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ANALYSIS OF SOIL SAMPLE FROM BURLIYAR FOR ITS PHYSIOCHEMICAL PROPERTIES

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Abstract: The analysis of soil nutrients serves to evaluate the nutrient composition within soil, providing essential information necessary to establish nutrient application targets. Additionally, it facilitates the identification and monitoring of changes in soil parameters. The accuracy of the findings is reliant upon the quality of the soil samples collected. In this investigation, soil samples from the Durian cultivation area were examined, encompassing assessments of pH, electrical conductivity (EC), and organic carbon levels. The determination of total nitrogen, available phosphorus, available potassium, as well as exchangeable calcium and magnesium, was conducted using the Kjeldahl method, Bray's method, flame photometric method, and EDTA titration method, respectively. Furthermore, the presence of micronutrients such as Boron, Manganese, Iron, and Zinc was detected utilizing Atomic Absorption Spectroscopy. Subsequently, the formulation of media was based on the nutrient content identified, utilizing commercially available media formulations.

Key Words: Kjeldahl method, Atomic Absorption Spectroscopy, Media formulation

I.INTRODUCTION

Soil testing encompasses a wide-ranging suite of chemical, physical, and biological assessments conducted on a provided soil sample. The nutrient analysis involves quantifying the nutrients present in the soil, extracted using a specific solution. Regular field sampling and testing yield valuable insights into changes in soil parameters over time, such as pH, nutrient levels, and salinity. The nutrient analysis comprises the analysis of Nitrogen, phosphorus, Sulphur, Boron, zinc, iron, copper, manganese, and Magnesium. *Durio zibethinus*, belonging to the family Bombacaceae and the genus Durio, is a seasonal tropical fruit cultivated in Southeast Asian nations like Malaysia, Thailand, Indonesia, and the Philippines. It is famously dubbed the "king of fruits" owing to its medicinal properties. It has health benefits of improving digestion, prevention of cardiovascular disease, maintaining the blood sugar level, and boosting immunity. Plant tissues and organs are cultured in vitro on artificial media, which provide the necessary nutrients for growth

2.MATERIALS AND METHODS

2.1 SAMPLE COLLECTION

Soil samples were obtained from Durian fruit-bearing trees located at the State Horticulture Farm in Burliyar.Samples were collected from two depths: the surface and one feet deep. They were then carefully transferred to bags and sealed tightly to prevent any contamination.The collected samples underwent drying and were sieved using a 2mm sieve before being prepared for further analysis.

2.2 pH ANALYSIS

Weigh 100g of the sieved sample and combine it with 100ml of distilled water. Stir the suspended solution for 30 seconds, then allow it to settle for 15 minutes. Filter the liquid using Whatman no.1 filter paper and transfer the filtrate into another beaker.Stir the filtrate once more and record the pH of the sample.Repeat the same procedure for both samples.

2.3 ELECTRICAL CONDUCTIVITY OF THE SAMPLE

Weigh 100g of the sieved sample and combine it with 100ml of distilled water. Stir the suspended solution for 30 seconds, then allow it to settle for 15 minutes. Filter the liquid using Whatman no.1 filter paper and transfer the filtrate into another beaker. Stir the filtrate once more and record the EC of the sample.Repeat the same procedure for both samples.

2.4 ORGANIC CARBON ANALYSIS

In a 500 mL conical flask, mix 1 g of soil with 1N K2Cr2O7 solution, H2SO4, and Diphenylamine indicator. Allow the reaction to stand for 30 minutes. Add 85% H3PO4 and Diphenylamine indicator, and perform a back titration using 0.5 N Ferrous Ammonium Sulphate until the color transitions from violet to bright green. Record the volume and conduct a blank titration.

2.5 NITROGEN ANALYSIS BY KJEHDAHL METHOD

The digestion process involved placing 1g of soil in a 500ml Pyrex Kjeldahl flask and using a gas-heated six-1g flask digestion stand. The flask was heated with 200ml of distilled water, potassium dichromate solution, concentrated H2SO4, and phosphoric acid. The flask was then titrated with ferrous ammonium sulphate until the color changed from blue-violet to green. The process was repeated with less or more soil, and the flask was brought to a rolling boil.

2.6 POTASSIUM ANALYSIS USING NORMAL NEUTRAL AMMONIUM ACETATE

Mix 5g of soil with 1N NH4OAC solution, shake, and measure absorbance. Prepare a stock solution with 1000 ppm of dried KCl. Create different concentrations by adding different amounts of KCl and water to 100ml.

2.7 AVAILABLE PHOSPHORUS (BRAYS METHOD MODIFIED)

2.5 g soil + 25 ml extractant (shake 5 min). Filter it Whatman no. 42 filter paper.Mix 5 ml of aliquot with 5ml of ascorbic acid indictor (mixed reagent). Volume makes up upto 25 ml d. H_2O. Take reading @ 882 nm.

2.8 ZINC ANALYSIS

Soil is mixed with DTPA solution, shaken, and filtered. Filtered solution is used for zinc measurement using Atomic Absorption Spectroscopy. Standard curve is prepared by plotting AAS reading against zinc concentration.

2.9 COPPER ANALYSIS

To analyze copper concentrations, dissolve 1 gram in 50 ml of nitric acid solution, adjust volume to 1 liter, prepare solution A and B, and prepare working solutions with concentrations from solution B. Analyze using an atomic absorption spectrometer.

2.10 IRON (Fe) ANALYSIS

Dissolve 1 gram of iron in nitric acid solution, adjust volume to 1 liter, prepare solution "B" with 100 mg/L concentration, and prepare solutions with different concentrations. Analyze using an atomic absorption spectrometer at 248nm.

2.11 MANGANESE ANALYSIS

The experiment involved preparing a solution of manganese dioxide and metallic manganese in nitric acid, adjusting the volume to 1 liter, and then preparing different concentrations of manganese. The samples were then analyzed using Atomic absorption spectroscopy at 279nm, revealing different concentrations of manganese.

2.12 DETERMINATION OF CALCIM & MAGNESIUM

Add 2 ml of the extract to approximately 20 ml of distilled water, then introduce 10 to 12 drops of NH_4Cl and NH_4OH buffer solution Titrate the resulting solution against 0.01 normal (N) ethylenediaminetetraacetic acid (EDTA) using Eriochrome Black T (EBT) as an indicator.

2.13 DETERMINATION OF CALCIUM

Take 2 ml of the extract and add about 20 ml of distilled waterAdd 0.1g of Muroxide indicator, and 10-12 drops of 4N Sodium Hydroxide buffer.Titrate the same against 0.01 N EDTA.

2.14 SULPHUR ANALYSIS

The process involves weighing a dry soil sample, adding monocalcium phosphate, powdered charcoal, filtering, stirring, and adding barium chloride crystals to create a turbid solution. The solution is then measured using a calibrated UV-VIS spectrophotometer.

2.15 PREPARATION

The macro, micro, and minor nutrients were prepared and combined with distilled water, potassium iodide, iron, vitamins, amino acids, and essential nutrients. The pH was adjusted to 5.7-5.7, and 8 grams of agar agar were added. The solution was sterilized and growth regulators like auxin and cytokinin were added. This process was repeated to formulate media based on soil analysis results.

2.16 INOCULATION

The inoculation involved harvesting leaf and stem samples from Durian saplings and sterilizing them with various treatments. The explants were treated with detergent Tween 20, Bavistin fungicide, antibiotics Penicillin and Ampicillin, 75% ethanol, and mercuric chloride. After sterilization, the explants were excised and inoculated into sterilized media. The culture bottles were sealed and transferred to a culture room with a temperature of 25 degrees Centigrade and 2000 lux of light. Observations were recorded at weekly intervals and any changes were noted.

3.RESULT AND DISCUSSION

3.1 pH, EC, C, N & K Analysis

The filtrate once more and record the pH of the sample and it is recorded as 6.05 for surface sample and 5.65 for one feet sample. Electrical conductivity was recorded as 0.31 & 0.12dSm^{-1}. The carbon content and potassium content of the soil is interpreted as high where as the nitrogen content of the soil absorbed with medium.

Table 1: Analysis of pH, Electrical conductivity, carbon, Nitrogen, Potassium and phosphorous

COMPONENTS	SURFACE	ONE FEET SAMPLE	INTERPRETATION
pH	6.05	5.65	Acidic
EC	0.31dSm^{-1}	0.12dSm^{-1}	Non – Saline
Organic carbon	1.78%	1.84%	High
Nitrogen	431$kgha^{-1}$	258 $kgha^{-1}$	Medium
Potassium	632 $kgha^{-1}$	744 $kgha^{-1}$	High
Phosphorous	84.6 $kgha^{-1}$	49.2 $kgha^{-1}$	High

3.2 ANALYSIS OF MICRO NUTRIENTS

The micronutrients of the soil sample was analysed and recorded as the sufficient level for the Copper, Iron and Manganese whereas Calcium , Magnesium and Sulphur shows the high esult for oth the samples.

Table 2 Analysis of Micro nutrients like Copper, Manganese , Iron , Calcium, Magnesium and sulphur.

COMPONENTS	SURFACE	ONE FEET SAMPLE	INTERPRETATION
Cu	3.57 ppm	7.19 ppm	Sufficient
Fe	41.94 ppm	48.44 ppm	Sufficient
Mn	10.92 ppm	18.49ppm	Sufficient
Ca	2160 mg/kg	1600mg/kg	High
Mg	2496 mg/kg	1632mg/kg	High
S	18.70mg/kg	33.18mg/kg	High

3.4 MEDIA PREPARATION AND INOCULATION

Fig 1 : Media prepared

Fig 2 : Media after inoculation

As a result, our research will continue, requiring us to fine-tune the formulation of the medium by modifying the nutrient concentrations accordingly. Through this investigation, we affirm that the developed medium will be conducive to cultivating durian under standard laboratory conditions, facilitating the utilization of the plantlets for medicinal purposes due to their valuable medicinal properties.

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