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DETERMINATION OF ELEMENT BY USING FLAME PHOTOMETRY

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ABSTRACT

The need of soil testing is very important for getting overall physical, chemical and biological behavior of soil. When we see the soils are not responding after sowing of crop and applied fertilizers, definitely soil and crop are suffering from deficiency of nutrients. Therefore we cannot achieve optimum growth of crop, productivity and soil health. Ultimately soil and crop nutrient balance is negative.

KEYWORD: *soil composition, role of physiochemical properties, soil precautions Precautionary measure soil, potassium status, potassium fertilization, crop response.*

1. INTRODUCTION

The soil of India is a complex and diverse resource that plays a crucial role in sustaining the country's agricultural productivity and supporting various ecosystems. It is a result of intricate interactions between geological processes, climate, vegetation, and human activities over thousands of years. India's vast territory and varied topography give rise to a wide range of soil types, each with distinct characteristics and capabilities.

Thus, soil testing is widely accepted and used in most advanced crop- production areas of the world to determine fertilization needs for crops. Soil testing can also be used to identify application The use of fertilizers without first testing the soil is like taking medicine without first consulting a physician to find out what is needed. It is observed that the fertilizers increase yields and the farmers are aware of this.

But are they applying right quantities of the right kind of fertilizers at the right time at the right place to ensure maximum profit Without a fertilizer recommendation based upon a soil test, a farmer may be applying too much of a little needed plant food element and too little of another element which is actually the principal factor limiting plant growth.

This may not only be uneconomical use of fertilizers, but also in some cases crop yields actually may be reduced because of use of the wrong kinds or amounts, or improper use of fertilizers. A fertilizers recommendation from a soil testing laboratory is based on carefully conducted.[24]

2. RESEARCH PROBLEM

2.1What is electrolytes

Electrolytes are substances that have a natural positive or negative electrical charge when dissolved in water.
Electrolyte in soil play a vital role in providing essential nutrients to plants. These minerals help in conducting electrical signals within the soil, facilitating the movement of water and nutrients to plant roots.

They also influence the pH levels of the soil, affecting nutrient availability for plant uptake. By maintaining proper electrolyte balance in the soil, plants can thrive and grow healthily. Electrolytes in soil can have a significant impact on plant growth and overall soil health.

2.2What is soil testing?

The process by which elements such as phosphorus, potassium, calcium, magnesium, sodium, Sulphur, manganese, copper and zinc are chemically removed from the soil and measured for their available content within the sample of soil is called Soil Testing. This is an important diagnostic tool for determining the nutrient for plants.

2.3 Why soil testing is important?

Knowing the exact nutrient found in your farm soil and the pH is the first step of any healthy crop production program. Crops are usually grown on a very wide variety of soil types and different fertilizer requirements, depending on the soil's health and condition. The Application of many nutrients can result in an imbalance in soil and eventually affecting the Environment and contaminating water and the creatures beneath. Regular, repeated soil Sampling is best management practice. The better you know your soil, the easier it will be to Get the best out of it.Improved crop yields, Sustainable land management. [26]

A) Sodium Chloride

Salinity is a major problem affecting crop production all over the world: 20% of cultivated land in the world, and 33% of irrigated land, are salt-affected and degrade Introduction Soil salinization is a major factor contributing to the loss of productivity of cultivated soils. Although difficult to estimate accurately, the area of salinized soils is increasing, and this phenomenon is especially intense in irrigated soils.

B) Potassium Chloride

Potassium (K) is an essential nutrient for plant growth. Because large amounts are absorbed from the root zone in the production of most agronomic crops. It is classified as macronutrient Plants require K for photosynthesis, ATP production, translocation of sugars, starch production in grains, nitrogen fixation in legumes, and protein synthesis. In corn and other crops, K strengthens stalks and stems, thus helping with disease. [6]

3. HYPOTHESIS STATEMENT

The hypothesis suggest that by sodium and potassium level present in body. How much concentration can be present in human body determined using flame photometer so that prophylaxis that the disease condition related with sodium potassium ion can be done easily.. This method aims to make it easier to address conditions related to sodium and potassium imbalances in the body.

4. LITERATURE REVIEW

The whole literature from the peer-reviewed research was collected using the web sources viz. Google search (http//www.google.co.in), Researchgate, Google scholars (http//www. Scholars. Google.co.in), CERA facility, HAU/ICAR [25]

5. METHODOLOGY

5.1 Flame Photometer

In flame photometry we will determine high sensitivity and high reliability of element first two column of the periodic table. Falme photometer a traditional and simple basic method for determination sodium and potassium in biological fluid involved in technique for emission photometry.

Flame photometry is a branch of spectroscopy in which the species are examined in a spectrometer are in a form of atom. A flame photometer is instrument used in inorganic chemical analysis to determine the concentration of certain metal ions (mainly sodium potassium calcium lithium)

Flame photometry is also called flame emission spectroscopy because of fame provide energy excitation to ion introduced into flame. Flame photometry is a sample rapid method for routine determination of element can easily excited.

This relies on the principle that on alkali metals salt drawn into a non luminous flame will ionise absorb energy form the flame then emit light of characteristic wavelength as the excited atom decay to the unexcited ground state.

History

During 1980s Bowling Barners, David Richardson Johnson Berry and Robert Hood development and instrument to measured the low concentration sodium and potassium in a solution. They name the instrument as flame photometer. Type of flame photometry .

5.2 Type of flame photometer

1]Single Elements Flame Photometer

Flame photometry, an analytical chemistry technique, is critical in determining the concentration of metal ions in a solution.

Flame photometers are crucial tools in flame photometry, offering a variety of capabilities to fulfill a variety of analytical demands. The most basic version of this device is the single-channel flame photometer that works by passing a sample solution through a flame, which atomizes the elements present. The heat of the flame then excites the atoms, causing them to release distinctive light. Flame photometers are used to determine the metal ion concentration of environmental samples such as water and soil.

2]Dual-Channel Flame Photometer

This type of instrument is capable of detecting multiple element typically (sodium calcium potassium). Dual-channel flame photometers are an improvement over single-channel versions in that they can assess two separate elements in a sample at the same time.

This tool can be used by environmental scientists to test samples containing numerous metal ions, allowing them to estimate pollution levels in water and soil.

3]The Multi-Channel Flame Photometer

The multi-channel flame photometer is an invaluable tool for laboratories dealing with complex samples including many components. It facilitates the analysis of several elements in a single sample run. These devices have numerous flame systems and detectors, each calibrated to a different element.

This equipment is extremely useful in environmental analysis for examining materials containing different metal ions, such as water and soil. This aids in the monitoring of pollutant levels and the comprehension of ecosystem health.

Medical laboratories benefit from simultaneous measurements of multiple elements in biological fluids. This aids in diagnosing and managing medical conditions.

4]Atomic Absorption Flame Photometer

Atomic absorption flame photometers take the technology a step further by employing the atomic absorption spectroscopy principle. In this method, a hollow cathode lamp emits light at a specific wavelength, which corresponds to the resonance wavelength of the element being analyzed.

The sample solution is introduced into the flame, and the amount of light absorbed by the excited atoms is measured. This absorption is directly proportional to the concentration of the element. In medical laboratories, simultaneous measurement of elements such as sodium and potassium in biological fluids aids in diagnosing and monitoring medical conditions.

5]Digital Flame Photometer:

Digital flame photometers have been developed as a result of modern technical breakthroughs. These instruments feature digital interfaces, touch screens, and computer connectivity, which improves user experience and data administration. They frequently include software for data processing and reporting, which speeds up the analytical process.

Industries that require strict quality control benefit from the precision of the equipment in quantifying metal ions in their goods, assuring consistency and conformity.

6. PRINCIPLE

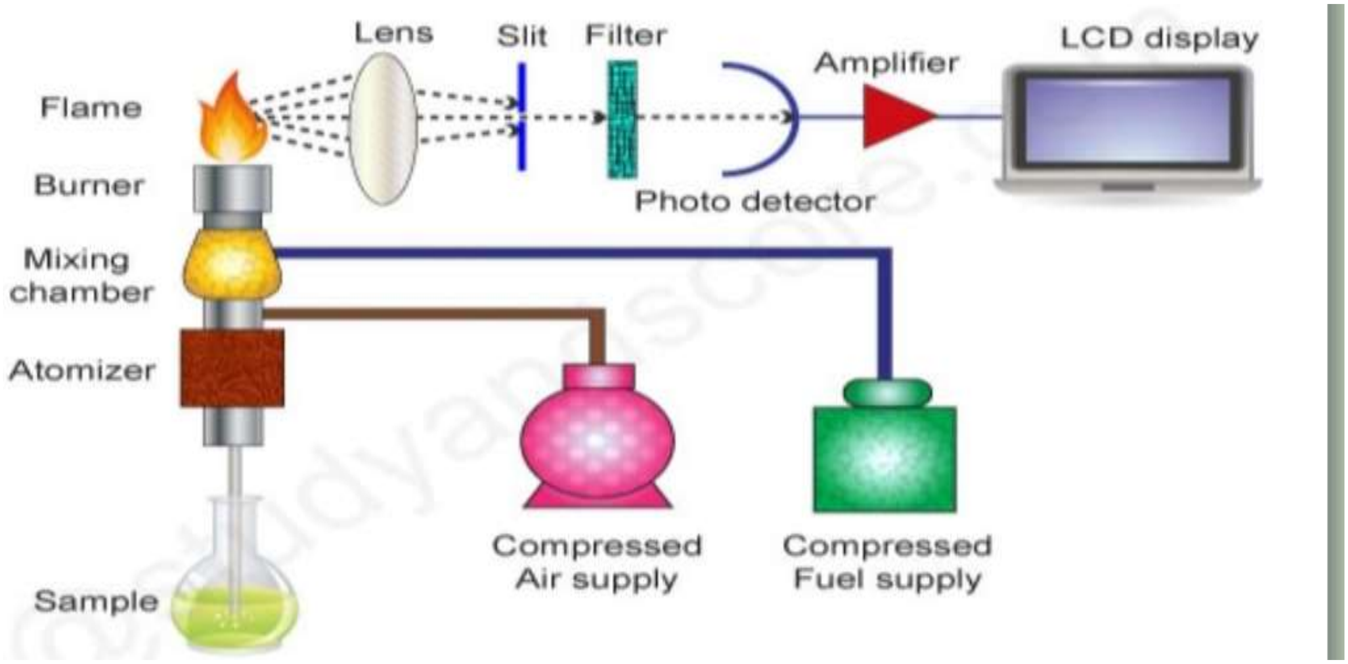
The flame photometry principle is based on measuring the intensity of emitted light.when metal is introduced into the flame the colour of the wavelength and its intensity both reveals information about the elements present in the given sample and their relative concentration respectively.

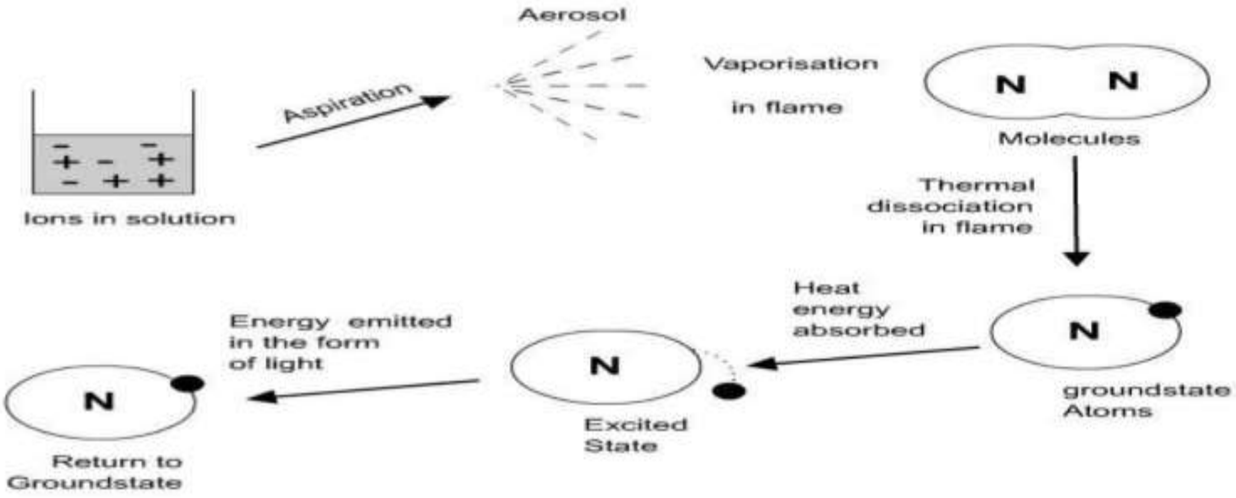
As a result this atom which unstable at greater level return to the ground state when these items return to their ground state they emit of specific wavelength primary in visible range when a solution containing significant amount of metal is injected into flame following event occur in a fast succession. Atom emits light when transition from excited state to lower energy state.

Flame atomization Sample solution is spray into flame where atom are vaporise and excited. Light measurement flame Photometer detect and measure the emitted light to quantity the element concentration.

In the 1920's Lundegardh largely overcame these difficulties by introducing a nebulizer that enabled the Sample to be presented to the air/acetylene flame in aerosol form.

6.1 Construction of Flame Photometer





6.2 Instruments

1. Sample
2. Source
3. Mirrors
4. Slits
5. Monochromators/Filters
6. Detector

1) Sample

There are Three components for introducing the liquid sample. Nebulizer: It breaks up the liquid into small droplets. Nebulization is Conversion of sample to a mist of finely divided droplets using a jet of Compressed gas.

A flaw carries the sample into atomization region.Nebuliser is a device used for sample introduction into the flame.

The process is called Nebulization and consists of thermal vaporization and dissociation of aerosol particles at highTemperatures producing small particle size with high residence time. A number of nebulization methods are available.

A few are listed below:

- Pneumatic nebulization
- Ultrasonic nebulization
- Electrothermal vaporization

Hydride generation (used for certain elements only) However, we would discuss about the pneumatic nebulization only. It is the most commonly Employed nebulization method in flame photometers.

Pneumatic nebulizer is the most commonly Used nebulizer for introducing aqueous/ liquid samples. In this the sample solution is fed or Aspirated into the nebulizer which converts liquid into a fine mist, or aerosol which into the flame. A common type of pneumatic nebulizer is called concentric pneumatic nebulizer.

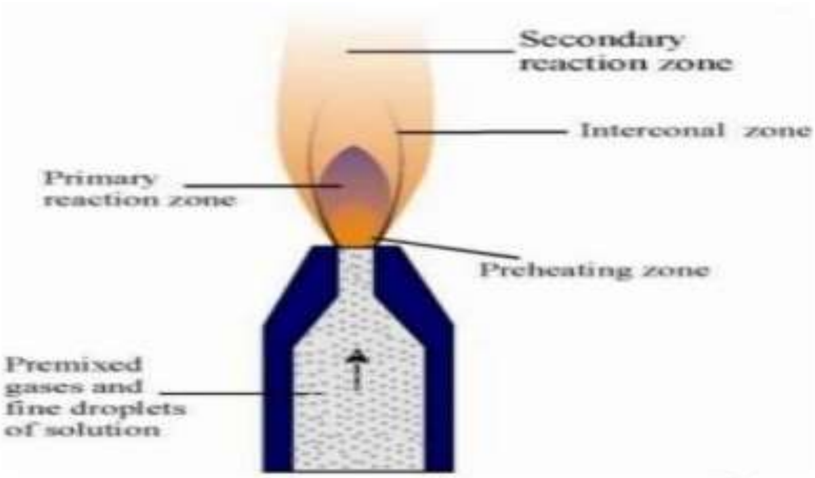
2) Source/Burner

The flame used in in instrument must possess these function the flame should possess the ability to evaporate the liquid droplets from the sample solution. Resulting in the formation of solid residues.

The flame should decompose the compound in the solid residue, resulting in the formation of atoms.

In flame photometry, several burners and fuel oxidant combinations have been used to produce The analytical flame. Including Meckel, Lundergarph, Total consumption burner, Premix of Laminar air flow burner, Shielded burners, Nitrous Oxide-Acetylene flames. The flame that atomizer needs, is obtained by the burner.

If a gas that gives cooler Flame is used then the atoms couldn't get excited. So, ion concentration of aqueous solutions cannot be Determined effectively.



- Preheating zones
- Primary reaction zone or inner zone
- Internal zone
- Secondary reaction zone

The first or the innermost region of the flame is the preheating zone where the combustion Mixture is heated to the ignition temperature by thermal conduction from the primary reaction Zone.

The second zone is the primary reaction zone or inner zone. This zone is about 0.1 mm Thick at atmospheric pressure and is visible by virtue of its blue green light ascribed to radicals C2 and CH.

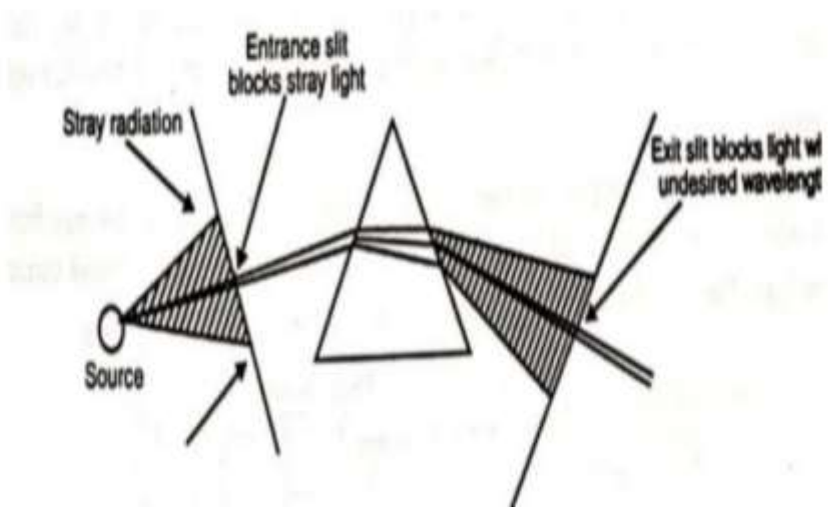
There is no thermodynamic equilibrium in this zone and the concentration of ions And free radicals is very high. This region is not used for flame photometry Immediately above the primary reaction zone lies the third or interconal zone or the reaction free Zone which can extend up to considerable height.

3) Mirrors

The radiation from the flame is emitted in all direction in space. In order to maximize the amount of radiation used in the analysis, a mirror is located behind the burner to reflect the radiation back to the entrance slit of the Monochromators. This mirror is concave and covers as wide angle from the flame as possible.

4) Slits

Entrance and exit slits are used before and after the dispersion elements. The entrance slit cuts out most of the radiation from the surroundings and allows only the Radiation from the flame and the mirrored reflection of the flame to enter the optical system.



5) Monochromators: In simple models the Monochromators is the prism, but in expensive models, the gratings are. Prisms- Quartz is the material most commonly used for making prisms.

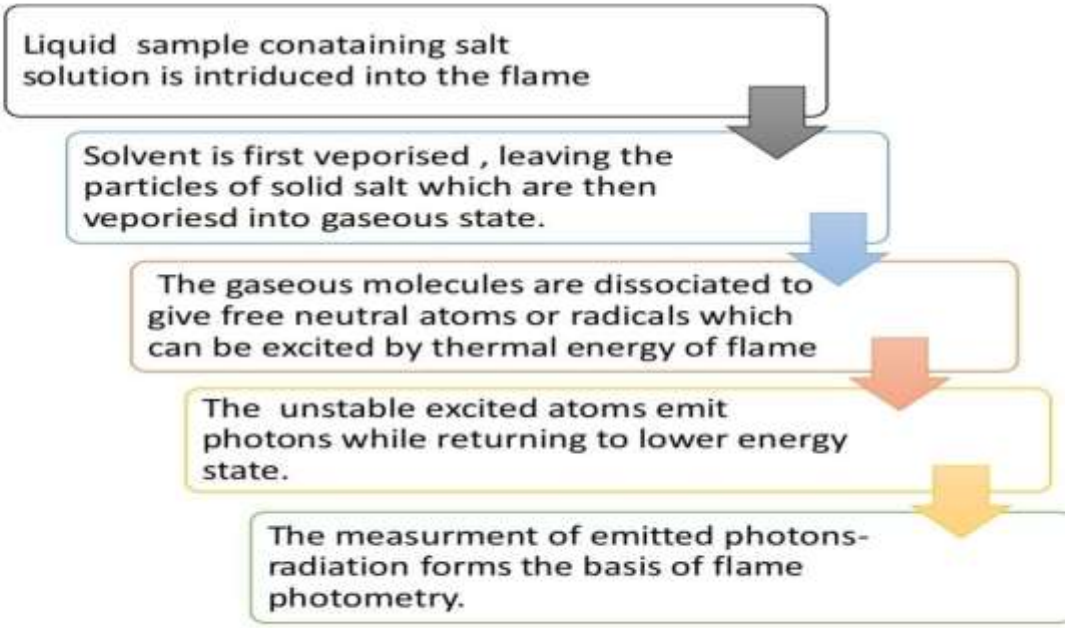
When a filter Is kept between the flame and detector, the radiation od desired wavelength from the flame will Be entering the detector and be measured. The remaining undesired wavelength will be absorbed by the filter and not measured.

Types of Monochromators:

- Grating Monochromators
- Prism Monochromators

6) Detectors: The radiation coming from the optical system is allowed to fall on the detector which measure The intensity of radiation falling on it.

The detector should be sensitive to radiation of all Wavelengths that may be examined. In good flame photometer, the photomultiplier detectors are Employed which produce an electrical signal from the radiation falling on them



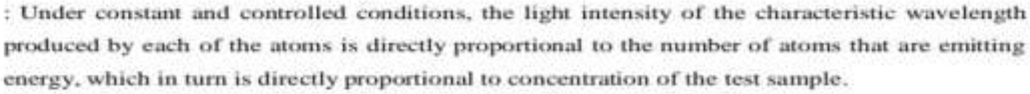
Liquid sample conataining salt solution is intriduced into the flame

Solvent is first veporised , leaving the particles of solid salt which are then veporiesd into gaseous state.

The gaseous molecules are dissociated to give free neutral atoms or radicals which can be excited by thermal energy of flame

The unstable excited atoms emit photons while returning to lower energy state.

The measurment of emitted photons-radiation forms the basis of flame photometry.



: Under constant and controlled conditions, the light intensity of the characteristic wavelength produced by each of the atoms is directly proportional to the number of atoms that are emitting energy, which in turn is directly proportional to concentration of the test sample.

6.3 Flame photometer handling procedure

Ensure that the compressor unit, LPG pipe are properly connected and secured.

A. Switch ON the main unit and compressor unit.
B. Adjust the air regulator knob to achieve a reading between 0.4-0.6.
C. Open the regulator valve from LPG cylinder.
D. Open the Fuel control valve from main unit.
E. Insert the igniter on the burner and ignite the flame. If the flame is not ignited within few Attempt increase the fuel flow gradually once the flame is ignited it will be yellow nonoxidizing flame. Slowly reduce the flame so as to get a blue oxidizing flame. Allow the Flame to stabilize for 5 min.
F. Take distilled water in the beaker and insert the capillary aspirator insert the required Filter.
G. Adjust the zero control to “00”On display. Remove the distilled water and place the Beaker containing the repaired sample of known concentration and select appropriate Filter.
H. Allow the flame to stabilize for 1-2 min.
I. Adjust the calibration knob to adjust the value of the standard on display.
J. Repeat the operations given in 8 & 10 above.
K. On pressing freeze switch the reading will be averaged and stored.
L. Remember to aspirate with distilled water between two readings to flush out earlier content .
M. At the end of the experiment shut ‘OFF’ the fuel valve first when the flame is Extinguished close the air valve and shut down the main unit and compressor unit

Elements	Emitted wavelength	Flame colour
Sodium	589 nm	Yellow
Potassium	766nm	Violet
Barium	554nm	Lime green
Calcium	622nm	Orange
Lithium	670nm	Red

For certain concentration range the intensity of emission is directly proportional to the number of atom returning to ground state and the light emitted in turn proportion to the concentration of samples amp.

6.4 Flame photometer working

Desolvation: Dissolution involved drying a sample in solution the metal particle in solvent are dehydrated by flame and the solvent is evaporated.
Vaporization: The metal particle in the sample are dehydrated and this also lead to the operation of the solvent.

Atomization: Atomization is the separation of all atom in chemical substance and the metal ion in sample are reduced to the metal item by the flame.
Excitation: The electrostatic force of attraction between electron and nucleus of atom help them to absorb particular amount of energy.
Emissions : The higher energy sale state is unstable the atom jump back to ground state or low emit radiation is measured by the photo detector. The elements are dissociated into atoms by the thermal energy provided by the flame element.

6.5 Advantage

- The method to carry out detection of elements by flame photometry is fast, simple and if carried out with care, quite reliable.
- It does not provide Information about the molecular structure of the compound present in the sample solution.
- Non radiating element such as carbon, hydrogen and halides cannot be detected. These can only be determined under special circumstances.
- The need for a rapid, accurate method to determine quantitatively Na and K present together in biological fluids has been met by the procedures to be described

6.6 Disadvantaged

- There are some difficulties. It does not provide information about the molecular structure of the compound present in the sample solution.
- The necessity of separating these elements prior to their determination by the various chemical methods usually employed has led to procedures which are often prohibitively tedious and time-consuming.

6.7 Application of flame photometer

A) **Qualitative Analysis:**

- Flame photometry is used to detect elements of groups l and ll of the periodic table. These are Na, K, Li, Mg, Ca etc.
- Identification is done by Peak matching technique, where at least 3 peaks Of emission spectrum should match when sample and standard spectra are recorded.

B) Quantitative Analysis:

- Concentration of calcium in serum.
- Concentration of Na, K, Ca, and K in urine.
- Amount of Ca, Na, K, and Mg in intravenous fluids, ORS.

The concentration or the amount of elements can be determined by any of the following four methods.

1) direct comparison method
2) Calibration curve method.
3) Standard addition method.
4) Internal standard method.

Flame photometer helps to determine the amount of the metals present in the sample of serum, urine, and other body fluids such as sodium, potassium, calcium, and lithium.

7. EXPERIMENTAL METHODOLOGY

7.1 Type of soil in India

A) White soil B) Sandy soil C) Black soil D) Red soil

A) White soil :

white soil also called calcareous soils are defined as soils containing amounts of calcium carbonate affect distinctly the soil properties related to plant growth, whether they are physical, such as soil – water relations, and soil crusting, or chemical such as the availability of plant nutrients (Talbot al. 2019). Calcareous soils are those which contains enough free calcium carbonate and which gives or produces effervesce on reaction with (0.1N) dilute HCL. Calcareous soils can contain from 3% to >25% $CaCO_3$ by weight with pH values with a range of 7.6 to 8.3. They are relatively widespread in the drier areas, in large part of arid and semiarid regions of the earth. Calcareous soil contains enough amount of potassium but due to higher concentration of calcium uptake of potassium ion is affected. Hence, deficiency of potassium is observed in plants. For example grapes become too acidic in calcareous soil due to less uptake of potassium. Therefore, potassium should be added in quantity more than its recommend dose under calcium content in soil. [21]

B) Sandy soil

This type has biggest particle and the size of particle does determine degree of aeration and drainage that soil allow. It is granular and consists of rock and mineral particle that are very small Therefore the texture is gritty and sandy soil is formed by and sandy soil is formed of disintegration and weathering of rock such as limestone granite quitez and shale sandy soil easy to cultivate if it is rich in organic material but then it allow drainage and dehydration plant in summer it worm very fast in spring seasons

C) Black soil

Black soil also called because of their black coloration and derived from the Basalt rock under semi-arid conditions. It is also known as “Regur” or black cotton soil as it is best suited for cotton cultivation. In India black soil are largely found over decant trap region namely the states of Maharshtra, Madhya Pradesh, parts of Andhra Pradesh, Northern part of Karnataka, Gujarat, parts of Tamil Nadu and Rajasthan. Black soil occupies 24.12% (74 Mha)of the total soil cover of the country with chief crops grown on it such as cotton, sugar cane, ground-nuts, millets, maize, pulses, sunflower, wheat and chilies. Brief about black soil v They are rich in Iron, line, calcium, magnesium, Carbonate and alumina, poor phosphorous, nitrogen and organic content. V Crops grow- under rainfed condition Cotton, sorghum, millet, soybean, pigeon pea, etc. Under irrigated condition such as sugarcane, wheat, citrus plantation. V Regur means cotton – best soil for cotton cultivation. V Most of the Deccan is occupied by Black soil. Mature soil and high water retaining capacity. Swells and will become sticky when wet and shrink when dried .

D) Red soil

These are generally reddish to brownish in colour obtained from weathering of granites, gneisses, and crystalline rocks and grade. These soils are ideal for cultivation of, ragi ground-nuts, millets, tobacco and potato. They are rich in Iron, containing small amount of Humus as they about retain moisture and are slightly acidic with poor quantity of phosphorous, nitrogen and organic contents. From poor, thin and light colored soils on the uplands to that of fertile deep dark colour soils of plains and valley. Red soils in India occupying 29.08% . red soils Seen mainly in low rainfall area. Also known as Omnibus group. Porous, friable structure and absence of lime, kantar (impure calcium carbonate). Colour is red because of Ferric oxide. The lower layer is reddish yellow or yellow. The texture is Sandy to clay and loamy Crop grow in these soils can be profitably used for a variety of agriculture, horticulture and plantation crops. Such as millets, rice, groundnut, maize, soybean, pigeon pea, green gram, jute, tea, cashew, cocoa, mango, etc. Also known as laterite soil, is a type of soil that is typically red or orange in colour due to the high Concentration of iron oxide. It is commonly found in tropical and subtropical regions that experience high levels of rainfall, where the weathering of rock and minerals leads to the development of this distinctive soil types.

7.2 Requirements

a) Chemical **:** Ammonium acetate(1 normal)
Potassium chloride (1.907 gm)
Soil sample

b) Instrument: conical flask
Pipette
Filter paper
Volumetric flask

1N Ammonium Acetate Solution: (a) Dissolve 77.08 g ammonium acetate in Distilled water and dilute it to 1 liter. Mix thoroughly, adjust pH to 7.0With dilute ammonium hydroxide/ammonia solution or acetic acid. OR (b)Dissolve 77.08 g ammonium acetate in 800 ml deionized water. Add 57 ml99.5% glacial acetic acid and then add 69 ml of concentrated ammonium Hydroxide or ammonia solution (Specific gravity 0.91) in it. After cooling adjust pH at 7.0 by the addition of more of NH_4OH or CH_3COOH and make Up the volume to 1 liter.

Standard potassium stock solution: Dissolve 1.908 g AR grade KCl (dried in oven at 70°C wit For 2 hr.) in deionized water and make volume to 1 liter. This will give stock Solution of 1000 ppm K. Take 100 ml of this stock solution and dilute it with Neutral normal ammonium acetate (extracting solution) up to 1 liter.

This Gives solution of 100 ppm K. From this solution, take 0, 5, 10, 15, 20, 25, 30And 40 ml in volumetric flasks of 100 ml capacity and make the volume by Further adding normal neutral ammonium acetate solution. This will give a Series of standard solutions having 0, 5, 10, 15, 20, 25, 30 and 40 ppm K,

7.3 Procedure

Transfer 5.0 g air dried soil in a 100 ml conical flask. Add 25 ml neutral 1 N ammonium acetate solution and shake the flask for5-10 minutes.

Filter it through Whatman filter paper No. 1.Determine K in the extract with the help of flame photometer. Set the K filter Compressor and light the burner of flame photometer.

Keep air pressure atlas and adjust the gas feeder so as to have a blue sharp flame cones. Adjust zero reading on the scale by feeding extract solution (CH3COONH4In the flame photometer Feed standard K solution of the highest volume in the standard series (40ppm K) and adjust the flame photometer to read full scale 100 reading.

Now take reading of each standard solution. Plot a standard curve between concentration and readings of standard potassium solution extracts of sample and Concentration and readings of standard K solution.

Standard sodium stock solution(1000 ppm) : weight accurately 5.85 gram Nacl dissolve 75 ml water and diluted 100 ml with distilled water in volumetric flask.[4]

Sodium chloride (salinity) is a major problem affecting crop production all over the world: 20% of cultivated land in the world, and 33% of irrigated land, are salt-affected and degrade Introduction Soil salinization is a major factor contributing to the loss of productivity of cultivated soils. Although difficult to estimate accurately, the area of salinized soils is increasing, and this phenomenon is especially intense in irrigated soils.

Salt affect plant growth due to increasing soil osmotic pressure and to interference with plant nutrition. A high salt concentration in soil solution reduces the ability of plants to acquire water, which is referred to as the osmotic or water-deficit effect of salinity. Damage occurs when the concentrations high enough to begin reducing crop growth.

Ammonium acetate : Dissolve 77.08 g ammonium acetate in Distilled water and dilute it to 1 liter.

Standard Sodium stock solution(100 ppm) :weight accurately 0.585gram of Nacl dissolve in 75 ml distilled water and diluted 100 ml with distilled water in volumetric flask.
Calculations:1000= 5.85 100 = ? 100×5.85÷1000 = 0.585

Standard sodium stock solution (200 ppm) : weight accurately 2.34 g sodium chloride dissolve in 75ml distilled water and diluted 100 ml with distilled water in volumetric . Calculations: 1000=11.7

200 = 200× 11.7÷ 1000
= 2.34

Potassium stock solution (100) :weight accurately 0.1908gram of kcl dissolve in 75 ml distilled water and diluted 100 ml distilled water in volumetric flask.

Calculation: 1000 = 1.908
100 = ?
100×1.908÷ 1000
0.1908

Standard potassium stock solution (500 ppm) weight accurately 0.954 gram of kcl dissolve in75 ml distilled water and diluted 100 ml distilled water in volumetric

Calculations: 1000 =1.908
500 = ?
0.95

Process: Transfer 20g air dried soil in a 100 ml conical flask. Add 25 ml neutral 1 N ammonium acetate solution and shake the flask for5-10 minutes. Filter it through Whatman filter paper No. 1.Determine K in the extract with the help of flame photometer. Set the K filter start Compressor and light the burner of flame photometer Keep air pressure atlas and adjust the gas feeder so as to have a blue sharp flame cones. Adjust zero reading on the scale by feeding extract solution (CH3COONH4In the flame photometer Feed standard K solution of the highest volume in the standard series (40ppm K) and adjust the flame photometer to read full scale . 100 reading. Using this process determine certain type of soil sample sodium and potassium concentration. Calcareous soil b) Red soil c) Black soil d) Sandy soil [3]

8. CALCULATION

Estimation of soil samples using following formula:

Formula: R × volume of exact/ weight of soil in taken× 2.24× 1000000÷ 1000000 R= part per million of soil samples.

Volume of exact= using ammonium acetate solution

Weight of soil = 20 gram

2.24 = soil depth weight

10-6= reading kg divided 10000 hector in soil**.**

1) Determination sodium concentration in red soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 1000000
56× 25 ÷ 20× 2.24×1000000÷ 10000
156.7

2) Determination potassium concentration in red soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 1000000÷1000000
182× 25÷ 20× 2.24× 1000000÷1000000
=509.6

3) Determination sodium concentration in black soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 10000000
191×25÷20×2.24×1000000× 1000000
=534.8

4) Determination potassium concentration in black soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 10000000
199×25÷20×2.24×1000000×1000000
= 462

5) Determination sodium concentration in White soil (calcareous soil)samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 1000000÷1000000
189 ×25÷20×2.24×1000000×1000000 =529

6) Determination potassium concentration in White soil (calcareous soil)samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 1000000÷1000000

183 ×25÷20×2.24×1000000×10000

=512.4

7) Determination sodium concentration in sandy soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 10000000

96×25÷20×2.24×1000000×1000000

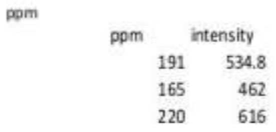
=268.8

8) Determination potassium concentration in sandy soil samples

Formula: R × volume of exact/ weight of soil in taken× 2.24× 10000000
187 ×25÷20×2.24×1000000×1000000
=523.6

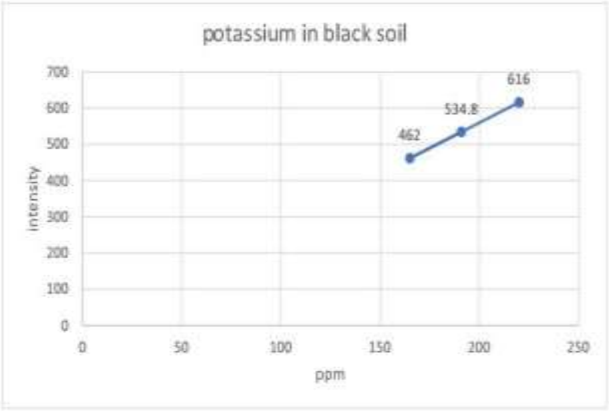
	Standard sodium value	Standard potassium value
High	>560	>280
Medium	280-560	180-280
Low	<280	108

9. Result And Interpretation

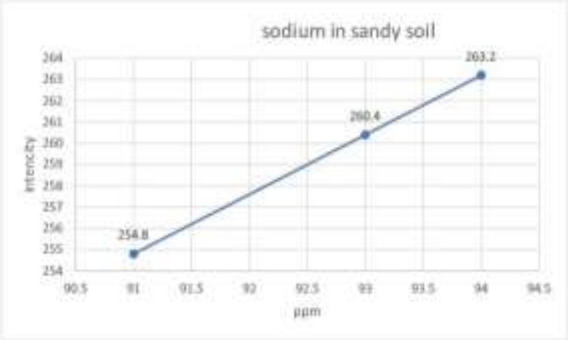


ppm

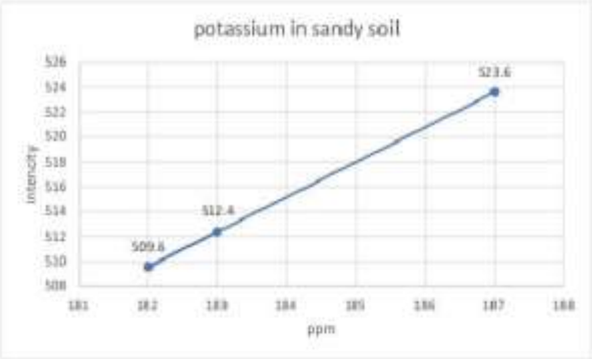
ppm	intensity
191	534.8
165	462
220	616



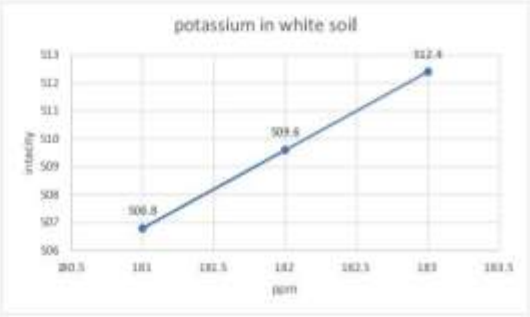
ppm	intencity
94	263.2
93	260.4
91	254.8



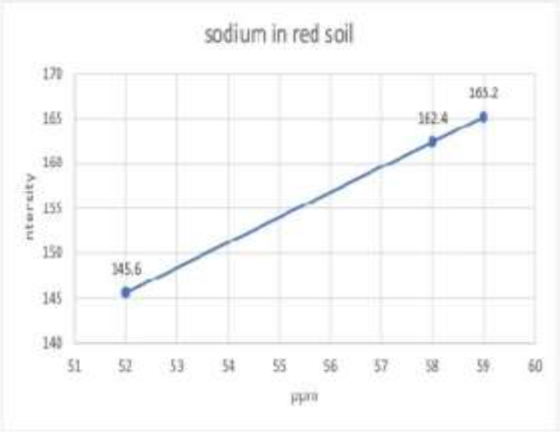
ppm	intencity
187	523.6
182	509.6
183	512.4



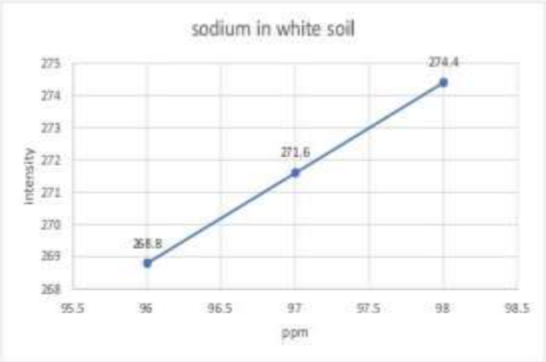
ppm	intencity
182	509.6
181	506.8
183	512.4



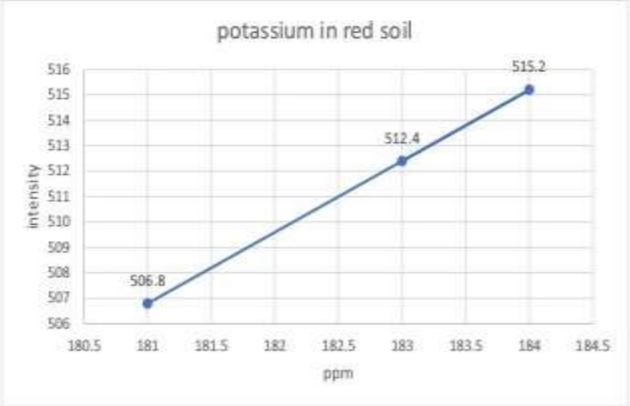
ppm	intensity
52	145.6
58	162.4
59	165.2



ppm	intensity
96	268.8
97	271.6
98	274.4



ppm	intensity
183	512.4
184	515.2
181	506.8



10. CONCLUSION

Conventional agriculture has been largely dependent on intensive chemical inputs which plays an important role in improving food productivity to meet human demands. In recent years, most of the farmers are using the excess amount of fertilizers and pesticides. Due to excess use of chemicals soil quality decreases. Small crop also affected due to large use of fertilizers and pesticides. So it becomes essential to analysis of soil parameter Above information help to farmers for use integrated nutrient management practice to maintain optimum concentration of all the essential nutrients for plants.

Organic agriculture dose not use synthetic fertilizers and pesticides and attempt to close nutrient cycle on their farms, protect environmental quality and enhance beneficial biological interaction and processes But farmers preference to the inorganic fertilizers as compare to organic because the nutrients are more readily available form and rapidly released after application.

To obtain high yield many farmers are using artificial and inorganic fertilizers. The nutrients from these fertilizers are not taken up directly by the plants and hence they may remain in the soil for several years, due to this the soil quality will be changed Like as a fertilizers, there is a wide range of chemicals used as pesticides. But the most harmful are those which either do not degrade or degrade very slowly in nature.

These hazardous chemicals that enter our food chain begin to increase their concentration at successive trophic levels in the food chain. The environmental problems associated with fertilizers application, a number of problems arise from the use of pesticides. These include persistence in the environment, toxicity in soil, vegetation and water supplies and its application for human health.
The persistence and toxicity of many pesticide compounds dependent on a number of soil characteristics. It also help to the farmers about the proper supply of nutrients for healthy growth and to increase the yield of crop. [18]

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