A

On Job Training Report
On

SOIL TESTING

Completed at

Government of Maharashtra Agriculture Department,

District Soil Survey and Soil Testing Laboratory Kolhapur.

Address- Soil Testing Lab, Near Seva hospital, Opposite to zilla Sainik Sanskrutik Bhavan, Kasbabawda, Kolhapur-416003

By

Name of student

Miss.Pallavi Ravindra Hande.
Mr.Atharv Ramdas Gurav.
Miss.Namrata Anil Kandalkar.
Mr.Shreeshail Mallappa Surgali.
Miss.Sanika Prakash Thorbole.
Mr.Sourabh Rajaram Sankpal.
Miss.Asavari Anil Kalamkar.
Mr.Rahul Gautam Malavi.
Mr.Rohan Ravindra Sawant.

M.Sc.Microbiology

Part I Semester II

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Mr.Rahul Gautam Malavi.

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Dissemination of Education for Knowledge, Science and Culture"

- Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANAND COLLEGE, KOLHAPUR

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PG Department of Microbiology

CERTIFICATE

OF

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This is to certify that Miss. Pallavi Ravindra Hande. (Exam seat no. 1119120) has satisfactorily carried out the required practical work prescribed by the BoS Department of Microbiology, Vivekanand College, Kolhapur (An Empowered Autonomous Institute) for M.Sc. - Part- I Semester II course in On Job Training (Sub code – OJT20MIC21) and this report represents his/her Bonafide work in the year 2024 - 2025

Place: Kolhapur

Date: 24-04-2025

Examiner

OJT In charge

Head

I/C HEAD
DEPARTMENT OF MICROBIOLOGY
VIVEKANAND COLLEGE,KOLHAPUR
(EMPOWERED AUTONOMOUS)

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CERTIFICATE
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This is to certify that Miss. Namrata Anil Kandalkar (Exam seat no. 1119117) has satisfactorily carried out the required practical work prescribed by the BoS Department of Microbiology, Vivekanand College, Kolhapur (An Empowered Autonomous Institute) for M.Sc. - Part- I Semester II course in On Job Training (Sub code – OJT20MIC21) and this report represents his/her Bonafide work in the year 2024 - 2025

Date: 24-04-2025

Place: Kolhapur

Examiner

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(स्वायत्त) कोल्हापूर

PG Department of Microbiology

CERTIFICATE

OF

"ON JOB TRAINING"

This is to certify that Miss. Sanika Prakash Thorbole (Exam seat no. 1119124) has satisfactorily carried out the required practical work prescribed by the BoS Department of Microbiology, Vivekanand College, Kolhapur (An Empowered Autonomous Institute) for M.Sc. - Part- I Semester II course in On Job Training (Sub code – OJT20MIC21) and this report represents his/her Bonafide work in the year 2024 - 2025

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This is to certify that Miss. Asavari Anil Kalamkar (Exam seat no. 1119125) has satisfactorily carried out the required practical work prescribed by the BoS Department of Microbiology, Vivekanand College, Kolhapur (An Empowered Autonomous Institute) for M.Sc. - Part- I Semester II course in On Job Training (Sub code – OJT20MIC21) and this report represents his/her Bonafide work in the year 2024 - 2025

Place: Kolhapur

Date: 24-04-2025

Examiner

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CERTIFICATE
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This is to certify that Mr. Atharv Ramdas Gurav (Exam seat no. 1119123) has satisfactorily carried out the required practical work prescribed by the BoS Department of Microbiology, Vivekanand College, Kolhapur (An Empowered Autonomous Institute) for M.Sc. - Part- I Semester II course in On Job Training (Sub code – OJT20MIC21) and this report represents his/her Bonafide work in the year 2024 - 2025

Place: Kolhapur

Date: 24-05-2025

5/5/25 05/05/25

Examiner

OJT In charge

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PG Department of Microbiology

CERTIFICATE

OF

"ON JOB TRAINING"

This is to certify that Mr. Shreeshail mallappa surgali (Exam seat no. 1119129) has satisfactorily carried out the required practical work prescribed by the BoS Department of Microbiology, Vivekanand College, Kolhapur (An Empowered Autonomous Institute) for M.Sc. - Part- I Semester II course in On Job Training (Sub code – OJT20MIC21) and this report represents his/her Bonafide work in the year 2024 - 2025

Place: Kolhapur

Date: 24-05-2025

Examiner

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This is to certify that Mr.Sourabh Rajaram Sankpal. . (Exam seat no. 1119132) has satisfactorily carried out the required practical work prescribed by the BoS Department of Microbiology, Vivekanand College, Kolhapur (An Empowered Autonomous Institute) for M.Sc. - Part- I Semester II course in On Job Training (Sub code – OJT20MIC21) and this report represents his/her Bonafide work in the year 2024 - 2025

Place: Kolhapur

Date: 24-05-2025

Examiner

OJT In charge

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CERTIFICATE
OF
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This is to certify that Mr. Rahul Gautam Malavi (Exam seat no. 1119122) has satisfactorily carried out the required practical work prescribed by the BoS Department of Microbiology, Vivekanand College, Kolhapur (An Empowered Autonomous Institute) for M.Sc. - Part- I Semester II course in On Job Training (Sub code – OJT20MIC21) and this report represents his/her Bonafide work in the year 2024 - 2025

Place: Kolhapur

Date: 24-04-2025

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Examiner

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HC HEAD
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PG Department of Microbiology

CERTIFICATE

OF

"ON JOB TRAINING"

This is to certify that Mr. Rohan Ravindra Sawant. (Exam seat no. 1119126) has satisfactorily carried out the required practical work prescribed by the BoS Department of Microbiology, Vivekanand College, Kolhapur (An Empowered Autonomous Institute) for M.Sc. - Part- I Semester II course in On Job Training (Sub code – OJT20MIC21) and this report represents his/her Bonafide work in the year 2024 - 2025

Place: Kolhapur

Date: 24-04-2025

5/5/25 **Examiner** 05/05/25

OJT In charge

Head

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INDEX

DECLARATION

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I express my gratitude to Mr. Shrikant Mane (District Soil Survey and Soil Testing Officer) at Government of Maharashtra Agriculture Department, District Soil Survey and Soil Testing Laboratory Kolhapur and the whole training team for their support and guidance throughout the training.

Date: 24-04-2025

Place: Kolhapur

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Place: Kolhapur

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We are thankful to Principal Dr. R. R. Kumbhar, for his kind co-operation and valuable support.

Also, we sincerely thank our parents for helping us in all aspects to complete the project work. Finally, we would like to appreciate our friends, colleagues for their direct and indirect contribution.

Date: 24-04-2025

Place: Kolhapur

Mr. Sourabh Rajaram Sankpal.

ACKNOWLEDGEMENT

At this juncture where the herculean task is nearing its pinnacle, science deems it a pleasure to look back and acknowledge efforts and support of all kith and kin that helped with zeal to turn a distant dream of an industrial training into reality.

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Date: 24-04-2025

Place: Kolhapur

Mr.Rahul Gautam Malavi

ACKNOWLEDGEMENT

At this juncture where the herculean task is nearing its pinnacle, science deems it a pleasure to look back and acknowledge efforts and support of all kith and kin that helped with zeal to turn a distant dream of an industrial training into reality.

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Date: 24-04-2025

Place: Kolhapur

Mr. Rohan Ravindra Sawant

INTERNSHIP UNDERTAKING

1. Student Name	Miss. Pallavi Ravindra Hande.
2. Current Address	At./Post. Shahpur,ichalkaranji. Tal.- hatkanangle, Dis.- Kolhapur Pin Code- 416115
3. Residence Address	At./Post. Shahpur,ichalkaranji. Tal.- hatkanangle,, Dis.- Kolhapur Pin Code- 416115
4. Email id	pallavihande@gmail.com
5. Mobile No.	8421632093
9. Internship /Area (Company/Institute)	Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Sainik Sanskrutik Bhavan, Kasbabawda, Kolhapur-416003

I confirm that the student has attended the internship orientation and has met all paperwork and process requirements to participate in the internship program, and has received approval from his/her mentor.

Sign of Head of the Department:

Date: 24-04-2025

HC HEAD
DEPARTMENT OF MICROBIOLOGY
VIVEKANAND COLLEGE,KOLHAPUR
(EMPOWERED AUTONOMOUS)

INTERNSHIP UNDERTAKING

1. Student Name	Miss. Namrata Anil Kandalkar
2. Current Address	At./Post. Nigave Khalsa, Tal.- Karveer, Dis.- Kolhapur Pin Code- 416207
3. Residence Address	At./Post. Nigave Khalsa, Tal.- Karveer, Dis.- Kolhapur Pin Code- 416207
4. Email id	namratakandalkar1409@gmail.com
5. Mobile No.	8080906993
9. Internship /Area (Company/Institute)	Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Sainik Sanskrutik Bhavan, Kasbabawda, Kolhapur-416003

I confirm that I agree with the terms, conditions, and requirements of the Internship Policy

Student Signature:

Date: 24-06-2025

I confirm that the student has attended the internship orientation and has met all paperwork and process requirements to participate in the internship program, and has received approval from his/her mentor.

Sign of Head of the Department:

Date: 24-06-2025

I/C HEAD
DEPARTMENT OF MICROBIOLOGY
VIVEKANAND COLLEGE,KOLHAPUR
(EMPOWERED AUTONOMOUS)

INTERNSHIP UNDERTAKING

1. Student Name	Miss. Sanika Prakash Thorbole
2. Current Address	At./Post. Gargoti, Tal.- Bhudhargad, Dis.- Kolhapur Pin Code- 416209
3. Residence Address	At./Post. Gargoti, Tal.-Bhudhargad, Dis.- Kolhapur Pin Code- 416209
4. Email id	Sanikathorbole@gmail.com
5. Mobile No.	73851 92243
9. Internship /Area (Company/Institute)	Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Sainik Sanskrutik Bhavan, Kasbabawda, Kolhapur-416003

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Student Signature:

Date: 24-04-2025

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Sign of Head of the Department:

Date: 24-04-2025

I/C HEAD
DEPARTMENT OF MICROBIOLOGY
VIVEKANAND COLLEGE,KOLHAPUR
(EMPOWERED AUTONOMOUS)

INTERNSHIP UNDERTAKING,

1. Student Name	Miss. Asavari Anil Kalamkar
2. Current Address	At./Post. Nigave Khalsa, Tal.- Karveer, Dis.- Kolhapur Pin Code- 416207
3. Residence Address	At./Post Nigave khalsa Tal.-Karveer Dis.- Kolhapur Pin Code- 416207
4. Email id	asavarikalamkar5@gmail.com.
5. Mobile No.	8767965646
9. Internship /Area (Company/Institute)	Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Sanik Sanskrutik Bhavan, Kasbabawda, Kolhapur-416003

I confirm that I agree with the terms, conditions, and requirements of the Internship Policy

Akalamkar

Student Signature:

Date: 24-04-2025

I confirm that the student has attended the internship orientation and has met all paperwork and process requirements to participate in the internship program, and has received approval from his/her mentor.

Gaupale

Sign of Head of the Department:

Date: 24-04-2025

I/C HEAD
DEPARTMENT OF MICROBIOLOGY
VIVEKANAND COLLEGE,KOLHAPUR
(EMPOWERED AUTONOMOUS)

INTERNSHIP UNDERTAKING

1. Student Name	Mr. Atharva Ramdas Gurav.
2. Current Address	At/Post. Hanumatwadi, Tal:-karveer Dis:- Kolhapur Pin Code- 416010.
3. Residence Address	At/Post. Hanumatwadi, Tal:- karveer Dis.- Kolhapur Pin Code- 416010.
4. Email id	atharvagurav1310@gmail.com
5. Mobile No.	9922270731
9. Internship /Area (Company/Institute)	Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Sainik Sanskrutik Bhavan, Kasbabawda, Kolhapur-416003

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Sign of Head of the Department:

Date: 24-04-2025

HC HEAD
DEPARTMENT OF MICROBIOLOGY
VIVEKANAND COLLEGE,KOLHAPUR
(EMPOWERED AUTONOMOUS)

INTERNSHIP UNDERTAKING,

1. Student Name	Mr.shreeshail mallappa surgali
2. Current Address	Samrad colony vikramnagar Kolhapur Tal.- Karveer, Dis.- Kolhapur Pin Code- 416004
3. Residence Address	Samrad colony vikramnagar Kolhapur Tal.-Karveer Dis.-Kolhapur Pin Code- 416004
4. Email id	Shree120304@ gmail.com
5. Mobile No.	9834388664
9. Internship /Area (Company/Institute)	Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Sanik Sanskrutik Bhavan, Kasbabawda, Kolhapur-416003

I confirm that I agree with the terms, conditions, and requirements of the Internship Policy

Student Signature:

Date: 24-04-2025

I confirm that the student has attended the internship orientation and has met all paperwork and process requirements to participate in the internship program, and has received approval from his/her mentor.

Sign of Head of the Department:

Date: 24-04-2025

VC HEAD
DEPARTMENT OF MICROBIOLOGY
VIVEKANAND COLLEGE,KOLHAPUR
(EMPOWERED AUTONOMOUS)

INTERNSHIP UNDERTAKING

1. Student Name	Mr Sourabh Rajaram Sankpal
2. Current Address	At/Post. uchagaon, kolhapur Tal:- Karveer, Dis.- Kolhapur Pin Code- 416005
3. Residence Address	At/Post. uchagaon, kolhapur . Tal.- karveer. Dis.- Kolhapur Pin Code- 416005
4. Email id	sourabhsankpal01@gmail.com
5. Mobile No.	9028769703
9. Internship /Area (Company/Institute)	Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Sainik Sanskrutik Bhavan, Kasbabawda, Kolhapur-416003

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Sign of Head of the Department:

Date: 24-04-2025

Gaupale

HEAD
DEPARTMENT OF MICROBIOLOGY
VIVEKANAND COLLEGE,KOLHAPUR
(EMPOWERED AUTONOMOUS)

INTERNSHIP UNDERTAKING,

1. Student Name	Mr.Rahul Gautam Malavi
2. Current Address	At Post kisrul, Kolhapur Tal.- Panhala, Dis.- Kolhapur Pin Code- 416205
3. Residence Address	At.post kisrul , Kolhapur Tal.-Panhala Dis.- Kolhapur Pin Code- 416205
4. Email id	rahulmalavi2002@gmail.com
5. Mobile No.	9356108001
9. Internship /Area (Company/Institute)	Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Sanik Sanskrutik Bhavan, Kasbabawda, Kolhapur-416003

I confirm that I agree with the terms, conditions, and requirements of the Internship Policy

Student Signature: Rahul.

Date: 24-04-2025

I confirm that the student has attended the internship orientation and has met all paperwork and process requirements to participate in the internship program, and has received approval from his/her mentor.

Sign of Head of the Department:

Date: 24-04-2025

VC HEAD
DEPARTMENT OF MICROBIOLOGY
VIVEKANAND COLLEGE,KOLHAPUR
(EMPOWERED AUTONOMOUS)

INTERNSHIP UNDERTAKING,

1. Student Name	Mr. Rohan Ravindra Sawant.
2. Current Address	At./Post. Nigave Khalsa, Tal.- Karveer, Dis.- Kolhapur Pin Code- 416207
3. Residence Address	At./Post Nigave khalsa Tal.-Karveer Dis.- Kolhapur Pin Code- 416207
4. Email id	rohanrsawant8256@gmail.com
5. Mobile No.	9075514790
9. Internship /Area (Company/Institute)	Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Sanik Sanskrutik Bhavan, Kasbabawda, Kolhapur-416003

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Student Signature:

Date: 24-06-2024

I confirm that the student has attended the internship orientation and has met all paperwork and process requirements to participate in the internship program, and has received approval from his/her mentor.

Sign of Head of the Department:

Date:

HEAD
DEPARTMENT OF MICROBIOLOGY
VIVEKANAND COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

ATTENDANCE SHEET

Name and Address of the Company/ Institute/Organization:

Email Id: pallavihande@gmail.com

Name of Supervisor: Mr. Shrikant Mane

Name of the Student	Miss. Pallavi Ravindra Hande.
Roll Number	5412
Name of Course	M.Sc.I Microbiology
Date of Commencement of Training	16/12/2024
Date of Completion of Training	03/01/2025

Month and Year:

Sr. No.	Date	Day	Time	Work done	Sign
1.	16/12/24	Monday	10am – 4pm	Grinding Of Soil	Hande
2.	17/12/24	Tuesday	10am – 4pm	Soil Phosphorous Testing	Hande
3.	18/12/24	Wednesday	10am – 4pm	Soil Phosphorous Testing	Hande
4.	19/12/24	Thursday	10am – 4pm	Soil Phosphorous Testing	Hande
5.	20/12/24	Friday	10am – 4pm	Soil Boron Testing	Hande
6.	21/12/24	Saturday	10am – 4pm	Soil Boron Testing	Hande
7.	23/12/24	Monday	10am – 4pm	Soil Sulfur Testing	Hande
8.	24/12/24	Tuesday	10am – 4pm	Soil Sulfur Testing	Hande
9.	26/12/24	Thursday	10am – 4pm	Soil Organic Carbon Testing	Hande
10.	27/12/24	Friday	10am – 4pm	Soil Organic Carbon Testing	Hande
11.	30/12/24	Monday	10am – 4pm	Soil pH & EC Testing	Hande
12.	31/12/24	Tuesday	10am – 4pm	Soil pH & EC Testing	Hande
13.	01/01/25	Wednesday	10am – 4pm	Soil Potassium Testing	Hande
14.	02/01/25	Thursday	10am – 4pm	Soil Nitrogen Testing	Hande
15.	03/01/25	Friday	10am – 4pm	Soil Nitrogen Testing	Hande

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District Soil Survey And Soil Testing Laboratory Kolhapur.
Address- Soil Testing Lab, Near Seva hospital, Opposite to
Zilla Sainik Sanskrutik Bhavan, Kasbabawda,
Kolhapur-416003

Email Id: shrikantmane@gmail.com

Name of Supervisor: Mr. Shrikant Mane

Name of the Student	Miss. Namrata Anil Kandalkar
Roll Number	5414
Name of Course	M.Sc.I Microbiology
Date of Commencement of Training	16/12/2024
Date of Completion of Training	03/01/2025

Month and Year: December 2024

Sr. No.	Date	Day	Time	Work done	Sign
1.	16/12/24	Monday	10am – 4pm	Grinding Of Soil	
2.	17/12/24	Tuesday	10am – 4pm	Soil Phosphorous Testing	
3.	18/12/24	Wednesday	10am – 4pm	Soil Phosphorous Testing	
4.	19/12/24	Thursday	10am – 4pm	Soil Phosphorous Testing	
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15.	03/01/25	Friday	10am – 4pm	Soil Nitrogen Testing	

Date:
Place: Kolhapur

ATTENDANCE SHEET

Name and Address of the Company/ Institute/Organization:

Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Sainik Sanskritik Bhavan, Kasbabavda,Kolhapur-416003

Email Id:- Shrikantmane@gmail.com

Name of Supervisor: Mr. Shrikant Mane

Name of the Student	Miss. Sanika Prakash Thorbole
Roll Number	5433
Name of Course	M.Sc. I Microbiology
Date of Commencement of Training	16/12/2024
Date of Completion of Training	03/01/2025

Month and Year:

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1.	16/12/24	Monday	10am – 4pm	Grinding Of Soil	
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Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Saunik Sanskritik Bhavan, Kasbabavda,Kolhapur-416003

Email Id:- Shrikantmane@gmail.com

Name of Supervisor: Mr. Shrikant Mane

Name of the Student	Miss. Asavari Anil Kalmkar
Roll Number	5413
Name of Course	M.Sc. I Microbiology
Date of Commencement of Training	16/12/2024
Date of Completion of Training	03/01/2025

Month and Year:

Sr. No.	Date	Day	Time	Work done	Sign
1.	16/12/24	Monday	10am – 4pm	Grinding Of Soil	Akalamkar
2.	17/12/24	Tuesday	10am – 4pm	Soil Phosphorous Testing	Akalamkar
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Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Saunik Sanskritik Bhavan, Kasbabavda,Kolhapur-416003

Email Id:- Shrikantmane@gmail.com

Name of Supervisor: Mr. Shrikant Mane

Name of the Student	Mr. Atharav Ramdas Gurav
Roll Number	5411
Name of Course	M.Sc. I Microbiology
Date of Commencement of Training	16/12/2024
Date of Completion of Training	03/01/2025

Month and Year:

Sr. No.	Date	Day	Time	Work done	Sign
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Email Id:- Shrikantmane@gmail.com

Name of Supervisor: Mr. Shrikant Mane

Name of the Student	Miss. Asavari Anil Kalmkar
Roll Number	5413
Name of Course	M.Sc. I Microbiology
Date of Commencement of Training	16/12/2024
Date of Completion of Training	03/01/2025

Month and Year:

Sr. No.	Date	Day	Time	Work done	Sign
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15.	03/01/25	Friday	10am – 4pm	Soil Nitrogen Testing	Akalamkar

ATTENDANCE SHEET

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Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Saunik Sanskritik Bhavan, Kasbabavda,Kolhapur-416003

Email Id:- Shrikantmane@gmail.com

Name of Supervisor: Mr. Shrikant Mane

Name of the Student	Mr.shreeshail Mallappa surgali
Roll Number	5431
Name of Course	M.Sc. I Microbiology
Date of Commencement of Training	16/12/2024
Date of Completion of Training	03/01/2025

Month and Year:

Sr. No.	Date	Day	Time	Work done	Sign
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ATTENDANCE SHEET

Government of Maharashtra Agriculture Department,

District Soil Survey and Soil Testing Laboratory Kolhapur,

Address:-Soil Testing Lab, Near Seva Hospital ,Opp Opposite to Zilla Sainik Sanskrutik Bhavan , Kasbabawda.

Email Id: Shrikantmane@gmail.com

Name of Supervisor: Mr. Shrikant Mane

Name of the Student	Mr. Sourabh Rajaram Sankpal.
Roll Number	5429
Name of Course	M.Sc. I Microbiology
Date of Commencement of Training	16/12/2024
Date of Completion of Training	03/01/2025

Month and Year:

Sr. No.	Date	Day	Time	Work done	Sign
1.	16/12/24	Monday	10am – 4pm	Grinding Of Soil	
2.	17/12/24	Tuesday	10am – 4pm	Soil Phosphorous Testing	
3.	18/12/24	Wednesday	10am – 4pm	Soil Phosphorous Testing	
4.	19/12/24	Thursday	10am – 4pm	Soil Phosphorous Testing	
5.	20/12/24	Friday	10am – 4pm	Soil Boron Testing	
6.	21/12/24	Saturday	10am – 4pm	Soil Boron Testing	
7.	23/12/24	Monday	10am – 4pm	Soil Sulfur Testing	
8.	24/12/24	Tuesday	10am – 4pm	Soil Sulfur Testing	
9.	26/12/24	Thursday	10am – 4pm	Soil Organic Carbon Testing	
10.	27/12/24	Friday	10am – 4pm	Soil Organic Carbon Testing	
11.	30/12/24	Monday	10am – 4pm	Soil pH & EC Testing	
12.	31/12/24	Tuesday	10am – 4pm	Soil pH & EC Testing	
13.	01/01/25	Wednesday	10am – 4pm	Soil Potassium Testing	
14.	02/01/25	Thursday	10am – 4pm	Soil Nitrogen Testing	
15.	03/01/25	Friday	10am – 4pm	Soil Nitrogen Testing	

ATTENDANCE SHEET

Name and Address of the Company/ Institute/Organization:

Government of Maharashtra Agriculture Department, District Soil Survey And Soil Testing Laboratory Kolhapur. Address- Soil Testing Lab, Near Seva hospital, Opposite to Zilla Saunik Sanskritik Bhavan, Kasbabavda,Kolhapur-416003

Email Id:- Shrikantmane@gmail.com

Name of Supervisor: Mr. Shrikant Mane

Name of the Student	Mr.Rahul Gautam Malavi
Roll Number	5417
Name of Course	M.Sc. I Microbiology
Date of Commencement of Training	16/12/2024
Date of Completion of Training	03/01/2025

Month and Year:

Sr. No.	Date	Day	Time	Work done	Sign
1.	16/12/24	Monday	10am – 4pm	Grinding Of Soil	Rahul.
2.	17/12/24	Tuesday	10am – 4pm	Soil Phosphorous Testing	Rahul
3.	18/12/24	Wednesday	10am – 4pm	Soil Phosphorous Testing	Rahul.
4.	19/12/24	Thursday	10am – 4pm	Soil Phosphorous Testing	Rahul.
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Name of Supervisor: Mr. Shrikant Mane

Name of the Student	Mr. Rohan Ravindra Sawant
Roll Number	5430
Name of Course	M.Sc. I Microbiology
Date of Commencement of Training	16/12/2024
Date of Completion of Training	03/01/2025

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INTRODUCTION

A Name of Soil Testing Lab

GOVERNMENT OF MAHARASHTRA AGRICULTURE DEPARTMENT,

DISTRICT SOIL SURVEY AND SOIL TESTING LABORATORY, KOLHAPUR

A Location of Soil Testing Lab

Venue - Soil testing Lab, Near Seva hospital, opposite to Zilla Sainik Sanskrutik bhavan, Kasbabavda, Kolhapur 416003

Information of Soil

In the present Era of declining soil health, soil productivity nutrient ratio and fast degrading natural resources, the soil testing holds a promise and key role to play in increasing farmers' income with minimum response Damage to the environment. However, soil testing has to be of high quality.

For achieving this objective, soil testing laboratories have to be equipped with facilities not only for NPK but also for secondary, micronutrients and physical properties. A single intervention of the improvement of soil health through Balanced and integrated use of plant nutrients makes substantial increase in crop production. Recognizing this reality soil testing Service were launched in India.

NEEDS OF SOIL ANALYSIS

In the present era of declining soil health. Soil productivity nutrient response ratio and fast degrading natural resources, the soil testing holds a promise and key role to play in increasing farmers income with minimum damage to be environment However, soil testing has to be of high quality. For achieving the objective, soil testing laboratories have to be equipped with facilities not only for NPK but also for secondary, micronutrients and physical properties. A simple intervention of the improvement of soil health through balanced and integrated use of plant nutrients makes substantial increase in crop production. Recognizing this reality, soil testing services were launched in India.

- **The important objectives of soil testing are:**

1. Assessment of evolution of soil fertility at periodic intervals to know the status of soil health with reference to some cropping and management practices.
2. As a means to rationalize use of fertilizer more economically and effectively.
3. As a guide to soul management, crop and cropping systems to be followed.
4. As a means to monitor possible deficiencies or toxicities of nutrient.
5. As an important tool to monitor the soil health and resilience.
6. To recommend balanced and integrated use of fertilizers.
7. Assessment of specific soil conditions which can be improved by using soil amendments.
8. To find suitability of soil for particular crop or fruit plant.

Fertilizer is the most effective and often the most expensive among the inputs used by small farmers and one method of increasing the efficiency of fertilizers and its economic use is to avoid fertilizers where they are not necessary. Soil fertility assessment through soil testing provides key and reasonably good guidelines. Soil fertility evaluation based on soil test is an inevitable prerequisite for predicting fertilizer need of crop. Soil testing serves as a guide to determine the fertilizer needs. Soil testing is "Soil Science 'testing as it is the practical application to crop production based un soil research primarily in the field of soil chemistry / fertility.

Thus, soil testing is a scientific diagnostic tool to evaluate soil fertility for recommending balance nutrition to crops to achieve profitable higher production: such recommendation improves

fertilizer use efficiency and reduces environmental pollution. The applied fertilizer response ratio has decreases from 18 to 6 kg/kg of nutrients. It would be Worthwhile to assess strength. weaknesses, opportunity and threats of soil testing services.

A) Strength

The soil testing program started with singing of ludo-US operational Agreement in 1952. Originally 15 soil testing laboratories were established in different parts of the country. Looking to the importance of soil testing, the number of soil testing laboratories have since increased to 609 in 200506 with annual analyzing capacity of about 7 million soil samples. Most of the laboratories are with the state Department of Agriculture and few with fertilizer industry. In addition, from laboratories of ICAR institutes and State Agricultural Universities.

In Maharashtra soil testing services started in 1957 establishing laboratories in Pune and Nagpur. Presently there are 29 Gov. Soil laboratories at district level. Around 176 soil testing laboratory Services are being extended by State Agri. University. KVKs. Co-operative sugar factories, fertilizer industries and private sector. Around 32 mobile van facilities are being created by Govt. of Maharashtra to monitor the soil health of the state. Recently 14 stable soil testing labs and 8 mobile labs are established under the programmer of National Soil health and soil fertility. improvement and 24 mobile vans are being allotted under Human development program.

B) Weaknesses

Of the total 585 districts in the country, around 205 districts have no facilities for soil testing services. All the4e soil testing laboratories have the capacity to analyze only 7 million soil samples against 1 IS million farms. Holdings in the country. Therefore, get fare chances of its analysis. Some laboratories are ill equipped manned by inadequate and non-professional staff and have very limited funding. The analytical facia files are available for major nutrients and limited facilities for secondary and hazards of solicit / acidity etc. S ML's not upgraded to integrated soil — plant analysis where horticulture and plantation crops are impost. The soil test reports are generally not delivered to farmers in timer. The majority of farmers are still not aware of usefulness of soil testing services and also cost burden to the farmers

C) Opportunities

Large hetman resources of unemployed soil science graduates and postgraduates could be utilized to manage soil testing laboratories as soil chemist and technician. The national commission or farmers as recommended a country wide network of 1000 advance soil testing service. For more profitable yield the fertilizer recommendations to be bollard on complete soil analysis including secondary, micronutrient and line/gypsum requirement. The R is a need to introduce sophisticated instruments and computerization. The improvement in sampling methodology and analytical procedure is very essential. As a general guideline and quick assessment of soil test at field level, the promotion of soil test kits essential.

In precision farming is expected to have site specific nutrient management by using electronic media. There are plenty opportunities of net working for soil testing laboratories with panchayats and block development offices. There is more interest among the planners and progressive farmers for online fertilizer recommendation. Therefore. for revitalization of existing soil testing services it is good idea to propose diversion of 19é of annual fertilizer subsidy (Rs/ lakh Crores) for Effective functioning and to meet operational cost.

D) Threats

At present due to limited resources the Soil testing has not succeeded to achieve desired objective. There is great need to develop good reputation of soil testing laboratories by generating good enough public concern and interest for value of soil test in crop production system and natural resource management.

Considering these SWOT analysis of existing soil testing services, it is worthwhile to mention some measure to revitalize the soil testing services in future.

Fig: content of soil

Fig: Grinding of soil

Fig: Collection of samples.

Instrumentations

- Flame photometry

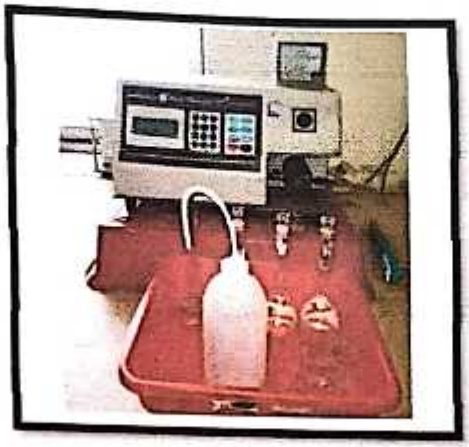


Fig: Flame photometry

Flame photometry is more accurately called atomic emission spectroscopy. It is a branch of spectroscopy in which species examined in the spectrometer are in the flame. The basic principle upon which atomic spectroscopy works is based on the fact that matters absorb light on the same wavelength at which it emits light. When metal salt solution is burned and each metal gives a different color flame.

Structure of flame

The flame may be divided into the following regions.

1.Preheating zone.

2.primary inner zone

3.internal zone

4.see reaction zone

Instrumentation:

Major component:

1. Sample delivery system
2. Source
3. Monochromatic

4. Recorder

1.Sample delivery system: -

There are components for introducing samples.

A] Nebulizer: -

It breaks liquid into small droplet. nebulization is conversion of sample to a mist finally divided droplet using a jet of compressed gas. The flow carries the sample into atomization region.

B] Aerosol modifier:

The stem and allow only smaller droplet than a certain size pass.

C] Flame of atomizer: -

It converts to analytic into free atoms.

2. Source: -

Serial burners and fuel with oxidant combination have combinations have used to produce analytical flame.

Total consumption burner: -

In this fuel and oxidant are hydrogen and oxygen gases. Sample solutions is aspirated through a capillary by high pressure of fuel and oxidant and burnt at the tip of burner.

3.monochroomatic:

Prism: Quartz is transparent over entire region.

Grating: it employs a greasing which is essentially a series of parallel straight lines cut into plane surface.

Detector:

Various types of detectors are used for qualitative as well as quantitative analysis. The detector used are

1. Photomultiplier tube
2. Photo emissive cell
3. Photo voltaic cell

➢ **Kjeldahl method:**

Fig: Kjeldahl nitrogen analyzer

The Danish chemist Johan Kjeldahl (1849-1900) developed this well-known Kjeldahl method of determining nitrogen in organic substance.

This method was introduced in 1883 and consist of three main steps: sample digestion, distillation and ammonia determination. This method uses sulfuric acid. A variety of catalysts and salt to convert organically bound nitrogen in sample to ammonium with its subsequent measurement. Now, this method is universally accepted and used for nitrogen analysis in wide variety of materials such as food beverages, agricultural products, environmental sample, chemical biochemical, and pharmaceutical. The Kjeldahl method has been validated and standardized for total (crude) protein estimation for wide Variety of food materials. Indirectly determined by their nitrogen content. The Kjeldahl procedure have several variants based mainly on sample size and apparatus required. So, a number of rapid and accurate instrument methods have been gradually introduced that have advanced technique. Thus, extracted nitrogen from Kjeldahl can be determined by several methods. Despite some negative factor (i.e. Hazardous, lengthy) the Kjeldahl method and its variants with instruments remain as accurate and reliable method.

Application of Kjeldahl method

The Kjeldahl method is a widely used analytical technique that enables the determination of total nitrogen in soil samples. Here are the key applications of the Kjeldahl method in soil analysis:

1. Soil Fertility Analysis: Nitrogen is an essential nutrient required for plant growth and its availability in the soil can have a significant impact or soil fertility. By measuring nitrogen concentration in soil samples using the Kjeldahl method. soil fertility can be determined and evaluated. This information is valuable in determining the need for fertilizer applications and nutrient management practices.
2. Assessment of Soil Health: The Kjeldahl method can be used to assess soil health by monitoring the total nitrogen content of soil samples. Healthy soils with high levels of organic matter generally have higher total nitrogen than degraded soils. Thus, the Kjeldahl method can help to evaluate the health of soils and identify areas where soil remediation may be necessary.

2. Environmental Monitoring: The Kjeldahl method is an essential tt›o1 in investigating the impact of anthropogenic activities on soils and the environment. It is used to monitor the total nitrogen content of son samples to assess the effects of agricultural practices, industries' activities and other sources of pollution on the natural environment.

3. Development of Fertilization and Nutrient management Strategies: The Kjeldahl method is used in developing appropriate fertilization and nutrient management strategies for various crops grown in different regions. While some crops require higher quantities of nitrogen, others may require considerably 1esser amounts. Hence, the determination of the total nitrogen using the Kjeldahl method helps to optimize fertilization strategies and ensure the sustainability of agricultural production.

Overall, the Kjeldahl method is an essential tool in soil analysis due to its simplicity. reliability and versatility. It provides valuable information for soil nutrient management soil health assessment, environmental monitoring, and development of new agriculture technologies and practices

SPECTROPHOTOMETER:

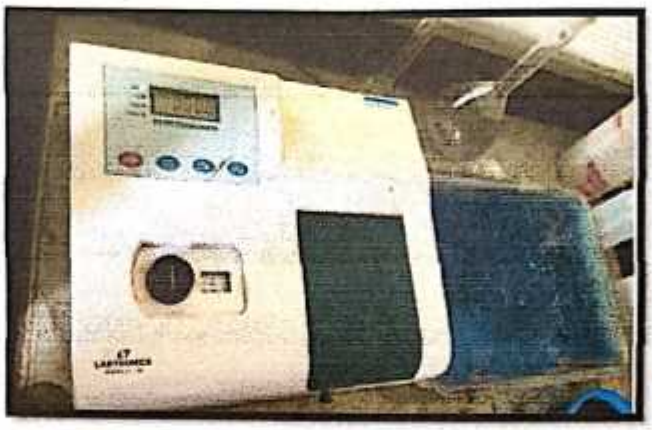


Fig: Spectrophotometer

The spectrophotometer is an instrument which measures the amount of light that a sample absorbs. The spectrophotometer works by passing a light beam through a sample to measures the light intensity of a sample. These instruments are used in the princess of measuring color and used for monitoring countify accuracy throughout production. They are primarily used by researchers and manufacturers everywhere. The major Spectrophotometer Applications are limitless as they are used in practically every industrial and commercial field. However, it finds its' major applications in liquids, plastics, paper, *metals and* fabrics. This helps in ensuring that the color chosen remains consistent from its original conception to the final, finished product

Wavelength-

- Organic carbon —060nm
- Sulphur— 882nm
- Boron- 420nm

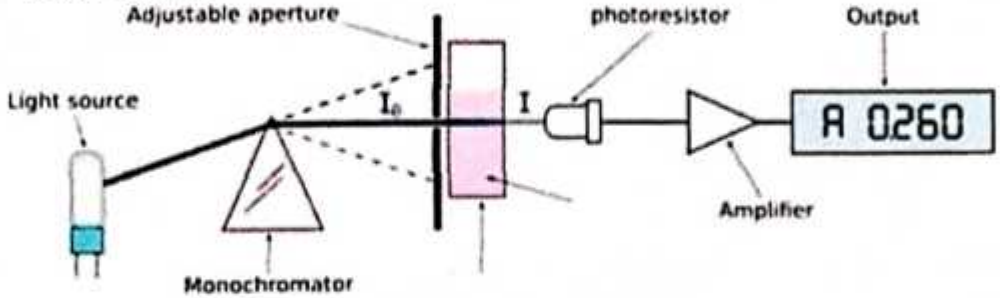


Fig: - Working of spectrometer.

symbolized as 1 is measure the number of photons per second. When the light is passed through the blank solution, it does not absorb light and is symbolized as (1). Other important factors are spectrophotometer is made up of two internments: a spectrometer and a photometer. The spectrometer is io produce light of any wavelength. while the photometer is to measure the intensity of light. The spectrophotometer is designed in a way that the liquid or a sample is placed been spectrometer and photometer. The photometer measure the amount of light that passes through the sample and delivers a voltage signal to the display. if the absorbing of light changes, the voltage signal also changes. Spectrophotometers come in a variety of shapes and sizes and have multipurpose uses to them. The different types of spectrophotometers available are all different from one another, based on their application and desired functionality. The popular spectrophotometers are 45 degrees, sphere and multi-angle spectrophotometers. Another closely related concept is spectroscopy. that simply measures the absorption of light from its source and the intensity of light as well.

The basic spectrophotometer instrument consists of 8 light source The intensity of light is Absorbance (A) and Transmittance {T) spectrophotometer are extensively used in soil analysis to determine the presence and correlation of various compounds in soil samples. Here are some of the key application of spectrophotometer in soil analysis:

- Take out the electrode, wash with distilled water and clean.
- Dip the electrode in the pH 4 buffer solution, Adjust the value on the pH readout meter by the slope switch. Repeat with pH 7 and pH 4 buffers till a correct and stable reading is displaced.
- While moving and cleaning the electrode, put the selector switch on standby mode, Turn to pH mode for recording the pH. Now place the electrode in the water sample whose pH is to be determined.
- You can take a number or simultaneous readings for different samples until the power is on.

Weighing balance:

Fig: weighing balance

A weighing balance is important which is used to determine the weight or mass of the object. Available in a wide range of sizes with multiple weight capacities they are essential tools in the laboratory.

Potential Of hydrogen -

The determination of pH refers to the measurement of hydrogen ion activity specific electrodes in the solution. Since the direct measurement of the pH is very difficult and accurate pH determination. pH is measured on a scale of0 to t4. With tower values indicating high H+ (more acidic) and higher values indicating low H+ ion activity (less acidic). A pH of 7 is considered as neutral. Every whole unit in pH represents n ten-fold increase in or decrease in hydrogen ion concentration. Most natural waters possess the pH values ranging from 5.0 to 8.5.

Rain water have a pH value of 5,4 io 6.0 which then reacts with the soils and minerals causing the reduction in H+ ion concentration and thus the water may become alkaline with a pH or 8.0 - 8.5. More acid water (pH < 5) and more alkaline (pH > 9) and other immediate changes in the hydrogen ion concentration (pH) suggest that the quality of the water is adversely affected due to the introduction of some toxic contaminants in water bodies.

pH is measured using pH meter, which comprises a detecting unit consisting of a glass electrode, reference electrode, usually a calomel electrode connected by KCL Bridge io the pH

sensitive gas electrode and an indicating unit which indicates the pH corresponding to the electromotive force is then detected. Before measurement. pH meter should be calibrated by using at least two buffers.

EOUIPMENT REQUIRED:-

- pH meter.
- pH electrode filled with KCL solution Buffer solutions or pH 4 and pH 7 Clean beakers.
- Tissue Papers Distilled water Thermometer.

Fig:- pH meter

Procedure:

- Plug in the pH meter to power source and let ii warm up for 5 to 10 minutes.
- Wash the glass electrode with distilled water and clean slowly with a soft tissue.
- Note the temperature of water and set the same on the pH meter.
- Place the electrode in pH 7 buffer solution and set the value of 7 on the pH meter turning the calibrate knob on the meter.
- Take the electrode, wash with D/W and clean.
- Dip the electrode in the pH 4 buffer solution, Adjust the value on the pH readout meter by the slope switch. Repeat with pH 7 and pH 4 buffers till a correct and stable reading is displaced.
- While shoving and cleaning the electrode, put the selector switch on standby mode Turn to pH mode for recording the pH.

- Now place the electrode in the water sample whose pH is to be determined.
- You can take a number or simultaneous readings for different samples
- until the power is on.

Fig: - Proceed for testing of pH in soil

Electrical conductivity (EC) -

EC or electrical conductivity of water is in ability io conduct an electric current. soil as other chemical that dissolve in water can break down into positively and negative charged ion. These free ion in the water conduct electricity, so the water electrical conducting depend on the concentration of ion. Salinity and trial dissolved solid (TDS) are used io calculate the EC of water which helps to indicates the water purity, The pure the water the lower the conductivity. To give a real-life example, distilled water is almost an insulator buy sail water is. a very efficient electrical conductor. Major positivity charged ion that affect the conductivity water are sodium, calcium, potassium, and magnesium. Major positively charged ion are chloride, sulphate, carbonate, and contributors to conductivity but they are very important biologically. The natural impact on EC in water are rain geology and evaporation. Human impacts include road soil septic / land fill leach impervious surface runoff and agricultural runoff.

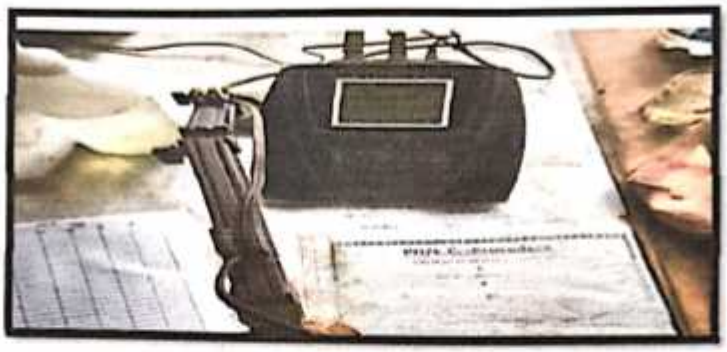


Fig: Electrical conductor

Procedure:

- Turn on the EC meter and calibrate the probe using a standard solution of known conductivity.
- Be sure to rinse the probe thoroughly before and after calibration using deionized water and carefully blot the probe dry using a wipes EC meter should be calibrated before each we or when measuring a large range of EC.
- Collect the sample water in a glass or plastic container collect enough so the probe tip can be submerged in sample. Submerge the probe into the sample and wait until the EC reading on the meter stabilizes
- Many meter have automatic temperature correction (ATC), when
- calculate the EC taking into account temperature if your meter does not have this feature, you may need to adjust a knob on the meter io correct the EC for temperature.
- Record the measurement when the EC reading is stable. Fix to the water sample for testing the pH of water -
- Take two clean and dried test tube.
- Add the collected two different water sample into the two tube.
- For a safer side label the test tube A and B.
- Dip the individual pH paper strips into the two different water sample.
- deep the strips on the tile and wait for the strips to dry.

Methodology

A near 2 nm sieve should be used for sieving soil. contamination do not use a brass, copper or galvanized iron sieve.

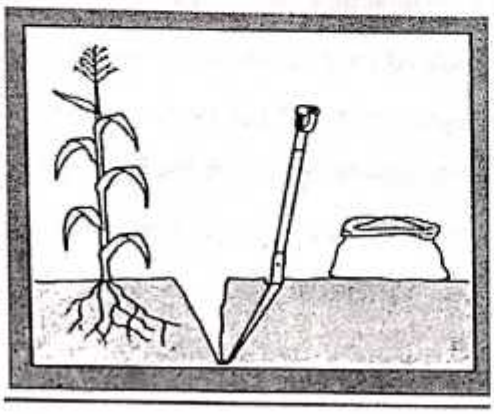


Fig: Sieving of soil.

1. Covered with a thin film 2.

2. Washing the tissues in a 0.1 — 0.3% solution of detergent for removing the dust.

3.Rinse in pure water for cleaning

4.This cleaning prevent any leaching of nutrients.

Grinding:

1. Grinding equipment available includes thin hammer mill. glass mortar and presume
2. Grindingensures greater uniformity in tennis of composition.
3. Under humid tropical condition, samples that have been poorly dried are frequently in danger of become mold.
4. Any samples that have to be stored for a prolonged period should be kept in a refrigerator prefer at temperature of -5^0C or lower.

Determination of Soil pH and EC

pH is defined a minus the decimal logarithm of the hydrogen ion activity in a solution by virtue of its logarithmic nature pH is dimensionless quantity.

One of the most enlightening attributes of soil is its pH Whether soil is acidic, or basic has much to do with the solubility of various components, the relative binding of ions on exchange sites, and actively of various in microorganism. The plant nutrient availability is influenced by soil pH the ideal pH range for availability of nutrients is 6.5 to 7.5 Thomas t 1957 noted that the three soil pH ranges are particularly informative: a pH less than 4 indicates presence of CaCO3.

Reagents:

- Standard buffer solution, pH 4.00
- Standard buffer solution, pH 9.2
- N potassium Chloride solution

Apparatus:

Electrometric pH meter with glass and calomel electrodes.

Procedure:

1. Weigh 20 g air- dry soil info a 100 ml beaker.
2. Add 50 ml distilled water.
3. Stir at regular interval for l hr.
4. Before facing reading calibrate the instrument by using standard buffet of 4,0. 7.0,
5. In the meantime, turn the pH meter in, allow it to warm up, and standardize the glass electrode using both the standard buffers. Remember to adjust the temperature compensation knob to the temperature of the solution. Measure the pH of the sample suspension, stirring the suspension well just before intriguing the electrodes.
6. Rinse the electrode determination with water carefully but do not blot them dry with filler paper before the next determination. Standardize the glass electrode

Determination of electrical conductivity of soil

Electrical conductivity meter.

Regental Potassium chloride, KCI, 9.01 N

Dissolve 0.7456 g of KCI in distilled water, and add water and mark up the minute to 1 L at 25 ° C. This is a standard reference. solution. At 25" C it has an electrical conductivity of 1.412 mS cm cm^{1} or dsm^{1}

Procedure

l. Weigh 20 g air-dry soil into a 100 mL beaker.

2. Add 50 mL distilled water.

3. Stir at regular interval for 1 hr.

4. Allow it to settle for 30 minutes, and measure the conductivity by dipping the electrode in the supernatant liquid only. Also measure the temperature.

Adjust the conductivity of the 0.01 N KCI solution, to 1.41 dsm^{-1} on conductivity meter

Determination of Organic Carbon in Soil Principle

The organic C in organic matter is oxidized by known excess of chromic acid ($K_2Cr_2O_7 + H_2SO_4$). The excess chronic chromic acid net reduced by organic matter is determined by back titration with standard FeSo4 solution (redox titration) using Fermin indicator. The organic C in soil is calculated from the chromic acid utilized (reduced) by it.

1. **Reagents: Potassium dichromate solation,1N**

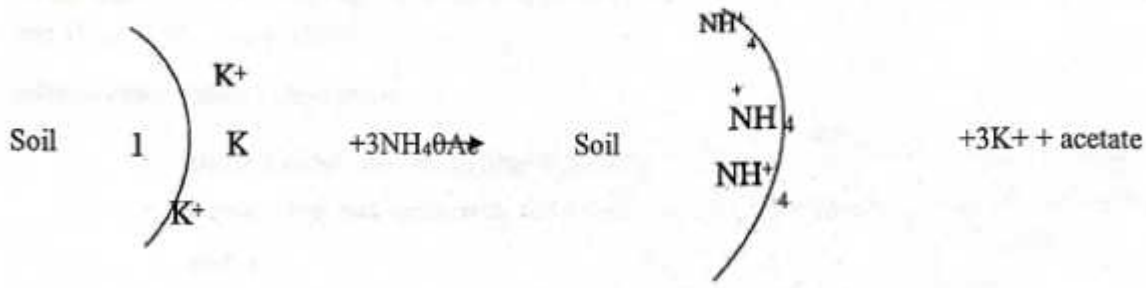
Dissolve 49.04g of dried reagent grade potassium dichromate, $K_2CR_2O_7$ distilled water and dilute it to one liter.

2. **Ferrari sulphate solutiontt,5 N**

Dissolve 139 g of reagent grade ferrous sulphate. $FeSo_4.\ 7H^2o$ in distilled water and add 15 ml of concentrated H_2So_4 cool and dilute to one liter, or dissolve 196. I9g ferrous ammonium sulphate $FeSO_4(NH4)\ SO_4.6H_2O$ and making up to one liter. Standardize the solution against potassium dichromate. Add 20 mL concentrated H_2S0_4 before making 1liter volume.

Determination of Available Potassium in Soil

In soil, potassium exists as their equilibrium form i.e., water soluble, exchangeable and nonexchangeable form. Available potassium includes both exchangeable and water-soluble forms. Available K which is free to exchange with ammonium ion of ammonium acetate added in the soil.



Principle of flame photometer

When a solution of the K+ (metallic salt) is atomized into a non-luminous flame, elemental K atoms get excited and emit light when they come to ground state. The light emitted is filtered through a glass filter which allows light of definite wave-length (766.5 nm for K). The light falls on photocell emitting electrons generating an electric current. This current is measured on galvanometer and is proportional to the concentration of metal element present in the solution atomized.

Material

1.125 mL Erlenmeyer flasks,

2.Funnels, filtration stands.

3. 100 mL volumetric masks.

4. Flat photometer.

Reagents

1.Neutral N ammonium acetate solution, NH_4OAc

Dissolve 77 g of NH_4OAc in distilled water and adjust pH to 7 by adding acetic acid or ammonium hydroxide and make final volume to 1 liter.

2.Standard potassium stock solution. Working solution

Dissolve 1.908 g of KCl in distilled water, make up the volume to l L. This solution contains 1000 ug K mL^{-1} Prepare secondary stock solution of 100 ug K mL^{-1} from this primary stock solution by taking $10ml^{-1}$ and making100ml.

3.Working solution

Pipette 0,0.5, l, 2, 4, 6, 8 and 10 mL of 100 ug KmL^{-1} solution in eight 100 mL volumetric flasks separately and make up the volume with NH40Ac solution. This gives 0, 0.5, l, 2, 4, 6, 8 and 10 ug K mL^{-1} respectively.

collaboration of Bame photometer

- check Whether the correct filter is placed in the proper place in the flame photometer.
- Replace fuel and ignite with self-ignition system. Immediately release air and set the pressure.
- Adjust the fuel knob to get a bluish colored sharp cone of non-luminous flame.
- Atomize with distilled water for some time.

Procedure

1. Take 10 g soil in 100 mL conical flask.

2. Add 50 mL N NHOAC into it.

3. Shake it on a mechanical shaker for 5 minutes and filter through Whatman's No. 1 filter paper and collect the filtrate and make up the final and make up the final volume of 100 ml

4. Atomize the filtrate to flame photometer and record the reading (Before atomization calibrate the flame photometer as below)

Fig:- Observation flame photometry

Determination of available phosphorus in soil

Principal

Phosphorus is extracted from the soil with 0.5 M NaHCO3 at nearly constant pH 8.5, In calcareous, alkaline or neutral soils containing calcium phosphates, this extractant decrease the concentration of Ca in solution by causing precipitation of Ca as $CaCO_3$ as a result, the reactive (high specific surface) from of P is extracted from the phosphates of iron, aluminum and calcium present in the soil.

For phosphorus, sodium molybdite, and potassium pyrosulfate in the purchased 3 reagent powder react with the soluble reactive phosphate to form a phosphor-molybdate complex.

Fig: - Phosphorus testing.

The complex then reduced by ascorbic acid (also contained in PhosYer 3 powder) to form a molybdenum blue color. The blue color is quantified using a phosphate color comparator box with a continuous phosphate blue color.

Reagent:

- Sodium bicarbonate NaHCO3 10.5 M)
- Dissolve 42 g of NaHCO3 in distilled water and make up the volume to I L. Adjust the pH of this solution to 8.5 with I M NaOH or dil. HMI.
- Carbon black

Use carbon black Darco G-60 P free.

Standard solution (stock solution):

Analytical grade (AR) KH_2PO_4 is dried in an oven at 60^0C for one hour and aftercooling in desiccators, weigh 0.4387 g and dissolve in about 500mL distilled water (shake the content until salt dissolved). Add 25 mL of 7 N H_2So_3 (approx. to it and volume is made up io one liter with distilled water. Add 5 drops of toluene to dimini.sh microbial activity. This gives 100 ppm stock solution of P (1OO / ml).

Dilute p solution (working solution):

From the above stock solution, a 2g P mL^{-1} working solution is made. Pipette out 20 mL of stock solution of P and volume is made up to 1 liter with distilled water. This solution contains 2 g P ml

Regents Solution:

- dissolve 6 g ammonium molybdian in 125- 150 mL warm distilled water $Mo7O_{24}4H_2O$
- Dissolve 0.145 g antimony potassium tartrate in 50 mL distilled water.
- Prepare 500 mL of 5 N H_2SO_4 Add slowly 70.5 mL cone. H_2SO_4 in distilled water and make 508mL volume. Add cooled ammonium molybdenum solution to 500 ml H2S04 solution, followed by cooled antimony potassium tartrate (solution b). Volume is made up to 1 L (Store in A mbar color bottle in cool place). Thus, a+b+c forms solution -A. This is also called acid thiolate stock solution.

Solution B: Dissolve 1,056 g ascorbic acid (LR) in 200 ml of solution -A. This solution is prepared fresh as and when required. just prior to color development.

Solution C: 2.25% pam nitrophenol (250, g/100mL) NaOH

Solution D: 5 N H2S04 **Procedure Extraction of P**

- Take 2.5 g of soil in 250mL conical flask.
- Add one teaspoon of carbon black or equivalent grade of activated charcoal free of 50 mL of the 0.5 M NaOH(pH 8.S)
- A blank is run without soil

- Shake the flank for 30 minutes on a platform shaker.
- Filter the suspension immediately through dry filter paper {Whatman No. 1) into clean and dry beakers. Shake the flask immediately before pouring the suspension into the funnel. Procedure for color development out 5 mL aliquot into 25mL volumetric flask.

Determination of available sulphur content in soil role of sulphur

Sulphur is part of amino acid cysteine. Cysteine and methionine, it involved in formation of chlorophyll activation of enzyme in the formation of glucoside or glucosinolates and SH-sulfhydryl linkage which provide a pungency in onion. oils etc. S is also part of coenzyme A, pyrophosphate vitamins such as biotin and thiamine (BI) and role in high seed yield and oil quality in oilseed crops, S improves nutritional quality protein). Sulphur is a constituent of ferredoxins containing nitrogenase which take part in the biological nitrogen in electron transfer reaction. The deficiency symptoms appear first on the younger leaves. Sonic of the older leaves of cotton, tobacco and citrus are affected.

Principle In soil available Sulphur is present as SOA ions. These ions can be extracts with calcium codified or calcium monophosphate solution extracted SOA° is precipitated as barium sulfate. The turbidity developed due io precipitated is measured at 420 not by using spectrophotometer.

Equipment Apparatus: Spectrophotometer, Erlenmeyer flask (ISD ml), pipette, volumetric flask (25 ml) etc.

reagents

Calcium chloride dehydrate: dissolve 1.5 g of $CaC_{12}.2H_2O$ in about 700mL of water and make to 1 liter with distilled water.

Barium chloride dehydrate: $BaC_{l2}.2H_2O$ Crystal of 20 to 30 mesh.

Stabilizing solution: Dissolve 75 g NaCl in a 275 mL of distilled water in 500ml. capacity of volumetric flask. Stir with magnetic stirring bar, add 30 mL of represented HCl,100 ml of absolute

ethanol and 50 mL of glycerol. Continue until NaCl dissolves. Remove stirring bar and make volume with distilled water.

Standard sulphate solution: Dissolve D 5434 g of oven dried AR grade k2so4 in distilled water and dilute to I L. This contains 100 mg S/ml: Take 0.25. 0 5, 1 0, 1.5, 2.0, 2.5. 3.0 and 5.0 rug of std. S solution in 25 mL volumetric flask and add l0 mi of extracting solution io each flask + 2.5 mL of stabilizing solution + 0.2 g of $BaCl_2$ and make up volume to 25 M This shows the concentration of 1, 1 4, 6. 8. 10, 12 and 20 ppm of SO_4-S.

Procedure

1. Weight 5 g soil and transfer into 150 mL Erlenmeyer flask.

2.Add 25 mL 0.ISO $CaCl_2$

3.Shake for 30 minutes on a reciprocating shaker {180 + Oscillations/min)

4. Filter the suspension through Whatman no. 42 filter paper.

5. Pipette out 10 mL (aliquot) in a 150 mL Erlenmeyer flask.

6. Add 2.5 ml of stabilizing solution and 0.2 to 0.3 g of BaC12 crystals make up the volume 25 mL with distilled wares the volume in 25 ml with deionized or redistilled water and measure absorbance at 420 rim This will give reading for standard solution having B concentration 0, 0.05, 0.10, 0.20, 0.40 and 0.80 md BL^{-1}

Determination of total nitrogen from organic manures (FYM/compost/Oil seed cake) by Micro Kjeldhal's Method

principle

Nitrogen present in FYM/ Compost / Oil cake is converted into ammonium sulphate by digesting ii with concentrated sulphate acid (H_2SO_4) and salicylic acid. Ammonium sulphate so formed is decomposed to ammonia by adding hydroxide (NaOH) during distillation. Liberated

ammonia is absorbed in 2& boric acid (H_3BO_3) to form ammonium borate. The ammonium borate formed is quantified by titration with standard solution of sulphate acid (0.002 N H_2SO_4). The volume of standard sulfuric acid required for titration are used to calculate the total nitrogen content in organic manure.

When chemically isolated from soil, nutrients can be detected using this technique. Nitrogen and phosphorus, typically found in the form of nitrates and phosphates, are extracted with a chemical extractant that will bind the nutrient of interest. Once extracted horn soil. each nutrient can be combined with a known reagent that causes the nutrient solution to change to a nutrient-specific color is a linear relationship, with a darker color indicating increased concentration of the nutrient. To analyze the concentration of each nutrient. A chemical reagent will be used to color each sample with an increase in color intensity indicating increased concentration of the nutrient. The high and medium-range tests, cadmium metal is used to reduce nitrates (NO_3) to nitrites (NO_2) The cadmium is contained in the purchased Nitrate 5 (high and medium range) and Nitrate 0 low range) powder pillows.

$$NO_3^- + Cd + 2\,H^+ \longrightarrow NO_2^- + Cd^{2+} + H_2O$$

Nitrite ions then react with sulfonic acid in an acidic medium contained in the nitrate 5 powder to form an intermediate diazonium salt. When coupled with gentisic acid (also contained in the Nitrate 5). an amber-colored solution is formed. Color intensity of this compound is directly proportional to the nitrate concentration of the water sample and can be quantified by using the nitrate color comparator box with.

Reagents

- Concentrated sulphuric acid (N free H_2SO_4).
- Salicylic acid
- Sodium thiosulphate.
- Salt mixture: 20 pans of potassium sulphate + 1 part of copper sulphate + 4 pat1s of ferrous sulfate.
- Saturated solution of sodium hydroxide
- Boric acid solution

↓

Add a few pieces of zinc to prevent back suction of distillate into distillation flask

↓

Keep the 250 ml capacity beaker containing 2% boric acid with mixed indicator under condenser, see that tip of condenser is dipped into the solution

↓

Add about 100 ml of 40% sodium hydroxide (NaOH) to distillation flask to make the content alkaline (red litmus may be added to ensure alkalinity)

↓

Quickly connect the distillation flask to the condenser and heat the distillation flask

↓

Collect the distillate about 150 ml (test with red litmus paper for free from NH_3)

↓

Titrate the distillate with St. sulphuric acid solution till color change from green to red

↓

Run a blank without sample in identical manner

Observations,

1. Weight of sample taken — W g
2. Volume of std. H_2SO_4 soln. required for nitration in test sample —A mL
3. Volume of std. H_2SO_4 soln. required for titration in blank sample —B mL
4. Normality of std. H_2SO_4 -N

Observations

Report of some soil samples from farmers

महाराष्ट्र शासन — कृषि विभाग

जमीन आरोग्य पत्रिका ([illegible])

नमुना प्रकार	सर्वसाधारण + सूक्ष्म मूलद्रव्ये		
प्रयोगशाळा नमुना क्रमांक	2728O202300000003	जमीन आरोग्य पत्रिका क्रमांक	27340842480007777
शेतकऱ्याचे नाव	वरदराज विजयकांत	गांव	मुरगूड
सर्व्हे \ गट क्रमांक	[illegible] ; [illegible] 0	तालुका	कागल
		जिल्हा	कोल्हापूर

तपासणी अहवाल

अ.क्र.	माती परीक्षणातील गुणधर्म	एकक	योग्य प्रमाण	परीक्षणातील मिळालेले प्रमाण	प्रमाणाचे विश्लेषण
1	सामू (pH)	सामू	6.5-7.5	7.10	किंचित अल्कली
2	क्षारता (EC)	([illegible])	0-1	0.35	साधारण
3	सेंद्रिय कर्बन (OC)	(टक्के)	0.40-0.60	0.75	साधारण भरपूर
4	स्फुरद (P)	(किलो/हे)	14-21	103.06	अत्यंत भरपूर
5	पालाश (K)	(किलो/हे)	150-200	88.08	अत्यंत कमी
6	तांबे (Cu)	(पीपीएम)	0.20-99.09	4.49	पुरेसे
7	लोह (Fe)	(पीपीएम)	4.5-99.99	9.36	पुरेसे
8	जस्त (Zn)	(पीपीएम)	0.61-99.99	1.32	पुरेसे
9	मंगल (Mn)	(पीपीएम)	2.0-99.09	17.13	पुरेसे

पुढील पिक क्रमांक १: ऊस (खोडवा)			पुढील पिक क्रमांक २: भुईमूग		
पीकाची जात: -			पीकाची जात: -		
आवश्यक मात्रा (कि.ग्रा./हेक्टर)			आवश्यक मात्रा (कि.ग्रा./हेक्टर)		
नत्र	स्फुरद	पालाश	नत्र	स्फुरद	पालाश
225	58	173	23	25	0

रासायनिक खते देण्याच्या वेळा	खतांची आवश्यक मात्रा (कि.ग्रा./हेक्टर) युरिया	सिंगल सुपर फॉस्फेट	म्युरेट ऑफ पोटॅश	रासायनिक खते देण्याच्या वेळा	खतांची आवश्यक मात्रा (कि.ग्रा./हेक्टर) युरिया	सिंगल सुपर फॉस्फेट	म्युरेट ऑफ पोटॅश
तोडणीनंतर पहिले पाणी	60	190	150	पेरणी वेळी	50	160	0
लागवडीनंतर 6-8 आठवड्यांनी	300	0	0				
लागवडीनंतर 12-16 आठवड्यांनी	60	0	0				
बांधणी वेळी	200	170	140				

* युरिया ४५ किलो = एक बॅग, इतर खते ५० किलो = एक बॅग

टिप 1. सदरचा अहवाल कोर्टाच्या कामासाठी वापरता येणार नाही.

2. विविध खतांचे संयोजन परिणामासाठी कृषिक ॲप आणि जवळील [illegible] वापर करावा.

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर
29-March-2024

महाराष्ट्र शासन कृषि विभाग

जमीन आरोग्य पत्रिका (सुपि.पातळी)

नमूना प्रकार सर्वसाधारण + सूक्ष्म मूलद्रव्ये
प्रयोगशाळा नमूना क्रमांक 2728O202300071001
जमीन आरोग्य पत्रिका क्रमांक 2734074233800330/1
शेतकऱ्याचे नाव आनंदराव रघुनाथ रोगे
गांव गांदे
सर्वे \ गट क्रमांक 330/1
भ्रमणध्वनी 0
तालुका राधानगरी
जिल्हा कोल्हापूर

तपासणी अहवाल

अ.क्र.	मातीचे परीक्षणातील गुणधर्म	एकक	योग्य प्रमाण	परीक्षणातील मिळालेले प्रमाण	प्रमाणाचे विश्लेषण
1	सामू (pH)	सामू	6.5-7.5	5.90	मध्यम आम्ल
2	क्षारता (EC)	(मिलीमोज/से)	0-1	0.07	साधारण
3	सेंद्रिय कार्बन (OC)	(टक्के)	0.40-0.60	0.97	भरपूर
4	स्फुरद (P)	(किग्रॅ/हे)	14-21	5.60	अत्यंत कमी
5	पालाश (K)	(किग्रॅ/हे)	150-200	2334.04	अत्यंत भरपूर
6	तांबे (Cu)	(पीपीएम)	0.20-99.99	2.32	पुरेसे
7	लोह (Fe)	(पीपीएम)	4.5-99.99	0.06	कमी
8	जस्त (Zn)	(पीपीएम)	0.61-99.99	0.06	कमी
9	मंगल (Mn)	(पीपीएम)	2.0-99.99	41.19	पुरेसे

पुढील पिक क्रमांक १ ऊस सुरु			पुढील पिक क्रमांक २ भात		
पीकाची जात			पीकाची जात		
आवश्यक मात्रा (कि.ग्रा./हेक्टर)			आवश्यक मात्रा (कि.ग्रा./हेक्टर)		
नत्र	स्फुरद	पालाश	नत्र	स्फुरद	पालाश
188	173	58	75	75	25

रासायनिक खते देण्याच्या वेळा	खताची आवश्यक मात्रा (कि.ग्रा./हेक्टर)			रासायनिक खते देण्याच्या वेळा	खताची आवश्यक मात्रा (कि.ग्रा./हेक्टर)		
	युरिया	सिंगल सुपर फोस्फेट	म्युरेट ऑफ पोटॅश		युरिया	सिंगल सुपर फोस्फेट	म्युरेट ऑफ पोटॅश
लागवडीचे वेळी	40	560	50	चिखलणीच्या वेळी	80	470	40
लागवडीनंतर 6-8 आठवड्यांनी	160	0	0	फुटवे फुटण्याच्या वेळी	30	0	0
लागवडीनंतर 12-16 आठवड्यांनी	40	0	0	फुलोरा-गाभा अवस्थेत	50	0	0
बांधणीवेळी	160	520	50				

* युरिया ४५ किलो = एक बॅग, इतर खते ५० किलो = एक बॅग

टिप 1. सदरचा अहवाल कोटीच्या कामासाठी ग्राह्य नाही.
2. विविध खतांचे संयोजन परिगणनेसाठी कृषिक ॲप प्रणाली खत गणकयंत्राचा वापर करावा.

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर
20-March-2024

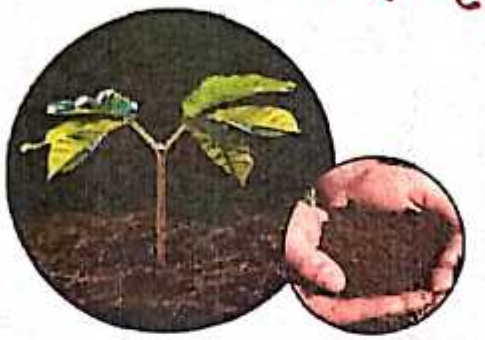
Conclsion

In soil analysis properties like pH, EC electrical conductivity), OC(organic carbon), potassium, phosphorus, Nitrogen, copper, Iron, zinc, Manganese etc. are determined. These properties are extracted successfully using soil sampling and analysis techniques. testing these properties through soil analysis helps us to learn about the ability of soil & to support crop growth with this knowledge growers or Farmers can minimize risk and maximum profitability. the ideal range of the properties to grow a suitable crop is given below-pH-6.5-7.5, EC-0-1 ms/,m oc-0.40-0.60%, P-14.21kg,K-150-200kg.cu-0.20-99.99ppm, Fe-4.5-99.99ppm, Zn-0.61-99.99ppm,Mn-2.0-99.99ppm.If the soil does not meet the ideal ranges of the properties, the soil is not capable of growing healthy crops. After the analysis, the soil is provided with proper amount of fertilizers. like Nitrogen, Phosphorus, Urea, Potassium is adviced to provide to the soil according to the soil report and depending on the crops. information from a well conducted soil sampling event can be useful in monitoring changes in soil fertility, developing fertilizers recommendation and improving on farm nutrient efficiency.

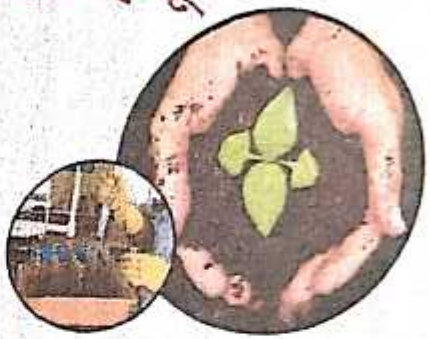
महाराष्ट्र शासन कृषि विभाग

सत्यमेव जयते

जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर



प्रमाणपत्र



प्रमाणित करण्यात येते की,

श्री./श्रीमती पल्लवी रविंद्र हांडे

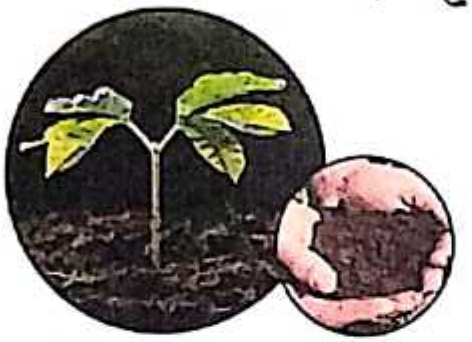
यांनी दिनांक : १६/१२/२०२४ ते ०३/०१/२०२५ या कालावधित जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर येथे माती व पाणी परिक्षणाचे प्रशिक्षण यशस्वीरित्या पूर्ण केले आहे.

दिनांक : ०३/०१/२०२५
ठिकाण : कोल्हापूर

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर

महाराष्ट्र शासन कृषि विभाग

जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर



प्रमाणपत्र

प्रमाणित करण्यात येते की,

श्री./श्रीमती नम्रता अनिल कांदळकर

यांनी दिनांक : १६/१२/२०२४ ते ०३/०१/२०२५
या कालावधित जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर येथे माती व पाणी परिक्षणाचे प्रशिक्षण यशस्वीरित्या पूर्ण केले आहे.

दिनांक : ०३/०१/२०२५
ठिकाण : कोल्हापूर

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर

आझादी के 75 वर्ष
आजादी का अमृत महोत्सव
Azadi Ka Amrit Mahotsav

महाराष्ट्र शासन कृषि विभाग

सत्यमेव जयते

जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर

प्रमाणपत्र

प्रमाणित करण्यात येते की,

श्री./श्रीमती आसावरी अनिल कळमकर

यांनी दिनांक : १६/१२/२०२४ ते ०३/०१/२०२५
या कालावधित जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर येथे माती व पाणी परिक्षणाचे प्रशिक्षण यशस्वीरित्या पूर्ण केले आहे.

दिनांक : ०३/०१/२०२५
ठिकाण : कोल्हापूर

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर

आजादी का अमृत महोत्सव
Azadi Ka Amrit Mahotsav

महाराष्ट्र शासन कृषि विभाग

सत्यमेव जयते

जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर

प्रमाणपत्र

प्रमाणित करण्यात येते की,

श्री./श्रीमती सानिका प्रकाश थोरबोले

यांनी दिनांक : १६/१२/२०२४ ते ०३/०१/२०२५
या कालावधित जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर येथे माती व पाणी परिक्षणाचे प्रशिक्षण यशस्वीरित्या पूर्ण केले आहे.

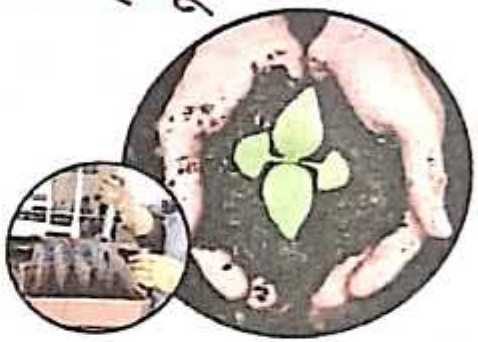
दिनांक : ०३/०१/२०२५
ठिकाण : कोल्हापूर

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर

महाराष्ट्र शासन कृषि विभाग

जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर

प्रमाणपत्र



प्रमाणित करण्यात येते की,

श्री./श्रीमती अथर्व रामदास गुरव

यांनी दिनांक : १६/१२/२०२४ ते ०३/०१/२०२५
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दिनांक : ०३/०१/२०२५
ठिकाण : कोल्हापूर

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर

आजादी के 75 वर्ष
आजादी का अमृत महोत्सव
Azadi Ka Amrit Mahotsav

महाराष्ट्र शासन कृषि विभाग

सत्यमेव जयते

शेतकऱ्यांच्या सेवार्थ
शेती विभाग, महाराष्ट्र राज्य

जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर

प्रमाणपत्र

प्रमाणित करण्यात येते की,

श्री./श्रीमती श्रीशैल मल्लाप्पा सुरगळी

यांनी दिनांक : १६/१२/२०२४ ते ०३/०१/२०२५
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दिनांक : ०३/०१/२०२५
ठिकाण : कोल्हापूर

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर

आजादी के 75 वर्ष
आजादी का अमृत महोत्सव
Azadi Ka Amrit Mahotsav

महाराष्ट्र शासन कृषि विभाग

सत्यमेव जयते

शेतकऱ्यांच्या स्वार्थ • शेती विभाग, महाराष्ट्र राज्य

जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर

प्रमाणपत्र

प्रमाणित करण्यात येते की,

श्री./श्रीमती राहुल गौतम माळवी

यांनी दिनांक : १६/१२/२०२४ ते ०३/०१/२०२५
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दिनांक : ०३/०१/२०२५
ठिकाण : कोल्हापूर

Thudale

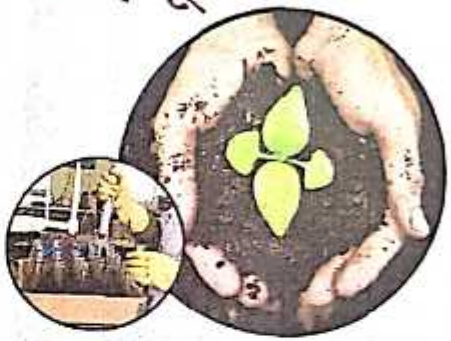
जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर

महाराष्ट्र शासन कृषि विभाग

सत्यमेव जयते

जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर

प्रमाणपत्र



प्रमाणित [illegible] येते की,

श्री./श्रीमती सौरभ राजाराम संकपाळ

यांनी दिनांक : १६/१२/२०२४ ते ०३/०१/२०२५
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दिनांक : ०३/०१/२०२५
ठिकाण : कोल्हापूर

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर

आजादी के 75 वर्ष
आजादी का अमृत महोत्सव
Azadi Ka Amrit Mahotsav

महाराष्ट्र शासन कृषि विभाग

सत्यमेव जयते

जिल्हा मृद सर्वेक्षण व मृद चाचणी प्रयोगशाळा, कोल्हापूर

प्रमाणपत्र

प्रमाणित करण्यात येते की,

श्री./श्रीमती रोहन रविंद्र सावंत

यांनी दिनांक : १६/१२/२०२४ ते ०३/०१/२०२५
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दिनांक : ०३/०१/२०२५
ठिकाण : कोल्हापूर

जिल्हा मृद सर्वेक्षण व मृद चाचणी अधिकारी
कोल्हापूर