-0.692	0.411
	Kairana	0.27-0.76	0.45	0.026-0.082	0.049	0.244-0.708	0.418
	M. Nagar	0.26-0.78	0.46	0.022-0.078	0.049	0.188-0.714	0.422
Lobia	Budhana	0.25-0.77	0.45	0.023-0.078	0.043	0.162-0.748	0.407
	Jansath	0.24-0.78	0.44	0.026-.078	0.044	0.186-0.709	0.406
	Kairana	0.27-0.76	0.45	0.027-0.078	0.044	0.187-0.709	0.403
	M. Nagar	0.24-0.76	0.46	0.024-0.078	0.047	0.188-0.711	0.409
Oat	Budhana	0.26-0.84	0.44	0.023-0.084	0.047	0.174-0.713	0.409
	Jansath	0.23-0.80	0.47	0.029-0.080	0.047	0.200-0.724	0.440
	Kairana	0.25-0.78	0.42	0.024-0.081	0.047	0.198-0.730	0.422
	M. Nagar	0.27-0.81	0.41	0.023-0.081	0.046	0.188-0.711	0.421

of Muzaffarnagar district varied between 0.140 to 0.748 ppm. The average residual selenium for soils of the district was 0.424 ppm. There were no marked difference in the residual selenium content in the soils of Muzaffarnagar district.

DISCUSSION

The total selenium content of the soils studied ranged from 0.15 to 0.84 with an average of 0.455 ppm. It is comparable to the total selenium in some of the soils of Uttar Pradesh, Madhya Pradesh and Bihar (0.158-0.710 ppm) Mishra and Tripathi, 1972. It is, however, several times lower than the range 1.0-10.5 ppm reported in soils of bio climatic zones of Haryana (Singh and Kumar, 1976) The soils under study may, therefore, be rated as normal in total selenium as most of the normal soils in the world over fall in the range of 0.1-2.0 ppm of total selenium (Swaine, 1958). The soil under guar showed highest total selenium followed by berseem, jawar, lobia and oat.

The available selenium content of soils under study was within the range of 0.14 to 0.089 ppm, which is comparable with the available selenium reported for some Gujrat soils (Patel and Mehta, 1969). Mishra and Tripathi (1972) also reported the similar range of available selenium (0.019 - 0.066) in some soils of Uttar Pradesh, Madhya Pradesh and Bihar. The values reported in this study however, are lower than 0.05-0.62 ppm available selenium reported in soils of bio climatic zones of Haryana (Singh and Kumar, 1976). The soils collected from guar fields had relatively more available selenium.

The residual selenium content of the soils under study ranged from 0.140 to 0.748 ppm with an average of 0.422 ppm. These results are, however, contrary to the findings of Singh and Kumar (1976), who reported 0.64 to 10.05 ppm residual selenium in Haryana soils. The soils under berseem sites possessed highest residual selenium followed by guar, jawar, oat and lobia.

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