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Study of correlation coefficient between soil parameters with nutrient status of soil and leaf nutrients uptake of pomegranate orchard of Jalna district

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Abstract

In Jalna district Pomegranate is grown on different soil types viz. very deep soil, moderately deep soil, shallow and very shallow soil. In correlation coefficient among soil parameters and leaf nutrient status, leaf N content was negatively significant correlated with P content of pomegranate growing orchards soils. Leaf P also showed positively significant correlated with lime content of pomegranate growing orchards soils. However, leaf Fe had negatively significant correlated with pH and Fe content of pomegranate growing orchards soils. Leaf Mn content showed positively significant correlated with Zn content of pomegranate growing orchards soils.

Keywords: Correlation coefficient, pomegranate, Jalna district

1. Introduction

The pomegranate orchard soils were neutral to alkaline in reaction with the mean value of collected samples was 7.86 and electrical conductivity of pomegranate orchard soil was in safe limit for the crop growth with the mean value of collected samples was 0.48 dSm⁻¹. These soils were highly calcareous in nature with the mean value of collected samples was 12.09 g kg⁻¹ and low to medium in organic carbon with the mean value of collected samples was 0.55 percent.

The soils are categorized as low in Nitrogen and Phosphorus as well as high in potassium content with the mean values of collected samples was 155.67 kg ha⁻¹, 11.01 kg ha⁻¹, 591.34 kg ha⁻¹ respectively, in pomegranate orchard soils of Jalna district.

These soils were low to medium in available Fe and Zn content with the mean values of collected samples was 0.23 mg kg⁻¹, 0.77 mg kg⁻¹ respectively whereas, high in Mn and Cu content with the mean values of collected samples was 8.32 mg kg⁻¹, 12.54 mg kg⁻¹, respectively.

The leaf nitrogen and potassium found in pomegranate orchard were in higher amount with the mean values of collected samples was 2.27, 4.92 percent respectively. While, phosphorus was deficient amount with the mean values of collected samples was 0.27 percent in pomegranate leaf. The micronutrients viz., zinc, copper were found to be deficient amount with the mean values of collected samples was 15.26, 19.68 mg kg⁻¹ in leaves of pomegranate while, leaf iron and manganese were sufficient amount with the mean values of collected samples was 211.82, 69.41 mg kg⁻¹ in pomegranate leaves.

2. Material and Method

Correlation (Statistical analysis)-The data obtained on chemical properties, macro nutrient and micro nutrient status of soil and leaf nutrient concentration of Pomegranate orchards were subjected to statistical treatments. The relationship between soil available nutrients and leaf nutrients was worked out by standard statistical procedures. (Panse and Sukhatme, 1985).

3. Result**Correlation between soil parameters and leaf nutrient**

The data pertaining to correlation coefficient between soil parameters and leaf nutrients status of pomegranate orchard of soils from area of Jalna district are presented in Table 12.

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The soil pH was positively correlated with leaf Total Mn as well as Total K and negatively correlated with leaf Total N, Total P, Total Zn, Total Cu. The soil pH was negative significantly correlated with leaf Total Fe which was evident by “r” value -0.293.

The soil EC was positively correlated with leaf Total P and negatively with Total N, Total K, Total Zn, Total Fe, Total Mn, Total Cu but Soil EC was not showing significant relation with all leaf parameters.

The soil Organic carbon was positively correlated with leaf Total N, Total Fe, Total Cu and negatively correlated with leaf Total P, Total K, Total Zn, Total Mn and not significantly correlated with all leaf parameters.

The soil Calcium carbonate was positively correlated with leaf Total Cu and negatively correlated with leaf Total N, Total K, Total Zn, Total Fe, Total Mn and positive significantly correlated with leaf Total P which was evident by “r” value 0.289.

The soil Nitrogen was positively correlated with Leaf Total N, Total K, Total Zn, Total Mn, Total Cu and negatively correlated with leaf Total P, Total Fe and not significantly correlated with all leaf parameters.

The soil Phosphorus was positively correlated with leaf Total P and negatively correlated with leaf Total K, Total Zn, Total Fe, Total Mn, Total Cu and negative significantly correlated with leaf Total N which was evident by “r” value -0.317.

The soil Potassium was positively correlated with leaf Total N, Total K, Total Fe, Total Cu and negatively correlated with leaf Total P, Total Zn, Total Mn and not significantly correlated with all leaf parameters.

The soil Zinc was positively correlated with leaf Total P, Total K, Total Cu and negatively correlated with leaf Total N, Total Zn, Total Fe and positive significantly correlated with leaf Total Mn which was evident by “r” value 0.299.

The soil Iron was positively correlated with leaf Total K, Total Mn and negatively correlated with leaf Total N, Total P, Total Zn, Total Cu and negative significantly correlated with leaf Total Fe which was evident by “r” value -0.276.

The soil Manganese positively correlated with leaf Total P, Total Mn, Total Cu and positively correlated with leaf Total N, Total K, Total Zn, Total Fe and not significantly correlated with all leaf parameters.

The soil Copper positively correlated with leaf Total N, Total P, Total K, Total Zn and negatively correlated with leaf Total Fe, Total Mn, Total Cu and not significantly correlated with all leaf parameters.

These results are confirmatory with the finding of Kolekar (2016) on pomegranate orchard and Hepaskoy *et al.* (1998) similar results of leaf characteristics and nutritional value of pomegranate and Parwe (2013) ^[2] showed pH of soil have significantly negative correlation with available N, P, K, Fe, Mn and Zn which was evident by “r” value of -0.322*, -0.255*, -0.264*, -0.239* and -0.267* respectively.

Table 1: Correlation coefficient between soil parameters and leaf nutrient status

Soil Parameters	Leaf Nutrient Parameter						
	Total N (%)	Total P (%)	Total K (%)	Total Zn	Total Fe	Total Mn	Total Cu
pH	-0.042	-0.230	0.048	-0.087	-0.293*	0.009	-0.174
EC	-0.011	0.079	-0.048	-0.001	-0.144	-0.104	-0.138
O.C.	0.107	-0.052	-0.060	-0.094	0.027	-0.027	0.042
CaCO ₃	-0.060	0.289*	-0.113	-0.091	-0.046	-0.024	0.042
Available N	0.078	-0.161	0.030	0.100	-0.099	0.055	0.191
Available P	-0.317*	0.055	-0.060	-0.233	-0.026	-0.008	-0.197
Available K	0.012	-0.009	0.182	-0.068	0.183	-0.153	0.025
Available Zn	-0.045	0.071	0.051	-0.162	-0.188	0.299*	0.010
Available Fe	-0.120	-0.123	0.025	-0.057	-0.276*	0.003	-0.161
Available Mn	0.095	-0.022	0.169	0.097	0.069	-0.118	-0.155
Available Cu	0.112	0.071	0.072	0.090	-0.152	-0.069	-0.147

(* star denotes significant correlation at 0.005 level)

4. Conclusion

In correlation coefficient among soil parameters and leaf nutrient status, leaf N content was negatively significant correlated with P content of pomegranate growing orchards soils. Leaf P also showed positively significant correlated with lime content of pomegranate growing orchards soils. However, leaf Fe had negatively significant correlated with pH and Fe content of pomegranate growing orchards soils. Leaf Mn content showed positively significant correlated with Zn content of pomegranate growing orchards soils.

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