2021 Report
Module I

Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut (250110)

2020-2021

WELCOME

TO

PROJECT REPORT ON

EXPERIENTIAL LEARNING PROGRAMME

SOIL, PLANT, WATER AND SEED TESTING.

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ACKNOWLEDGEMENT

- First of all, I please and thanks to God and almighty whose Benevolent blessings always keep us on the right track. Achieving a milestone for any person alone is extremely difficult however there are motivations that come across the curvaceous part like twinkling star in the Sky and make over task much easier.
- We take this Golden opportunity to express our heartfelt and deepest sense of gratitude to those who have help our whole team to complete this report.
- Our debt to many individual again warmly be acknowledged but never full compensed.
- In the ecstasy of the delight, We humble for the words to pen down heartfelt veneration towards our mentor, erudite and revered teachers and their delight guide I am extremely thankful to all the dignitaries who have their blessing hand and knowledgeable overview for completion of our team reports especially our unit-in-charge
- **Dr. S. P. Singh Sir** for the guide project "Seed, plant, water and soil testing
- **Dr. D. V. Singh** the course coordinator Department of Entomology College of agriculture Sardar Vallabhbhai Patel University of agriculture and technology Meerut for their unceasing interest and constructive suggestions.
- We also want to thank **Dr. N.S.Rana, Dean,** College of Agriculture, Sardar Vallabhbhai Patel University of agriculture and technology Meerut, for their sincere attitude towards our work and lending the helping hand in all demands and especially having a close eye in the entire unit functioning with perfection.
- He not only motivated us to be engage in work but also leaves a positive impact of our concerned authority towards our welfare.
- We also deeply indebted to **Dr. R. K. Mittal, Vice Chancellor**; Sardar Vallabhbhai Patel University of agriculture and technology Meerut for providing necessary financial support to our respective units and especially when needed to conduct a practical work.
- In the last but not the least high praise and thanks to Lord God almighty who's benevolent blessings always keep us on the right track and motivated.

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COLLECTION OF REPRENSENTED SOIL SAMPLE, ITS PRECESSING AND HANDLING IN LABORATORY

SOIL TESTING - Soil testing is a chemical method for estimation of nutrient supplying power of soil/ soil fertility evaluation.

Soil fertility may be defined as the capacity of soil to furnish available plant nutrient to the plants in proper amount and appropriate balance, under ideal condition of plant growth .Whereas, soil productivity is the capacity of soil to produce under specific condition of crop production.

Advantages of soil testing-

- More rapid method of compare to biological or deficiency symptoms/ plant analysis
- One may determine the need of the soil before the planting of the crop.

Objective of soil testing -

- To study/maintain fertility status of a field.
- To predict the probability of obtaining a profitable response of lime and fertilizers.
- To provide basis for recommendation of fertilizers.
- To evaluate fertility status of soil of an area/state/country for developed of plans for research and education work.

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- To study the acidity, alkalinity and salinity problems.
- To determine of the soil for laying gardens.
- Lime problems.
- Soil survey.

Why do we need Soil Testing ?

- Following are the benefits of soil testing-
- Soil testing encourages plant growth by providing the best fertiliser recommendation.
- It diagonises whether there is too little or too much of a nutrient
- Soil testing promote environmental quality .
- It also save money that might otherwise be spent on unneeded fertiliser.

When and How to take a sample of soil?

Right Time-

- Before planting anything in the field
- Before application of any organic or chemical fertilizer
- Three months after application of organic or chemical fertilizer

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Don'ts-

- Where cattle graze
- Under tree
- Garbage are a

Equipment used in soil sample collection-

Shovel

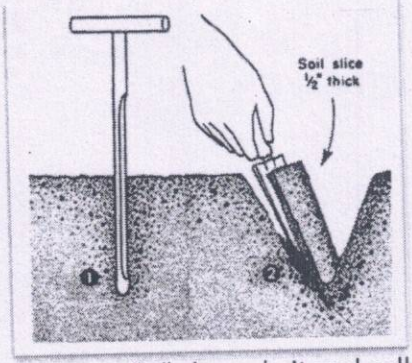
Scale

Trowel

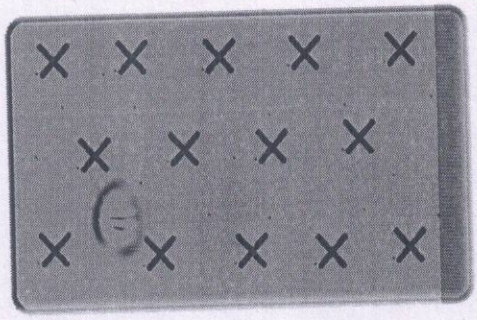
Bags

Mortar Pestle

Right way of taking soil sample



Dig a 15 cm "V" shaped pit and collect sample from one side



Take soil from 10-15 places from the field.

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Clean the sample by removing any garbage. Mix all the sample very well.

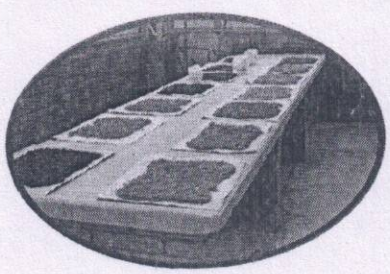
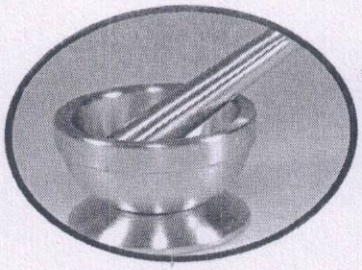
Make 4 equal part of the mixed sample and mix diagonally opposite parts. Repeat the procedure 4-5 times.

Information required in the label:

- **Name of the farmer**
- **Location of the field**
- **Field number**
- **Soil depth of which sample is collected**
- **Date of collection**
- **Cropping pattern**
- **Irrigation facility, etc.**

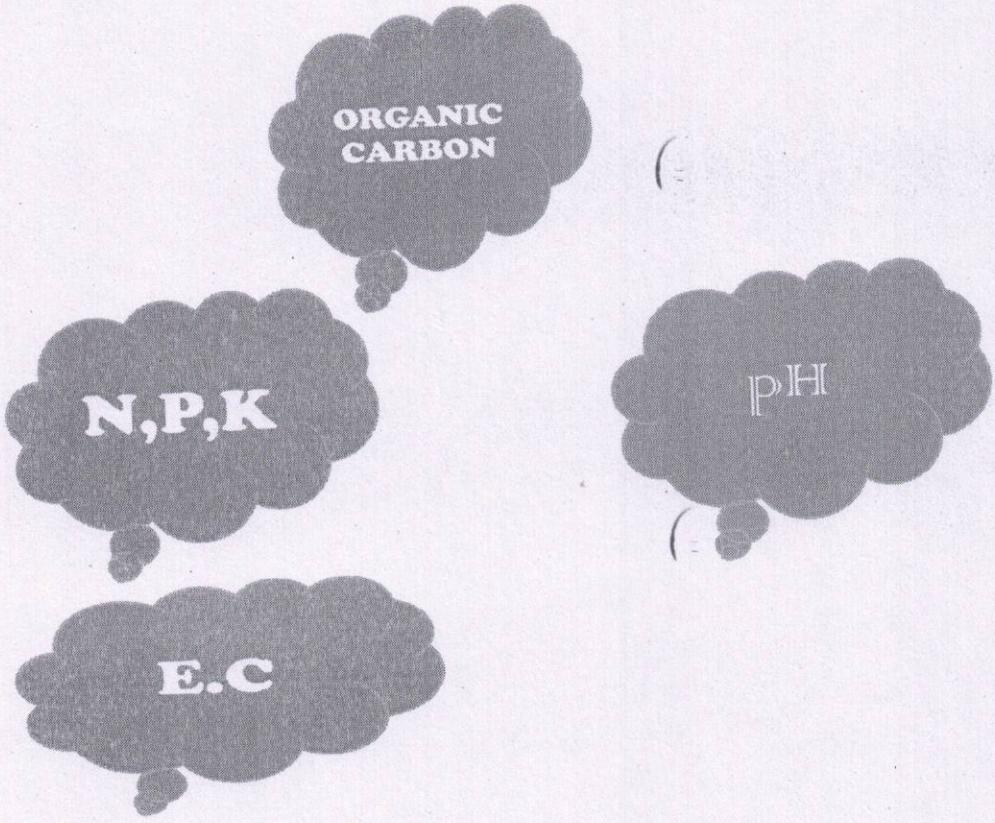
Place one label in the bag and tie another outside the bag.

- After bringing the sample from the field, spread it on a dry tray. Be sure that the tray has proper label. Do not keep tray where fertilizer or manure is stored.
- Allow the sample to dry in shade (on a drying rack) for 24-48 hours, so that the samples become air dry.
- Using a mortar and pestle or a wooden roller grind the sample and pass it through a 2mm sieves.


Following precautions must be taken while processing of sample

1. Avoid contact of the sample with chemicals, fertilizer or manures.
2. Use stainless stee augers instead of rusted i on khurpi for sampling or nutrient analysis.
3. Do not use bags or boxes, previously used for storing fertilizers, salt or an chemical.
4. Store soil sample referably in clean cloth or polythene bags.
5. Use glass, porcelain or polythene jar for long duration storage.



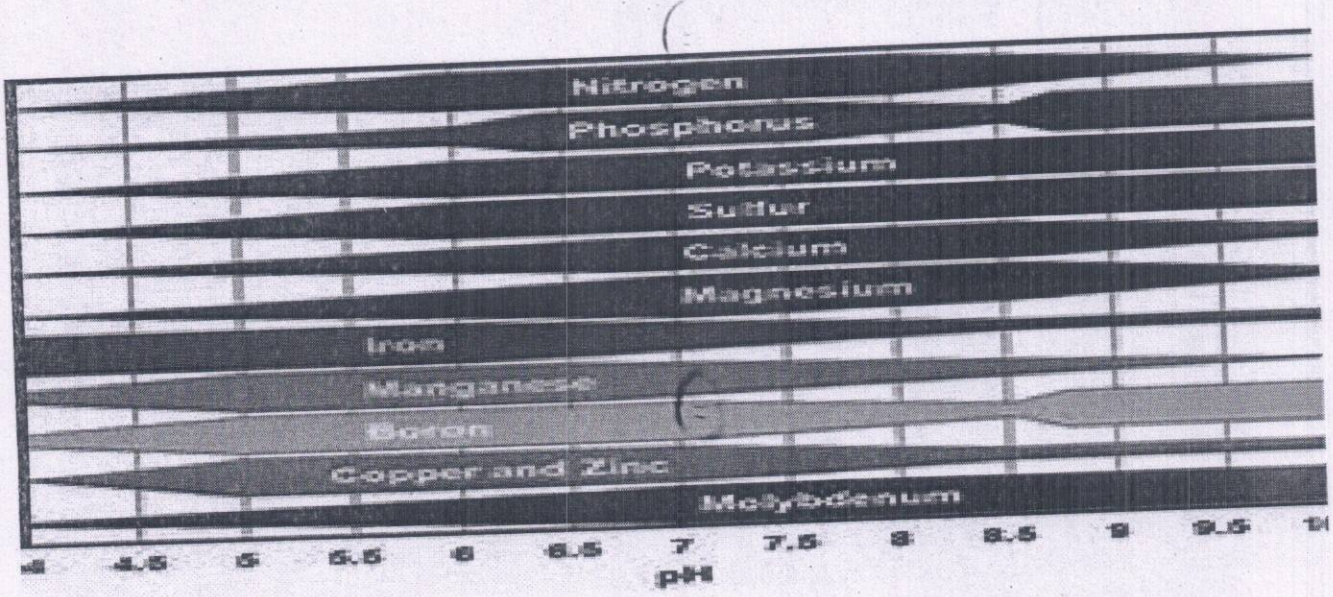
SOIL ANALYSIS PARAMETERS

Estimation of pH-

- pH also called as "SOIL REACTION" is measured by pH meter with reference to pure water.
- pH of a solution ranges from 0 to 14.

- Acidity is due tc excess of H ion concentrat on &
- alkalinity due to OH ion concentration.
- A neutral reactic n is produced by an equal a ctivity of H & OH ion concentration.(i.e. pH = 7)

AVAILABILITY (F NUTRIENTS AT pH



Estimation of pH –

Soil and water ratio 1:2.5

-Shake for 5 minutes.

-Dip the electrode in the solution.

- Note the value of the given sample.

ELECTRICAL CONDUCTIVITY –

The E.C. indicates the amount of soluble salts (ions) in the soil solution.

UNIT – dS/m

INSTRUMENT USED- E.C METER having a meter and a probe .

Electrical conductivity levels can serve as an indirect indicator of the amount of water and water soluble nutrients available for plant uptake.

ORGANIC CARBON ESTIMATION

PRINCIPLE: Walkley-Black chromic acid wet oxidation method.

REAGENTS:

-1 N Potassium Dichromate

Dissolve 49.040 g $K_2Cr_2O_7$ AR (dried at 105 °C) in deionized water, transfer to a 1 L volumetric flask and make to volume with deionized water.

-Sulphuric Acid 98% w/w

This should be used fresh from the bottle and not left standing in a burette or beaker, as it rapidly picks up moisture from the air. It is satisfactory until the strength falls to <96%.

-0.4 N Ferrous Sulphate

Dissolve 112 g $FeSO_4.7H_2O$ in 800 mL deionized water containing 15 mL concentrated H_2SO_4. Dilute to 1 L with deionized water and store in a dark bottle.

-"Ferroin"

Dissolve 1.485 g O-phenanthroline monohydrate and 0.695 g ferrous sulphate in approximately 80 mL deionised water, then dilute to 100 mL. Store in a dark bottle away from Light .

PROCEDURE-

- -Determine the moisture content of the soil sample weighing between 0.5 to 1gm
- Add 10 ml of 1N potassium dichromate and swirl the flask gently. Now add 20 ml concentrated sulphuric

acid. Heat the flask to about 135 degree Celsius on a hot plate.

- Set the flask aside to cool down slowly (for 20 to 30 minutes)
- When cool, dilute to 200 ml with deionised water & proceed with the iron sulphate solution using ferroin as an indicator. Till the colour changes from blue green to reddish grey.

.NO	NUTRIENT DETERMINATION	ANALYSING PROCESS
	Total Nitrogen in Soil	Kjeldahl process
	Available nitrogen	Alkaline permanganate method
	Phosphorus (acid)	Bray No 1
	Phosphorus(base)	Olsen's method
	K &Na	Flame Photometer
	Sulphate	Terbimatric method

	O.C.	Walkley & Black Method
	Available K	Chromic acid digestion

Estimation Of Available Nitrogen

Potassium permanganate method:-

Principle:

- The procedure involves distilling the soil with alkaline potassium permanganate solution and determining the ammonia liberated. This serves as an index of the available N status of a soil and was therefore, proposed as a soil test for N by ***Subbiah*** and ***Asija (1956).***

APPARATUS-

1. Kjeldahl digestion assembly
2. Ammonia distillation assembly
3. Conical flask 250 ml

4. Kjeldahl flasks 500/800 ml

5. Pipette 25 ml

6. Automatic burette 50 ml with 2 litres container.

REAGENTS REQUIRED –

1.0.32% potassium permanganate $KMnO_4$ solution .

Dissolve 3.2 gm of $KMnO_4$ in distilled water and make up to volume 1 l.

2. 2.5% NaOH solution: Dissolve 25 gm of NaOH in distilled water, make the volume to 1 liter store in a plastic container.

3. Liquid paraffin (extra pure).

4. 0.02 N (N/50) standard sulphuric acid.

5. Boric acid indicator solution (2%)

6. Mixed indicator: Dissolve 70 mg methyl red and 100mg bromocresol green in 100 ml of 95% ethanol.

PROCEDURE:

1. Place 5 gm soil in a 800 ml Kjeldahl flask.
2. To this, add 20 ml of water and swirl 1 ml of liquid paraffin + few glass beads (to prevent frothing and bumping respectively during distillation) + 100 ml each of 0.32% $KMnO_4$ and 2.5% NaOH solution.
3. Distill the contents in a Kjeldahl distillation assembly at a steady rate and collect the liberated ammonia in an Conical flask (250 ml) containing 20 ml of boric acid solution (with mixed indicator).
4. With the absorption of ammonia, the pink colour of boric acid turns to green.
5. .Titrate the content with 0.02N H_2SO_4 to the original shade (pink). Blank correction (with out soil) is to be made for final calculations.

Estimation of Available Phosphorus:

- A method based on the use of ascorbic acid (Watanable and Olsen,1965)

Apparatus :

1. Colorimeter or spectrophotometer

2. Mechanical shaker

3. pH meter

REAGENTS:

1.SOLUTION A-12g Ammonium molybdate in 250ml distilled water.

SOLUTION B- 0.291 g of Antimony potassium tartrate in 100 ml distilled water. Prepare one liter of 5*N* H_2SO_4 and add solution 'A' and 'B' to it. Mix thoroughly and make the volume to 2 liters with distilled water.

2. Ascorbic acid solution:

Dissolve 1.056 gm of ascorbic acid in 200 ml of the molybdate-titrate solution and

mix well. Prepare it fresh as and when required.

3. P-nitro phenol Indicator:

Dissolve 0.5 gm of p-nitro phenol in 100 ml of distilled water.

4. 5*N* H_2SO_4:

Carefully dilute 140. Molybdate- titrate solution:

Dissolve ml of concentrated H_2SO_4 to 1 liter with distilled water (H_2SO_4 to be slowly added to water) to get approx. 5*N* H_2SO_4.

6. Standard working solution:

Dilute a suitable volume of 100 mg P/L solution 50 times

to get 2 mg P/L solution.

7. 0.5*M* $NaHCO_3$:

Dissolve 42gm of P-free sodium bicarbonate in about

500ml of hot water and dilute to one liter. Adjust the pH

to 8.5 using dilute NaOH solution or dilute HCL.

8. Activated charcoal:

Wash pure activated charcoal or commercially available

Darco G-60 with acid to make P-Free.

PROCEDURE-

1. Weigh 2.5 gm of soil sample in 100 ml conical flask.

2. Add a pinch of Darco-60 and 50 ml of Olsen' reagent (0.5 *M*

$NaHCO_3$, pH 8.5).

3. Shake for 30 minutes on a mechanical shaker.

4. Filter through whatman No. 1 filter paper.

5. Pipette 5 ml of the Olsen's reagent into a 25 ml volumetric flask and add 2-3 drops of p-nitrophenol indicator. It develops yellow color.

6. Add known quantity of 5*N* H_2SO_4 drops by drop acidify the Olsen's reagent to pH 5.0 at which the yellow colour will disappear.

Note the volume of 5*N* H_2SO_4 used.

7. Dilute to 20 ml with distilled water.

8. Add 4ml of the ascorbic acid solution after 10-15 minute between colour developing and make the volume to 25ml and shake well.

9. Wait for 10 minutes

10. Run a blank with the extracting solution (without soil).

11. Prepare a standard curve and measure absorbance on

spectrophotometer at 720-840 nm

POTASSIUM ESTIMATION-.

- **PRINCIPLE**- Potassium in soil exists as water soluble, exchangeable, non-exchangeable (fixed) and lattice-K.
- The first two forms constitute only a small part, normally not more than one percent of the total content and are considered to be easily available to plants.
- On amount basis, the exchangeable form (K+ Ions adsorbed on exchange site) far exceeds water soluble fraction and the two are in equilibrium with each other.
- Only when these two forms are depleted, a part of the non-exchangeable K moves to the exchange sites and soil solution.

REAGENTS:

1. 1N Ammonium acetate: Dissolve 77.09 gm of ammonium acetate in about 500 ml of distilled water and make the volume to 1 liter. Adjust the pH to 7.0 with glacial acetic solution. This reagent may also

prepared by taking 800 ml of distilled water and adding to it 57 ml of glacial acetic acid and 68 ml of ammonia solution (sp. gr. 0.91), followed by dilution to 1 liter and adjusting pH at 7.0 after cooling.

2. Standard K solution: Prepare 1000 mg /l K solution b K solution b dissolving 1.908 gm of AR grade potassium chloride (dried in oven at 700C for two hours) per liter solution. Dilute suitable volume of this solution to get 100ml of working standards containing 5, 10, 15, 20, 25, 30, and 40 mg K L-1. The working standards should be prepared in the medium of extraction (ammonium acetate in this case).

PROCEDURE:

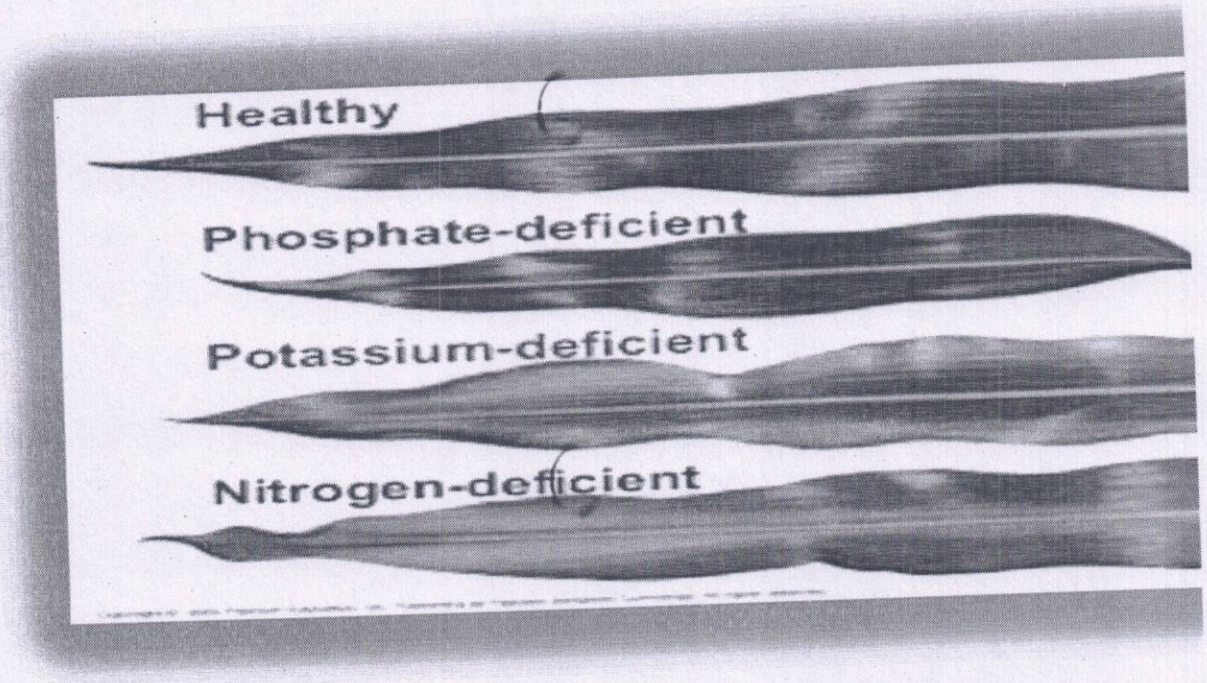
1.Weigh 5 gm of soil sample in 100 ml conical flask.

2.Add 25 ml of the neutral 1*N* ammonium acetate solution and shake for 5 minutes.

3. Filter through Whatman No. 1 filter paper.

4.Measure K concentration in the filtrate using flame photometer.

- **Nitrogen, Phosphorus &Potassium deficiency symptoms in maize:-**



RATING CHART FOR SOIL TEST VALUE OF PRIMARY NUTRIENT:

NUTRIENT	LOW	MEDIUM	HIGH
ORGANIC CARBON	<0.5	0.5-0.75	>0.75
NITROGEN kg/ha	<280	281-560	>560
PHOSPHORUS **1:NABARD- Farm Graduate scheme for soil testing laboratory** **2:SOIL HEALTH MANAGEMENT SCHEME(SHM)** **Under this scheme ,financial assistance are to be provided to a village entrepreneur/SHGs/farmer joint liability group**	<10	10-25	>25

/FCS/Farmer producer organisation .

Financial assistance = investment = 40% of project cost Max subsidy = 10 lakh for an individual

For Group investment = 80% of project cost max. subsidy = 10 lakh

3: SOIL HEALTH CARD SCHEME (SHCS):

For 14 crore Farmer to check the excess use of fertilizer in India in 19 febuary.2015. under this scheme card will be issues for testing of soil and the estimated saving for farmer with land holding of 3 Acre . This scheme was launched by government

of India. kg/ha			
POTASSIUM Kg/ha	<125	126-280	>280

SCHEME FOR SOIL TESTING LABORATORY

1:NABARD- Farm Graduate scheme for soil testing laboratory

2:SOIL HEALTH MANAGEMENT SCHEME(SHM)

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SOIL HEALTH CARD SCHEME-

Soil Health Card Scheme is a scheme launched by the Government of India in February 2015.[1] Under the scheme, the government plans to issue soil cards to farmers which will carry crop-wise recommendations of nutrients and fertilizers required for the individual farms to help farmers to improve productivity through judicious use of inputs.

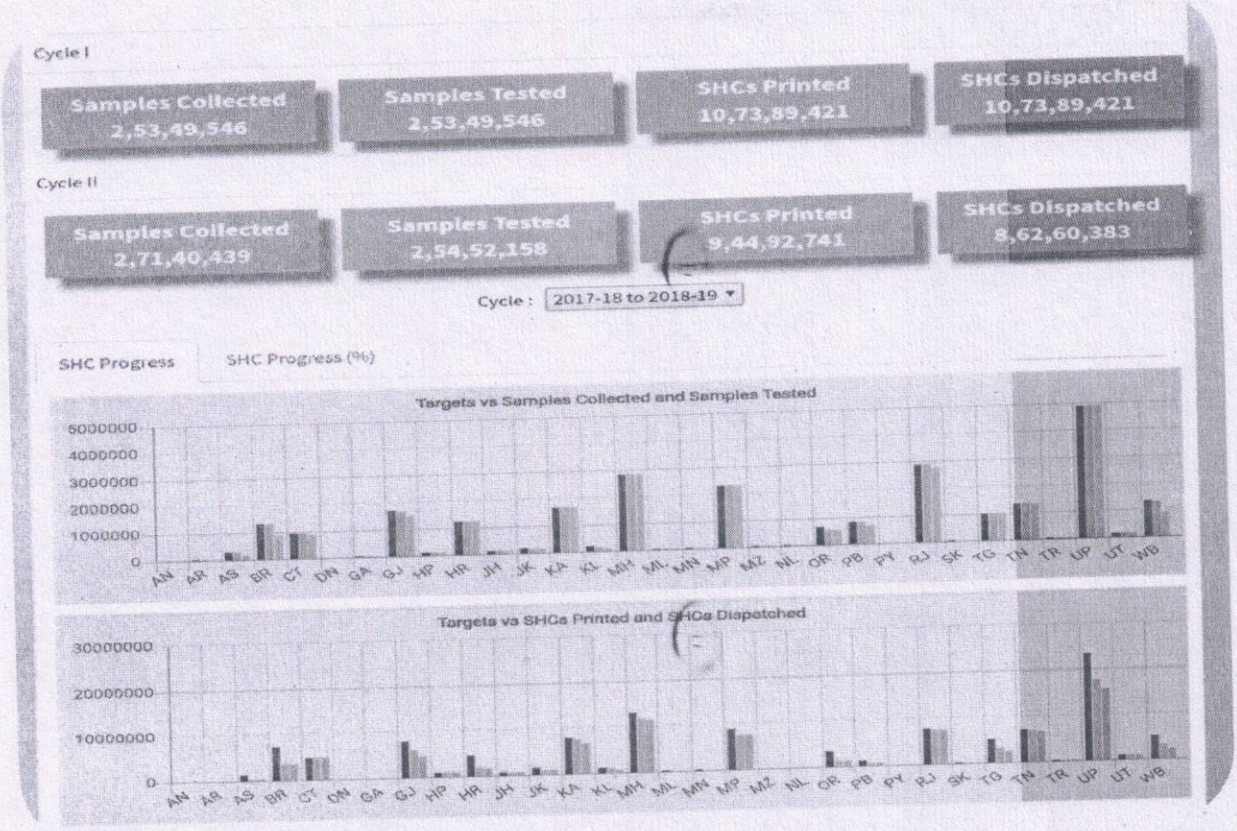
METHOD OF COLLECTING SAMPLE-

- Collect the soil with help of khurpa, 2.5cm layer from the walls of the digged pit of 6*4*6inches.
- Mix the soil taken from sample in a clean cloth and divide it into 4 parts.

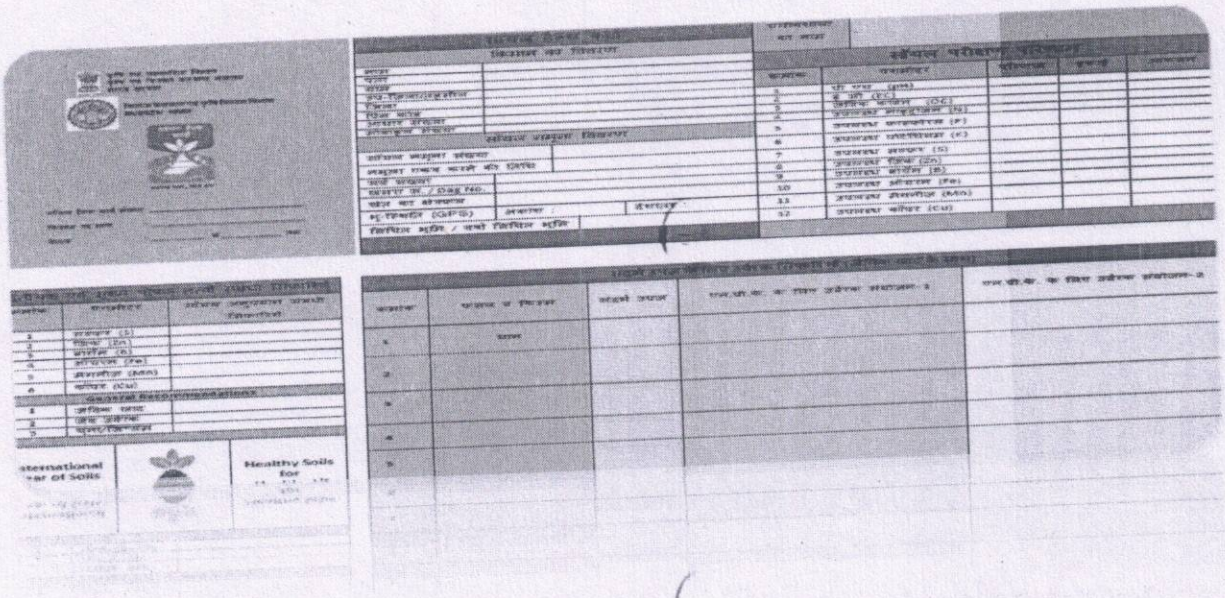
- Throw 2 parts and mixed the remaining 2 parts and make the heap again and repeat the same process.
- Do the same process till quantity of spoil reduced to ½ kg .
- Take 2 labels.
- Write the name of farmer ,geo status, name of village,identification mark of field,Khasra no,mobile no,name of block,Tehsil and district.
- Keep one label inside bag and tie another on the bag from outside.

At the time of sending do mention the to be soen crop for further recommendations

EXAMPLE OF A SOIL HEALTH CARD-



Economic analysis



Seed Testing

Seed testing (the evaluation of planting value of seed) is done to achieve the following objectives for minimising the risks of planting low quality seeds :

- ✓ To determine their quality, that is, their suitability for planting.

- ✓ To identify seed quality problems and their probable cause.
- ✓ To determine the need for drying and processing and specific procedures that should be used.
- ✓ To determine if seed meets established quality standards or labeling specifications.
- ✓ To establish quality and provide a basis for price and consumer discrimination among lots in the market.
- ✓ International Seed Testing Association (ISTA)
- ✓ Association of Official Seed Analysts (AOSA)
- ✓ The Society of Commercial Seed Technologists (SCST)

ISTA

- ✓ The primary object of ISTA is to develop, adopt and publish standard procedures for sampling and testing seeds, and to promote uniform application of

them for the evaluation of seeds moving in the international seed trade.

- ✓ In addition, it also promote research in all aspects of seed science and technology, including sampling, testing, storing, processing, and distribution, it encourages cultivar certification, participates in conference and training courses aimed at furthering these objectives and establishes and maintain liaison with other organisations having common or related interests in seeds.
- ✓ The technical and scientific work of the association is carried out by fifteen special committees (e.g., committee on seed sampling and bulking, purity, germination, vigour, etc.).
- ✓ One of the foremost achievement of ISTA is the adoption of the International Rules for Seed Testing.

Seed Testing Laboratory

- ✓ The seed testing laboratory is the hub of seed quality control.
- ✓ Seed testing services are required from time to time to gain information regarding planting value of seed lots.
- ✓ To carry out these operations effectively, it is necessary that seed testing laboratories are established, manned and equipped in a manner such that whatever samples are received could be analysed in the need of seed industry are effectively met.
- ✓ Kahre *et al.* (1975) has listed the following conditions that are essential for ensuring good seed testing work :
- ✓ 1. A highly responsible staff which must continue to work conscientiously when the person in charge is away.

✓2. Uniformity of equipment, procedures and interpretations. In other words, consistently good facilities and skilled analysts.

✓3.Good service, that is, prompt analysis and a cooperatives spirit among employees.

✓4.Leaders with a scientific background to give advice to all types of customers and to furnish explanatory remarks in reports, when necessary, to those who submit samples.

✓5.Promotion of research, leading to improvement of the whole seed programme, especially of testing procedures, with practical questions being submitted for scientific analysis.

✓Plan for Seed Testing Laboratory

✓General Principles

✓1.The physical-infrastructure and facilities should be planned on the basis of average expected workload during the peak season, so as to permit efficient handling of seed samples without undue delays.

✓The working space should be adequate.

- ✓ This is important since the time taken in reporting results is of crucial importance.
- ✓ There should be sufficient space left for any special tests section etc. if the need arises.
- ✓ 2.The kinds of tests to be carried out or likely to be carried out, for example, routine tests, seed health test, varietal purity tests etc. must be ascertained in advance for making provisions in the plan.
- ✓ 3.The selection and number of equipment should be such so as to permit efficient handling of work. The equipment must meet requisite specifications.

Building

- ✓ A seed testing laboratory can be housed as a separate building or it could form part of a larger building housing a department.
- ✓ The entire work can be organised in a hall/or in separate rooms.

- ✓ The size of the building or space requirement depends upon the number of samples to be handled and the kind of tests to be done.
- ✓ The purity room, in particular, should have abundant natural light.
- ✓ It should be perforated to locate windows in this section along the north side of the building.
- ✓ It would also be desirable that the bottom window paned open in a horizontal manner so that the air coming through the window will be deflected upward and not blow directly across be screened on the outside to keep out insects and birds.

Staff

The number of workers in the seed testing laboratory should be related to the number of samples, crop species to be handled and kind of tests to be performed.

- ✓ For handling 10,000 samples per year the requirement may be as on next slide.

Staff requirements of a seed testing laboratory

Position	No. of post
1. Officer Incharge	1
2. Senior Seed Analysts	1
(i) Purity	1
(ii) Germination	1
(iii) Seed Health	1
(iv) Special Tests, e.g. varietal purity	2
	2
3. Junior Seed Analysts	1
(i) Purity	1
(ii) Germination	
(iii) Seed Health	
(iv) Special Tests	

Equipment

- ✓ The rules for testing seeds includes the type of equipment and its specifications.
- ✓ The equipment for a seed testing laboratory, therefore, should be selected accordingly.

Testing procedures and Management of Seed Testing Work:-

The following may be used as a guideline for managing the work in a seed testing laboratory for efficient handling of seed samples.

1. Receipt and registration of seed samples : The samples received in the laboratory should be entered in a pre-printed register or forms and assigned a test number to be used in all the analysis.
2. The information, namely, name of the sender, type of sample, kind of tests required, crop, variety and class of seed etc. should be properly recorded.
3. The samples especially received for moisture test in the moisture-proof container should passed on as

such to the moisture test section after assigning the test no.

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9. The samples especially received for moisture test in the moisture-proof container should passed on as

such to the moisture test section after assigning the test no.

2. Moisture Test:-

- ✓ The samples intended for a moisture test requires special attention, because it may otherwise either lose or may absorb moisture from outside.
- ✓ These samples after assigning the test no. should be passed on for moisture testing analysis without unnecessary delay.

3. Working Sample

- ✓ After entering sample the next step is to prepare the working sample (s) for various tests.
- ✓ To save time taken in completing the seed tests the first objective should be to prepare a working sample for the germination / viability test so as to limit the seed testing time to the minimum time

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required to complete seed germination / viability test, as the case may be.

- ✓ Subsequently, if the seed cleaning on laboratory model machines or test weight determination, is desired, the same may be done at this time.

The working sample envelops for the various tests alongwith the corresponding analysis card should be serially placed in sample trays for sending to the concerned section.

4. Routine Tests

- ✓ In seed testing laboratory, germination test, purity test, test for other seeds and moisture test are known as routine tests.
- ✓ For all such crops where the analysis for diseased seeds or other variety seeds is also desired on the routine basis (as in case of certified seed samples for the issuance of certification tags) these lots should also be included in the routine tests.

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- ✓ Every effort should be made to analyze the samples speedily so that there are no undue delays in sending the results.
- ✓ These tests must be done as per rules, that is, rules mentioned in the 'Seed Testing Manual'.

5. Other tests:-

- ✓ Every effort should be made to complete these tests as quickly as possible.
- ✓ These should be carried out as per available procedures.
- ✓ The name of the procedure adopted should, however, be mentioned while reporting the results.

6. Reporting of results:-

- ✓ After the test have been completed, the results are reported on a printed form, known as, seed analysis certificate in the requisite manner.
- ✓ One of the common complaint against seed testing laboratories is "length of time" that is, the days taken in sending the report.
- ✓ It is therefore important to ensure that there are no undue delays.

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✓ The result of seed samples received from seed inspectors under the provision of Seeds Act should be communicated within 21 days from the date of receipt but not later 30 days in any case.

7. Storage of guard samples:-

✓ The submitted samples received by the seed testing laboratory, on which reports are issued, should be stored after analysis for one year from the date of issue of reports, in conditions calculated to minimise any change in quality.

8. Maintenance of records:-

✓ To serve the needs of seed certification, farmers and other applicants, it is essential that records are immediately available for any sample tested during the current year, season, or at any other specified time.

✓ The records should be maintained in such a manner that any information needed can be traced immediately.

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Probable Causes of Discrepancies in Seed Test Results:-

- ✓ As a rule the seed testing results must be accurate and reproducible within comparable limits.
- ✓ However, the results obtained at two different seed testing laboratories may vary, although the same results are followed.

The probable causes are :

1. Heterogeneity of seed lots
2. Sampling and equipment
3. Experience.

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Thank
You

Time Period - 17 may - 20 July (Module - I)

PPT (12 - Students)

2021 - 2022

21-22

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PROCESS OF MAKING POTATO CHIPS

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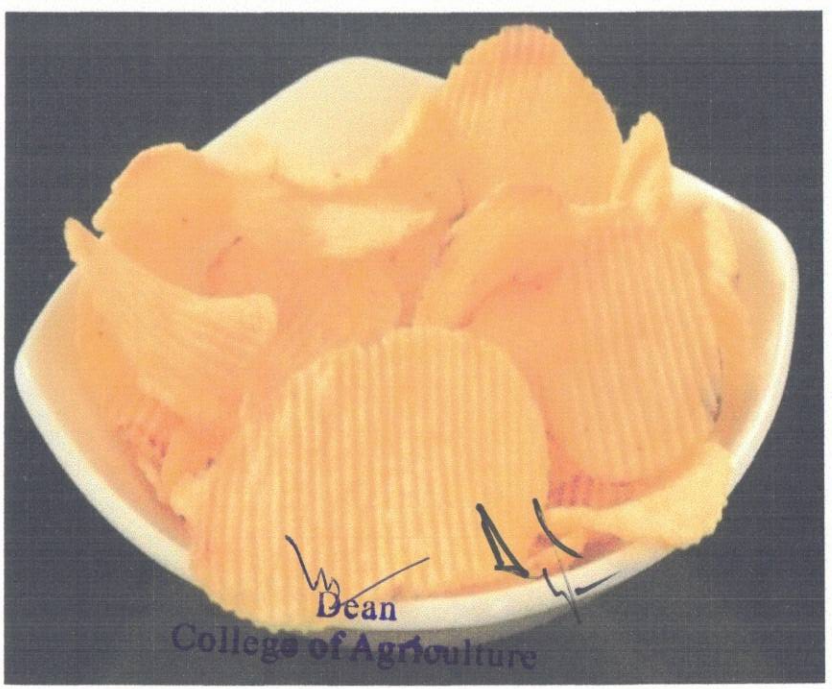
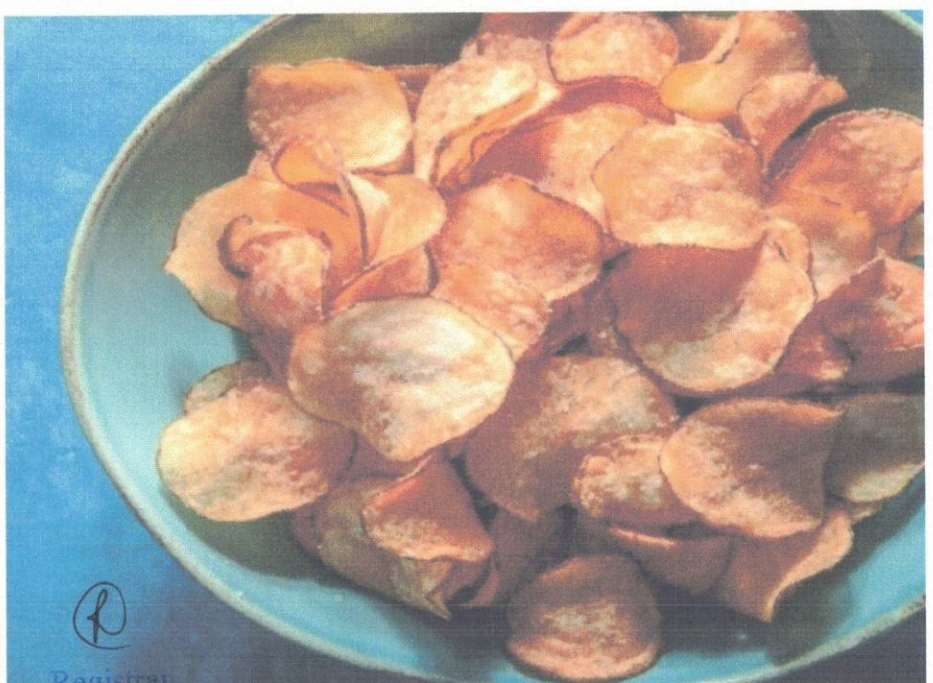
INTRODUCTION

- A potato chip or crisp is a thin slice of potato that has been deep fried, baked, kettle cooked, or popped until crunchy.
- Potato chips are commonly served as a snake, side dish, or appetizer.
- Potato chips was invented in 1853 by chef George Crum at a restaurant in New York.





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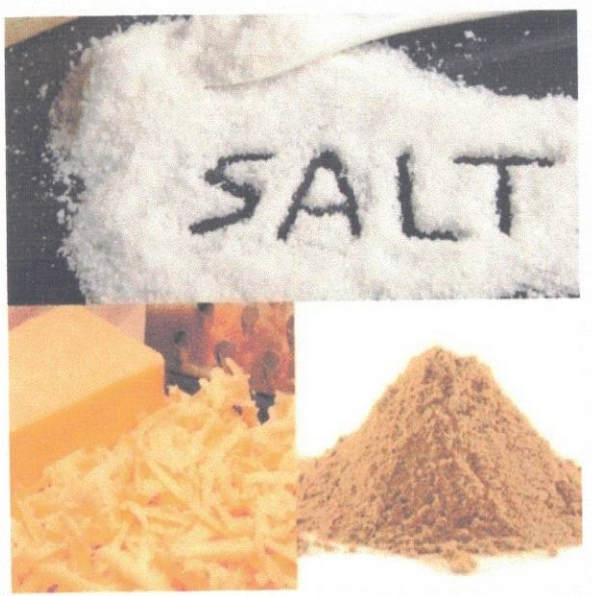
MATERIAL FOR PROCESSING

- Raw material: Fresh potatoes(20-25% dry matter content and low reducing sugar levels about 0.25-0.5%).
- Frying medium: edible oil, vegetable oil .
- Seasoning: salt, seaweed, cheese, flavor enhancer, sugar, natural flavour.



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PROCESSING QUALITY OF SOME POTATO VARIETIES

- Kufri Chipsona -1
- Kufri Chipsona -2
- Kufri Chipsona -3
- Kufri Jyoti
- Kufri Lauvkar
- Kufri Chandramukhi

Besides two more varieties viz. Kufri Surya and Kufri Himsona have been released for processing purpose and are soon expected to cover large cultivation area in the country.

METHOD OF MAKING POTATO CHIPS

After harvesting from the fields, potatoes will be examined the quality. The selected potatoes move along a conveyor belt to the various stages of manufacturing. This process of producing potato chips undergoes these main steps

WASHING → PEELING → SLICING → BLANCHING

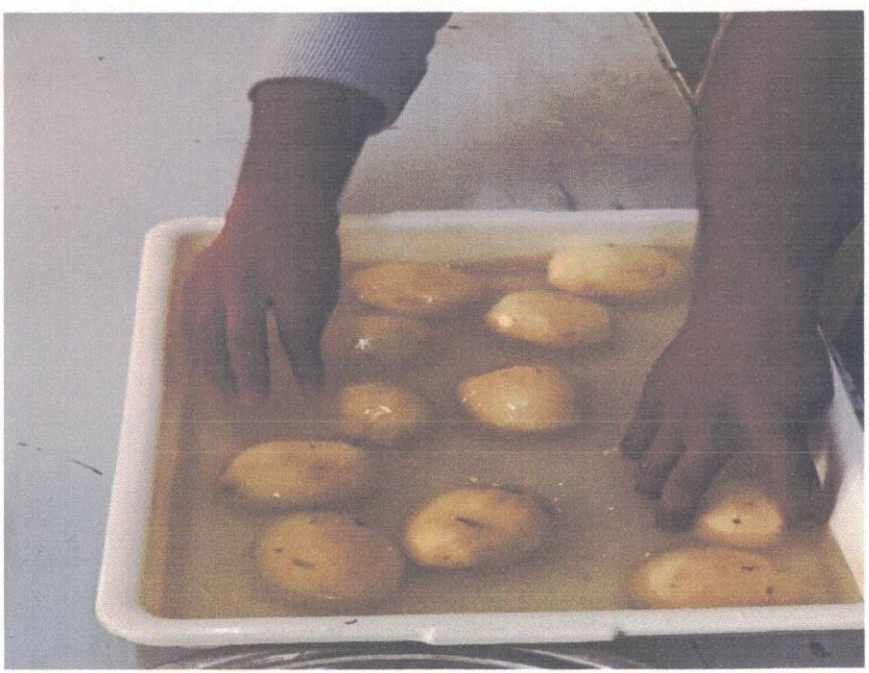
FRYING → DRY THE SLICE → COOLING → PACKAGING

WASHING

- The best qualified potatoes will be poured into water pipe with high flow rate and velocity to clean the soil and residue on potatoes.

PEELING

- Normally abrasive peelers are used
- Steam peelers are also used in large commercial units
- Only full-size potato will be allowed to continue processing, which ensures the product's design.

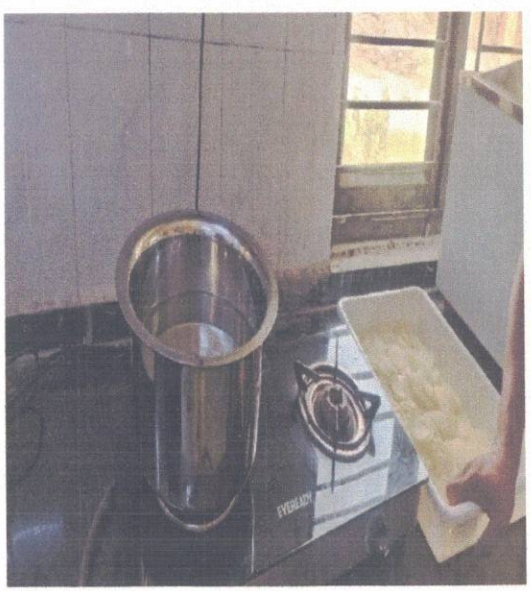


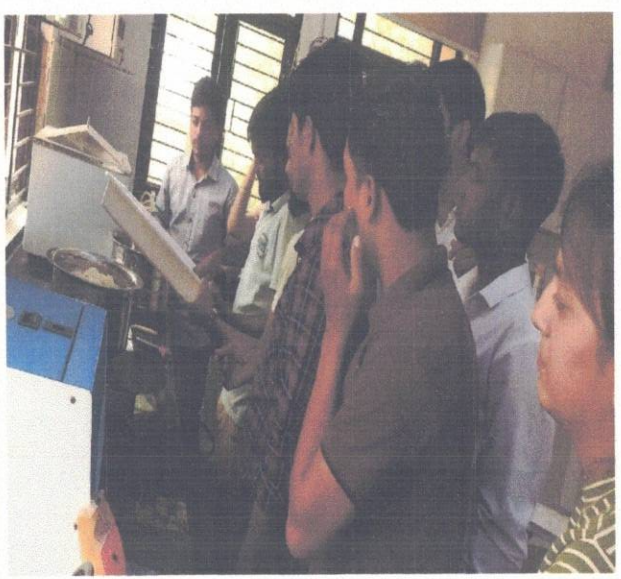
SLICING

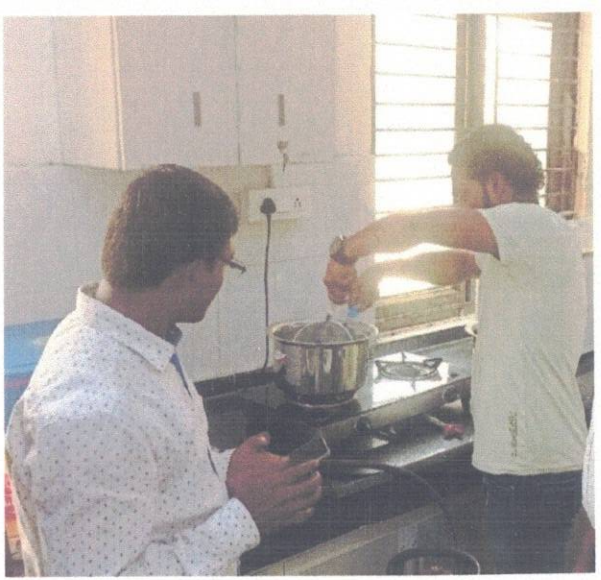
- Uniform thickness (1.5-1.8 mm)
- Smooth surface(rough surface absorbs more oil)
- Wash in water(starch removal avoids sticking of slices) washing removes sugars from surface)
- Keep the slices immensed in water(to prevent discolouration)

BLANCHING

- Dip in hot water (80-100 C) for 5 minutes
- Blanching removes some reducing sugars
- Inactivates enzymes that cause discoloration

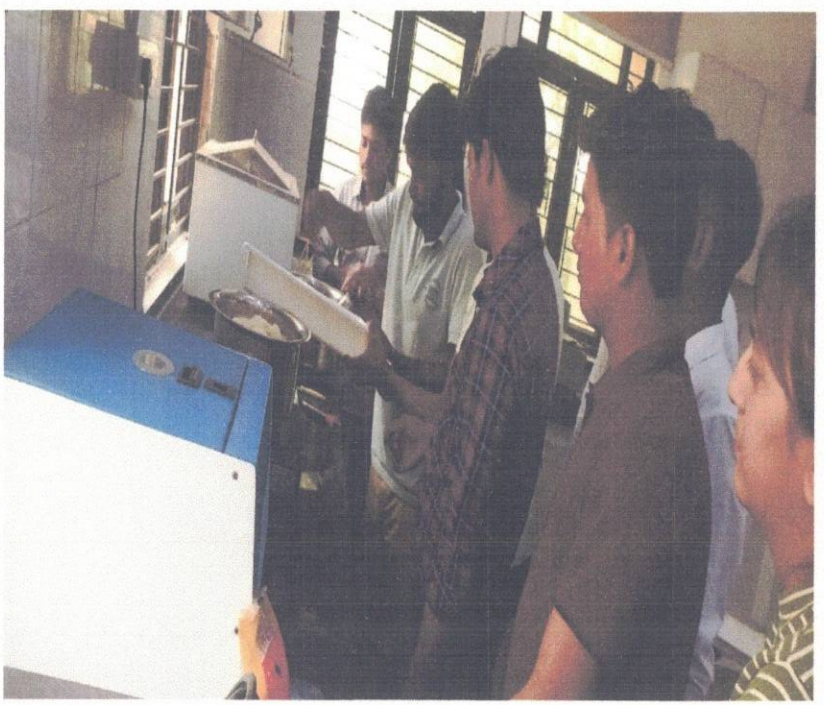






SALTING AND FLAVOURED

- Salt is sprinkled from receptacles Positioned above the trough at the rate of about 1 – 2 % of total weight or 1.75lb (0.79kg) of salt to each 100lb (45.4 kg) of chips.
- Potato chips that are to be flavoured pass through a drum filled with the desired powered seasoning.



DRYING

- Remove excess moisture
- Less frying time.
- Tray drier are used

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FRYING

The slices are passed under air jets in order to remove excess water. Then, they are flow into fryer filled with the oil . The oil temperature is kept at 176- 190 °C .

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PACKAGING

The chips then move to the packing machine.

In this stage the air is sucked out of the bags filled with chips.

Many manufacturers use nitrogen to fill the space in the bags.

The sealed bags are conveyed to a collator and hand-picked into cartons

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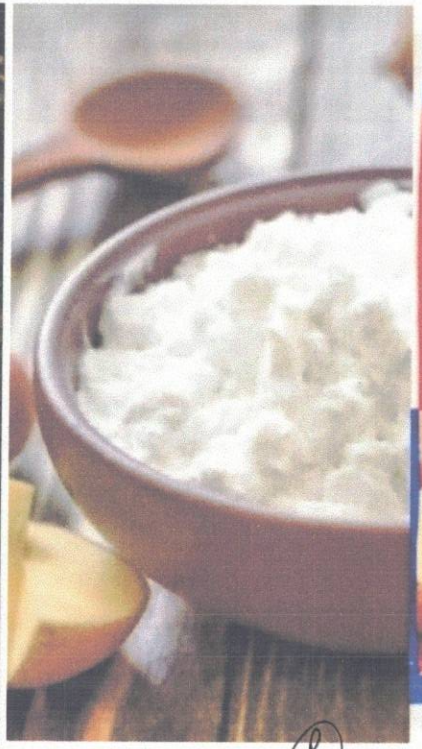
BY-PRODUCTS/WASTE

- Rejected potatoes and peelings are sent to farms to be used as animal feed.
- The starch that is removed in the rinsing process is sold to a starch processer.



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