# Soil Science and Agricultural Chemistry Department

N. M. College of Agriculture, NAU, Navsari - 396 450

## Introduction:

The Department of Soil Science and Agricultural Chemistry was set up in 1965 with the inception of the N. M. College of Agriculture at Navsari. The divisions associated with teaching and research activities in the field of Soil Science and Agricultural Chemistry and other laboratory services like soil and water testing and advisory services.

## Mandate:

- Teaching, research and capacity building in the field of Soil Science and Agricultural Chemistry, biochemistry and allied sciences.
- Provide analytical services to farmers and sister departments of NAU, Navsari

## Facilities available:

- Under Graduate lab
- Post Graduate lab
- Conference room
- PG smart classroom
- Central Instrumentation facility
- Pot House
- Internet connectivity with *wifi*
- CCTV camera
- Sample digestion room
- UPS and Generator

## 1. TEACHING ACTIVITIES:

### A. Undergraduate level: Soil Science and Agricultural Chemistry

| Sr. No. | Course No. | Course title | Credit |
|---|---|---|---|
| 1 | Ag. Chem. 1.1 | Fundamentals of Soil Science | 2+1 |
| 2 | Ag. Chem. 2.2 | Manures, Fertilizers and Soil Fertility Management | 2+1 |
| 3 | Ag. Chem. 3.3 | Problematic soils and their Management | 2+1 |
| 4 | Biochem. 2.1 | Fundamentals of Plant Biochemistry | 2+1 |
| 5 | ELP-8.10 | Soil, Water, Plant and Seed Testing | 0+10 |

## B. Master's level: Soil Science and Agricultural Chemistry

| Sr. No. | Code | Course title | Credit |
|---|---|---|---|
| 1 | Soils 501* | Soil Physics | 2+1 |
| 2 | Soils 502* | Soil Fertility and Fertilizer use | 3+1 |
| 3 | Soils 503* | Soil Chemistry | 2+1 |
| 4 | Soils 504* | Soil mineralogy genesis, classification and survey | 2+1 |
| 5 | Soils 505 | Soil Erosion and Conservation | 2+1 |
| 6 | Soils 506* | Soil Biology and Biochemistry | 2+1 |
| 7 | Soils 507 | Geomorphology and Geochemistry | 2+0 |
| 8 | Soils 508 | Radio isotopes in soil and plant studies | 1+1 |
| 9 | Soils 509 | Soil, Water and Air pollution | 2+1 |
| 10 | Soils 510 | Remote sensing and GIS Techniques for soil and crop studies | 2+1 |
| 11 | Soils 511 | Analytical techniques and instrumental methods in soil and plant analysis | 0+2 |
| 12 | Soils 512 | System approaches in soils and crop studies | 2+1 |
| 13 | Soils 513 | Management of problematic soils and waters | 2+1 |
| 14 | Soils 514 | Fertiliser Technology | 1+0 |
| 15 | Soils 515 | Land degradation and Restoration | 1+0 |
| 16 | Soils 591 | Master's Seminar | 1+0 |
| 17 | Soils 599 | Master's Research | 20 |
| * Compulsory for Master's Programme | | | |

## Pre-Requisite Courses offered for Post Graduate Basic Science Student

| Sr. No. | Course No. | Title of Course | Credit |
|---|---|---|---|
| 1 | Ag. Chem. 1.1 | Fundamentals of Soil Science | 2+1 |
| 2 | Ag.Chem.2.2: | Soil Chemistry, Soil Fertility and Nutrient Management | 2+1 |

## C. Doctoral level

| Sr. No. | Code | Course title | Credit |
|---|---|---|---|
| 1 | Soils. 505 | Soil Erosion and Conservation | 2+1 |
| 2 | Soils. 507 | Geomorphology and Geochemistry | 2+0 |
| 3 | Soils. 508 | Radio isotopes in soil and plant studies | 1+1 |
| 4 | Soils. 509 | Soil, Water and Air pollution | 2+1 |
| 5 | Soils. 510 | Remote sensing and GIS Techniques for soil and crop studies | 2+1 |
| 6 | Soils. 511 | Analytical techniques and instrumental methods in soil and plant analysis | 0+2 |
| 7 | Soils 512 | System approaches in soils and crop studies | 2+1 |
| 8 | Soils 513 | Management of problematic soils and waters | 2+1 |
| 9 | Soils. 514 | Fertiliser Technology | 1+0 |
| 10 | Soils. 515 | Land degradation and Restoration | 1+0 |
| 11 | Soils 601 | Advances in soil physics | 2+0 |
| 12 | Soils 602 | Advances in soil fertility | 2+0 |
| 13 | Soils. 603 | Physical chemistry of soils | 2+0 |
| 14 | Soils. 604 | Soil genesis and micropedology | 2+0 |
| 15 | Soils 605 | Biochemistry of soil organic matter | 2+0 |
| 16 | Soils. 606 | Land use planning and watershed management | 2+0 |
| 17 | Soils 691 | Doctoral Seminar-I | 1+0 |
| 18 | Soils 692 | Doctoral Seminar-II | 1+0 |
| 19 | Soils 699 | Doctoral Research | 45 |

## A. Master's level: Biochemistry

| Sr. No. | Code | Course title | Credit |
|---|---|---|---|
| 1 | Biochem 501 | Basic biochemistry | 3+1 |
| 2 | Biochem 502 | Intermediary metabolism | 3+0 |
| 3 | Biochem 503 | Enzymology | 2+1 |
| 4 | Biochem 504 | Molecular biology | 2+1 |
| 5 | Biochem 505 | Biochemical techniques | 1+2 |
| 6 | Biochem 506 | Immuno chemistry | 2+1 |
| 7 | Biochem 507 | Plant biochemistry | 3+0 |
| 8 | Biochem 508 | Animal biochemistry | 3+0 |
| 9 | Biochem 509 | Food and nutritional biochemistry | 2+1 |
| 10 | Biochem 510 | Carbon and nitrogen metabolism | 2+1 |
| 11 | Biochem 511 | Biochemistry of cereal, oilseeds and pulses | 2+0 |
| 12 | Biochem 591 | Master's seminar | 1+0 |
| 13 | Biochem 599 | Master's research | 20 |

### Pre-Requisite Courses offered for Post Graduate Basic Science Student

| Sr. No. | Course No. | Title of Course | Credit |
|---|---|---|---|
| 1 | Ag. Chem. 1.1 | Fundamentals of Soil Science | 2+1 |
| 2 | Biochem. 2.1 | Fundamentals of Plant Biochemistry | 2+1 |

## B. Doctoral level

| Sr. No. | Code | Course title | Credit |
|---|---|---|---|
| 1 | Biochem 504 | Molecular biology | 2+1 |
| 2 | Biochem 506 | Immuno chemistry | 2+1 |
| 3 | Biochem 507 | Plant biochemistry | 3+0 |
| 4 | Biochem 508 | Animal biochemistry | 3+0 |
| 5 | Biochem 509 | Food and nutritional biochemistry | 2+1 |
| 6 | Biochem 510 | Carbon and nitrogen metabolism | 2+1 |
| 7 | Biochem 511 | Biochemistry of cereal, oilseeds and pulses | 2+0 |
| 8 | Biochem 601 | Advanced enzymology | 2+0 |
| 9 | Biochem 602 | Advanced molecular biology | 3+0 |
| 10 | Biochem 603 | Biochemistry of biotic and abiotic stress | 3+0 |
| 11 | Biochem 604 | Current topics in biochemistry | 1+0 |
| 12 | Biochem 605 | Functional genomics and metabolomics | 3+0 |
| 13 | Biochem 606 | Biomembranes | 2+0 |
| 14 | Biochem 607 | Advanced techniques in biochemistry | 0+2 |
| 15 | Biochem 691 | Doctoral seminar I | 1+0 |
| 16 | Biochem 692 | Doctoral seminar II | 1+0 |
| 17 | Biochem 699 | Doctoral research | 45 |

## 2. RESEARCH ACTIVITIES
### A. Current Research Projects

| Expt. No. | Title of the Experiments |
|---|---|
| 1 | Effect of organic manure on soil health and nutrient requirement of kharif and summer rice crop sequence. (Collaborative experiment with Agronomy Department, N.M. College of Agriculture, N.A.U., Navsari) |
| 2 | Effect of boron and zinc application on growth, yield and quality of sugarcane (Collaborative experiment with College Farm, NMCA, NAU, Navsari). |
| 3 | Evaluation of Low Cost Natural Farming in sugarcane under south Gujarat condition (Plant crop) (Collaborative experiment with Main Sugarcane Research Station, N.A.U., Navsari). |
| 4 | Effect of phosphorus and potassium application in *rabi* sweet corn (Zea mays L. var. saccharata Sturt) under south Gujarat condition. (Collaborative experiment with college Farm, KVK NAU, Navsari). |
| 5 | A comparative study of Humus, Nitrogen and Sulphur dynamics of organically and conventionally managed arable soils in different crops |
| 6 | Studies of different forms of N, S and K in soil of Navsari district of South Gujarat |
| 7 | Effect of pre and post-emergence herbicides in soybean. (Collaborative experiment with Polytechnic in Agriculture, NAU, Vyara). |
| 8 | Biochemical changes associated with storage period in sweet potato. |
| 9 | Phytochemical composition and antimicrobial actions of aqueous and ethanolic extracts of the peels and leaves of lesser yam genotypes. |





## 3. ANALYTICAL SERVICES

- Provide the soil and water testing facility to farmers.
- Provide the chemical and biochemical testing facility to sister departments of NAU.

### Sample analysis at SSAC: Guidelines to sister departments of NAU

(1) The department of SSAC will analyze samples pertaining only to agriculture or research viz. soil, irrigation water, organic manures etc. which are feasible considering the facilities and resources of the laboratory.

(2) The concern department should ensure that the samples send for analysis, must be delivered to the Dept. of SSAC while maintaining its physical integrity.

(3) The concerned department has to mandatorily submit a letter along with the samples clearly mentioning the analytical parameters and other relevant details which are going to be performed.

(4) The sister departments should have to pay the analysis charges fixed by the competent authority of NAU, Navsari prior to the analysis. The credit bill for the payment of analytical charges will be provided to the sister departments of NAU, Navsari.

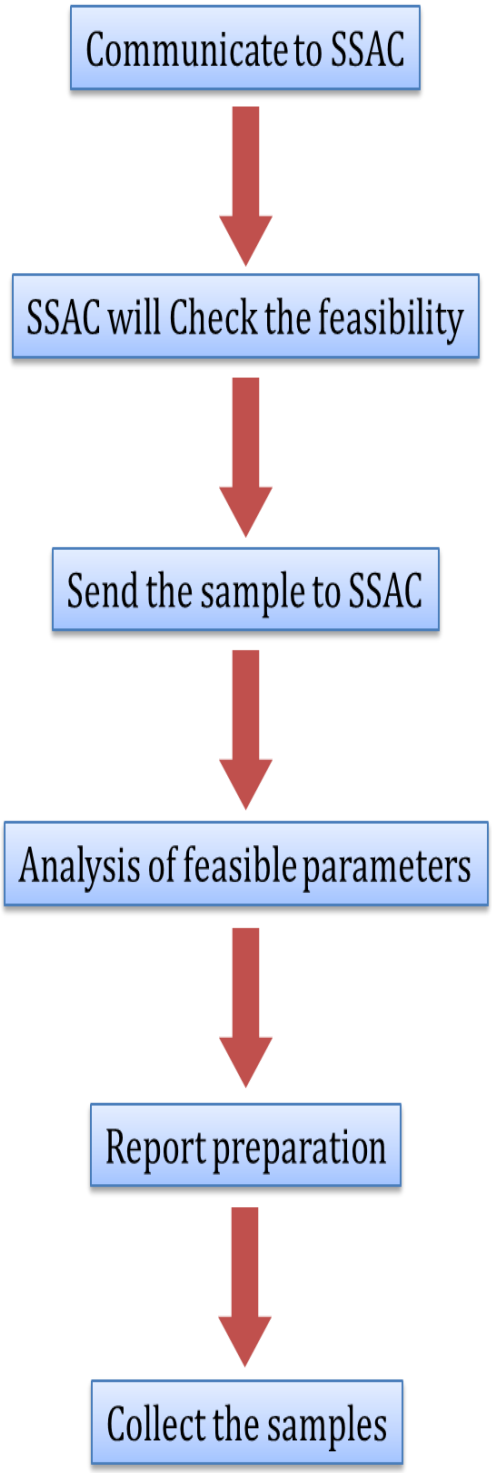
(5) The results of analysis will be communicated to the sister departments of NAU Navsari after its completion through authorized person deputed by the concern department or by post or official electronic mail box of the signatory authority.

(6) Any delay or deviation to the sample analysis due to any natural calamities or any technical/non-technical issues or any unforeseeable circumstances after receiving the samples by SSAC will be informed to the concern department through the official telephone, letter or email.

(7) The chemicals required for the analysis of special parameters has to be provided by the concerned department. Once the analysis is over, the left over chemicals will be returned back to the concern department. But, in such cases the payment for the analysis fixed by the university will have to pay by the concern department.

(8) Performance of any specific parameter from any sample, whose charges are not fixed by the university, needs prior sanction from the competent authority in consultation with the department of SSAC.

(9) The analytical samples will be preserving in the department for a period of 15 days after the dispatch of analytical results. Afterwards, the samples will be discarded from the laboratory. However, the preserve sample will be returned back if the concern department has informed earlier.



## ખેડૂતોમાટે નમુનોઓના પૃથક્કરણ માટેના નિયમો

(૧) ખેતીની જમીન તથા પિયત પાણીના નમુનાઓનુજ ફક્ત નીચે જણાવેલ પરિમાણો માટેજ પૃથક્કરણ કરવામાં આવશે. આ શિવાયના નમૂનાઓ અને પરિમાણો માટે પૃથક્કરણ કરવામાં આવશે નહિ.

| અ.નં. | જમીન | અ.નં. | પાણી |
|---|---|---|---|
| ૧ | અમ્લતા આંક ($pH_{1:2.5}$) | ૧ | અમ્લતા આંક |
| ૨ | વિદ્યુત વાહકતા ($EC_{1:2.5}$) | ૨ | વિદ્યુતવાહકતા |
| ૩ | સેન્દ્રિય કાર્બન | ૩ | કેલ્શીયમ + મેગ્નેશીયમ |
| ૪ | લભ્ય નાઈટ્રોજન | ૪ | સોડીયમ |
| ૫ | લભ્ય ફોસ્ફરસ | ૫ | કાર્બોનેટ |
| ૬ | લભ્ય પોટાશ | ૬ | બાયો કાર્બોનેટ |
| ૭ | લભ્ય ગંધક | ૭ | ક્લોરાઈડ |
| ૮ | લભ્ય લોહ | ૮ | શેષ સોડીયમ કાર્બોનેટ |
| ૯ | લભ્ય મેંગેનીઝ | ૯ | સોડીયમ અધિશોષણ આંક |
| ૧૦ | લભ્ય જસત | | |
| ૧૧ | લભ્ય તાંબુ | | |
| ૧૨ | જીપ્સમની જરૂરિયાત | | |

(૨) જમીન/પિયત પાણીનો નમુનો પૃથક્કરણ કરાવનારે વિભાગની પ્રયોગશાળામાં આપવાનો રહેશે. વિભાગમાંથી જમીન/પિયત પાણીનો નમુનો લેવા માટેની પધ્ધતિનું માર્ગદર્શન આપવામાં આવશે.

(૩) નમુનો લાવનારે નમુનાની અને અન્ય વિગતની માહિતી નિયત ફોર્મેટમાં આપવાની રહેશે.

(૪) જમીન/પિયત પાણીના નમુનાના પૃથક્કરણ માટે યુનિવર્સિટીના વખતો વખતના નિયત કરેલ દરો ચુકવવાનો રહેશે અને તેનું ચુકવાણું થયા બાદ જ પૃથક્કરણ કરવામાં આવશે.

(૫) નમુનાઓ અત્રેની કચેરીમાં જમા કરાવ્યા બાદ ૩૦ દિવસમાં પૃથક્કરણનો રીપોર્ટ મળી શકશે. પૃથક્કરણનો રીપોર્ટ રૂબરૂમાં અથવા પત્ર અથવા ઈ-મેઈલ દ્વારા મળી શકશે.

(૬) કુદરતી આફતો, નમુનાઓનું ભારણ, મશીનમાં તાંત્રિક ખામી કે અન્ય કે જેમાં પૃથક્કરણનો રીપોર્ટ ૩૦ દિવસની અંદર આપી શકાય તેમ નહોય તેવા સંજોગોમાં તેની જાણ ફોન/પત્ર/ ઈ-મેઈલ દ્વારા કરવામાં આવશે.

(૭) વિભાગમાં પૃથક્કરણકર્તા/સાધનોની કાર્યરત્તા/રસાયણો અથવા અન્ય કોઈ વિગત કે જે પૃથક્કરણને અસરકર્તા હોઈ તેની ઉપલબ્ધી ન હોયતો નમુનો સ્વીકારવામાં આવશે નહી.

(૮) પૃથક્કરણ નો રીપોર્ટ અત્રેથી આપ્યા/રવાના કર્યાબાદ ૧૫ દિવસ સુધી નમુનાઓની અત્રે જાળવણી કરવામાં આવશે. આ સમયગાળો વિત્યાબાદ તેનો નિકાલ કરવામાં આવશે.

(૯) કોઈ પ્રમાણપત્ર આપવામાં આવશે નહિ પરંતુ પૃથક્કરણનો રીપોર્ટ આપવામાં આવશે અને પૃથક્કરણ રીપોર્ટના આધારે વિભાગની નિપુણતા મુજબ માર્ગદર્શન આપવામાં આવશે. જે નિપુણતા આ વિભાગમાં ઉપલબ્ધ ન હોય તેનું માર્ગદર્શન અન્ય વિષય નિષ્ણાંત પાસેથી લેવાનું રહેશે.


## Rate for analysis of farmers' sample:

| Soil parameters | Rs. | Water parameters | Rs. |
|---|---|---|---|
| EC (1 :2.5) | 30 | pH | 30 |
| pH (1 :2.5) | 30 | EC /TDS | 30 |
| Organic Carbon | 130 | Ca | 50 |
| Available N | 70 | Mg | 50 |
| Available P | 100 | Na | 60 |
| Available K | 100 | $CO_3$ | 50 |
| Available Ca | 70 | $HCO_3$ | 50 |
| Available Mg | 70 | Cl | 50 |
| Available S | 130 | $SO_4$ | 60 |
| DTPA Fe | 100 | | |
| DTPA Mn | 100 | | |
| DTPA Zn | 100 | | |
| DTPA Cu | 100 | | |
| Gypsum Requirement | 130 | | |

**Price for analysis of sister departments' sample:** see the circular subjected to વર્ષ ૨૦૨૧-૨૨ માટે ઉચ્ચક દરોથી ભાવ નક્કિ કરવા બાબત જા.નં. નકૃયું/ સંનિ/ ઉચ્ચક દરો/ ટી.૨ (એ)/ ૪૫૪૮/ ૨૦૨૧, તા. ૯-૬-૨૦૨૧.

## 4. Extension/Capacity building

- Need based training given to the extension workers / officers of Department of Agriculture Gujarat State, Officers / Field Staff of Sugar Factories; and farmers bring by various NGOs to strengthen their knowledge about soil health and their management.

- Deliver the lecture to farmers on various platform to increase awareness and knowledge about fertilizer management, problematic soil and water management, organic farming *etc.*

- Staff is actively participating in *Krishi Mela, Krishi Mahotsav, Khedut Din, Khedut Shibir*, Seminar, *etc.* Also visited the farmers field as a diagnostic team member.