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RAPID ESTIMATION OF AVAILABLE POTASSIUM IN SOIL BY TDS METER

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Abstract : *In a soil there are thirteen nutrients which are helpful for the better yield of crop. These thirteen nutrients are further classified into major and minor nutrients. Major nutrients plays vital role in good crop yield and better crop management through soil amendment. Major nutrients of the soil comprises of Nitrogen (N),Phosphorus (P)and Potassium(K) these nutrients are popularly known as NPK. This research article is aimed in determining the available potassium (K) in soil using TDS meter. The method suggested is very fast as compared to conventional method.*

Keywords: *Potassium, TDS meter,nutrients*

I. INTRODUCTION

Potassium (K), calcium (Ca), and magnesium(Mg) availabilities in soil are generally estimated bymeasurement of the water soluble and exchangeableforms. The amounts of K, Ca, and Mg in the soil solutionare quite small relative to the amounts in theexchangeable form. Hence, the quantities of thesethree cations extracted in most soil test proceduresare simply referred to as exchangeable K, Ca, and Mg.Available K levels in soils of the region are importantfor determining the appropriate rates of supplementalK to apply.***D.Warncke and J. R. Brown ,1980*)**

1.1 Cation Exchange Capacity (CEC)

The total number of exchangeable cations a soil can hold is called cation exchange capacity (CEC). The higher the CEC, the more cations it can retain. It can be expressed in terms of milli equivalents /100 g of soil (me/100 g) or centimoles of positive charge per kg of soil (cmol/kg), which is numerically equal to me/100 g. The CEC of the soil depends on the kind of clay and organic matter present.

II. LITERATURE REVIEW

Warncke et al. (1980) found that CEC by summation is a good estimate of the actual CEC in acid, neutral and calcareous soils. Gelderman (2) reports that CEC measuresby summation may be inflated in calcareous soils by dissolution of CaCO3 in the neutral 1 M NH4OAc. Sodium acetate is a better replacing solution to use in the determination of CEC in calcareous soils. The Mehlich 3 extractant has been adapted by many laboratories as a near-universal extractant (Mehlich 1984). Workers in the North Central Region have been evaluating the Mehlich 3 as indicated in Chapter 6 for P. The results suggest that Mehlich 3 is asatisfactoryextractant for K and for Ca and Mg on non-calcareous soils. These results show that either 1M ammonium acetate or Mehlich 3 may be used to extract K. However, Mehlich 3 is **not** recommended as a substitute for 1 M ammonium acetate as an extractant for Ca and Mg from calcareous soils.

III. METHODOLOGY

The electrical conductivity (EC) is a measure of the ionic transport in a solution between the anode and cathode. This means, the EC is normally considered to be a measurement of the dissolved salts in a solution. Like a metallic conductor, they obey Ohm's law.

Since the EC depends on the number of ions in the solution, it is important to know the soil/water ratio used. The EC of a soil is conventionally based on the measurement of the EC in the soil solution extract from a saturated soil paste, as it has been found that the ratio of the soil solution in saturated soil paste is approximately two-three times higher than that at field capacity. As the determination of EC of soil solution from a saturated soil paste is cumbersome and demands 400-500 g soil sample for the determination, a less complex method is normally used. Generally a 1:2 soil/water suspension is used. The electrical conductivity of the solution is measured with the TDS meter .TDS meter gives reading in ppm.

The standard values for measurement of available K in soil isgiven as below:

0- 135 ppm Low K

136-335 ppm Medium K
336- 550 ppm High K
551 and above Very high K

To convert K concentration (ppm) in the soilextract solution to ppm in a soil (mg K/kg), multiplyby 10. To convert to pounds of K per acre,multiply by 20.

3.1 Apparatus required: TDS meter,glass beaker,glass stirrer,ion free water.

3.2 Procedure

1.Take 10 gram soil in a beaker.
2. Add 50 ml of ionfree water in the beaker. Stir the soil and water for 10 sec. with the help of glass stirrer .
3.Insert the measuring probe of the TDS meter in beaker and measure the exchangeable K in the solution and note the reading.
4. The reading obtained from the TDS meter has units in ppm.
5. Rinse the TDS probe in distilled water before taking another reading.
6.Repeat step-1 -2 and 3 with different soil samples.

IV. RESULT AND DISCUSSION

Normally the results are reported as ppm potassium in the extract. These is classified in a qualitative scale as shown in the table below. 50 soil samples were taken for the experiment on random basis. The measurement of K was done in each case by the method explained above and the results of the few selected samples are tabulated below:

S.N	*Soil Sample No.*	*Value of K (ppm)*	*Remark*
1	41	22	Low
2	32	28	Low
3	3	20	Low
4	14	245	Medium
5	5	228	Medium
6	6	240	Medium
7	47	340	High
8	8	356	High
9	19	348	High
10	30	650	Very high
11	1	1125	Very high
12	12	1276	Very high
13	43	1368	Very high
14	24	1457	Very high
15	15	1563	Very high

The qualitative determination of available K in soil can be done using TDS meter.

V. CONCLUSION

1.The values of K obtained using the TDS are found to be close to standard values obtained.
2.The suggested method very fast as compare to the conventional method.
3.The qualitative value of K in soil can be determined within 2 minutes.
4.The presence of Phosphorus can change the values of K by 10 % as P are also positively charged particles.
5. The effect of P can be neglected as they are available in complex form in soil and they not readily soluble in water.
6.For different soil composition (sand, silt and clay) can alter the readings.

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