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Agriculture Skill Council of India

# Facilitator Guide



Sector  
**AGRICULTURE INDUSTRIES**

Sub-Sector  
**Agriculture Industries**

Occupation  
**Seed Production And Processing**

Reference ID: **AGR/Q7101, Version 1.0**  
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# Quality Seed Grower

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**Shri Narendra Modi**  
Prime Minister of India

“ Skilling is building a better India.  
If we have to move India towards  
development then Skill Development  
should be our mission. ”

## Acknowledgements

We are thankful to all organizations and individuals who have helped us in preparation of this Participant manual. We also wish to extend our gratitude to all those who reviewed the content and provided valuable inputs for improving quality, coherence and content presentation of chapters. This handbook will lead to successful roll out the skill development initiatives, helping greatly our stakeholders particularly trainees, trainers and assessors etc. We are thankful to our Subject Matter Expert **Dr. N. Emayavaramban** who has given the content and helped us in preparation of Facilitator Guide.

It is expected that this publication would meet the complete requirements of QP/NOS based training delivery, we welcome the suggestions from users, Industry experts and other stakeholders for any improvement in future.

## About this Guide

Dear Trainer,

This Trainers Manual is intended to empower preparing for the Quality Seed Grower Qualification Pack (QP). Every National Occupational (NOS) is spread over Unit/s. Key Learning Objectives for the NOS check the start of the Unit/s for that NOS. The images utilized as a part of this book are portrayed beneath. Quality Seed Grower is in charge of Installation, Testing, Commissioning of Quality Seed Grower at agriculturist's field for better water administration and increment in yield of product. The National Occupational Standards indicate the measures of execution an individual must accomplish when doing a capacity in the work environment, together with the information and comprehension they have to meet that standard reliably. These word related guidelines are appropriate both in the Indian and worldwide settings. According to these measures the Quality Seed Grower ought not work freely, ought to be relentless and must be able to settle on operational choices relating to his range of work. The student ought to pick up clarity of work and ought to be result situated; The Trainee ought to likewise have the capacity to exhibit abilities to utilize different devices in the Quality Seed Grower. The mentor should guide and prepare the students' in the accompanying abilities:

- **Knowledge and Understanding:** Satisfactory operational learning and comprehension to play out the required chore
- **Performance Criteria:** Pick up the required aptitudes through hands on preparing and play out the required operations inside the predetermined measures
- **Professional Skills:** Capacity to settle on operational choices relating to the zone of work

The course incorporates Trainer Guide including student handbook for the learners and coach's aide; appraisal guide; session arrangement; and syllabus for you. The course material likewise incorporates a couple of blurbs as showing helps in the classroom. The appraisal guide subtle elements the assessment system. As a mentor you will assess the learners' execution and grade them in light of the assessment parameters given in the aide. The system additionally incorporates field visit for the students where they will watch the method/operations and administrations of the Quality Seed Grower. Chapter are prepared to build up the expert abilities like – choices making, systematic and basic considering. We hope you will be able to impart your knowledge with our help to make this program a success and up-skill the workers to the recommended standards.

We trust you will have the capacity to confer your insight with our help to make this program a win and up-skill the workers to the suggested norms.

All the best!

## Role of the Trainer

As a trainer, keep in mind the following guidelines:

### Know your job thoroughly

The Trainer ought to first know his/her learners (the students) keeping in mind the end goal to guarantee their productive contribution in the learning procedure. Fundamentally the majority of these contemplations are guided by the reasoning of participatory preparing, which advocates that preparation, not at all like instructing, is more worried with the general improvement of the human identity.

- As a Trainer, remember the accompanying rules:
- Training is not learning
- The trainer needs to learn for himself/herself, through his/her own particular activity and movement
- The trainer can just guide the understudy movement in a way that prompts a decent learning background
- The trainer can create reasonable situations fancied to deliver a powerful learning (curricular, co-curricular and additional curricular) experience
- Trainees' response with the earth is relied upon to achieve an adjustment in conduct
- The trainer is the key component, as on him/her depends the arranging of the learning circumstance for accomplishing the sought result

### Practice these common courtesies

- Greet the students
- Be warm and neighborly
- Introduce yourself
- Ask their names
- Explain the reason and objectives of preparing project
- Ask their desires
- Always make inquiries
- Listen to them quietly and answer their inquiries
- In case you can't react to an inquiry say that you will hit them up
- Respect the students
- Do not hang over them, their work, or get in their work-space
- Do not take their work or move it without requesting their consent
- Be a decent onlooker
- Offer rededication for weaker students Correct the flawed practices of learners at work before they transform into propensities
- Do not condemn
- Show gratefulness where it is expected
- Always say 'please', 'thank you', and "too bad"
- Be a tutor

### Responsibilities

- The trainer has a unique position and assumes a few parts. He/she is a go between the student and administration.
- The trainer has moral and lawful duties and guarantees the expert advancement as well as the prosperity of the young. You need to counteract:
  - Discrimination as a result of sexual orientation, race or nationality or some other kind
  - Bullying and/or lewd behavior
  - Abuse of liquor, prescription or whatever other substance
  - Physical threats through mischance, air contamination, commotion or risky chemicals
  - Overstepping the student's physical limit
- You likewise need to secure that time directions or other lawful controls are not infringing– neither by you nor by the disciple.

### Symbols Used



Steps



Time



Tips



Notes



Objectives



Do



Ask



Explain



Elaborate



Field Visit



Practical



Lab



Demonstrate



Exercise



Team Activity



Facilitation Notes



Learning Outcomes



Say



Resources



Activity



Summary



Role Play



Example

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# 1. Introduction

Unit 1.1: Seed Industry In India

Unit 1.2: India Seed Act

Unit 1.3: Different types / class of seed

Unit 1.4: Characteristics of Quality Seed

Unit 1.5: Seed Standard

Unit 1.6: Basic Principles in the Production of Various types / Class of Seed



## Key Learning Outcomes

After completing this session the trainees will be able to:

- Discuss about the concept of quality seed
- The quality parameters which differentiate a seed from the grain.
- The characteristics of various class of seeds and its production at the field.
- Define the Importance of Indian seed Act and Indian Minimum seed certification standards.

## UNIT 1.1: Seed Industry In India

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- The gradual development of Indian seed industry
- about the importance of quality seed in crop production

### Say

**Indian agricultural was mainly dependent on the traditional way of cultivation**

- farmers used only farm saved seed to sow the crop
- Slowly the awareness about the quality of a seed was understood when the farmer has sown well cleaned and pure seed.

Various experiments and variety shown that quality seed when sown gives higher yield  
Subsequently importance was given for seed quality.

**More importance for agriculture was given in five year plan**

- Indian council of Agricultural Research (ICAR) also gave importance for quality seed
- Introduced "All India co-ordinate crop improvement" programme
- All India co-ordinate maize improvement programme was started during .
- Many other such programme for crop like sorghum, paddy etc. were started during 1972.
- 

The aim of such programme was to release newer varieties having higher yield to Produce quality seeds of such varieties and distribute them to the farmer to recommend various scientific methods to improve productivity.

**Other steps taken by government**

National seed corporation (NSC) was started in 1963 to produce and market good quality seed to farmers Tarai Development corporation (UPSTDC) was started in Uttar Pradesh state to multiply and supply good seed. Seed certification Agencies were started in various states to monitor and certify seed production.



## UNIT 1.2: India Seed Act

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Understand the importance of Indian Seed Act in the quality seed production and to maintain the seed standard as per the act for various seed quality parameters.

### Say

Indian seed Act was enacted in 1966 in order to bring seed production under a legal umbrella.

Objective was to regulate the quality of the seed marketed

For this purpose labeling was made compulsory for all seeds of notified varieties.

Certified seed production was made mandatory.

The act ensures the following

- Seeds produced must conform to the minimum seed standard
- Seed should be sold after proper tagging
- Regulate functioning of all agencies / dealers dealing with any notified variety
- Applicable only for the F/S and C/S for any variety notified by the government
- To establish central seed laboratory to carry out function entrusted under this act.
- To fix the minimum limits of germination, purity
- To establish seed certification agencies in various states.
- To establish central seed certification board
- To appoint seed analysts and seed inspectors

### Ask

What is the difference between labeling and certification?

In case if you don't get a correct answer

Explain – labeling means giving details about seed produced by any seed producer on various quality parameters. Certification is the process of certifying the seed as standard by the concerned seed certification agency.



## UNIT 1.3: Different types / class of seed

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- about the seed production chain and the importance of each class of seed.

### Say

There are 5 class of seed

- Nucleus seed (N/S)
- Breeder seed (B/s)
- Foundation seed (P/S)
- Certified seed (C/S)
- Truthfully labelled seed (T/L)

### Explain

**Nucleus seed – initial stage of seed in any seed production chain.**

- Maintained by the breeder / scientist.
- 100% pure.

**Breeder Seed: (B/S)**

- Produced from Nucleus seed
- As pure as breeder seed, produced by breeder of ICAR or by Agricultural Universities.

**Foundation seed (F/S)**

- Produced from Breeder seed
- Produced by institution like NSC, SSCs certified by the seed certification agency.

**Certified Seed (C/S)**

- Produced how Foundation Seed and certified by the certification agency

**Produced by institutions like NSC, SSCs and by private seed growers.**

- Truthfully labeled seed (T/L) produced from C/S.
- Not certified by the agency but conform to the seed standard as that of certified seed.



## UNIT 1.4: Characteristics of Quality Seed

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- know the characters of a quality seed. assess whether the seed given to him is a good seed.

### Say

Good quality seed is the cheapest input in the production of a commercial crop one must therefore know the characteristics of a quality seed.

Various quality characteristic are Physical purity, Good germination, Optimum moisture content, Uniformity both physical uniformity like colour, shape, size, weight of individual seed and genetic purity, free from diseases and pest, true to type in expression of character. should have vigour and growth potential when sown. (explain all the above parameters in detail)

### Do

- Arrange to show samples of seed of the same variety and ask the trainees to judge the physical purity of each sample and list them in order of high physical purity.

### Notes for Facilitation

- Arrange a participatory discussion on the importance of qualify seed.

## UNIT 1.5: Seed Standard

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- know about various seed standards.
- Check for the above standards when any seed is received for sowing.

### Say

Applicable for all crops which are eligible for certification. Both field standard and seed standards are available for each crop.

#### Various field standard

The following field standard are to be checked at various stages of crop growth. Isolation distance from other varieties

#### Off types.

- Plants which do not conform to the character of the variety grown.

#### Other variety plants:-

- Diseased plants – plants affected by certain disease which become seed borne and can't be controlled during next seed production.
- Objectionable weed plants

#### Seed standards in the laboratory test Purity

- Pure seed (minimum %)
- inert matter (maximum %)
- Other crop seed (maximum) %
- Total weed seed (maximum) %

#### Objectionable weed

Seed (maximum Nos)  
Other crop seed (maximum)

#### Other distinguishable varieties (based on Kernel colour & texture)

- Maximum No/Kg
- Weed seed - Nil
- germination (minimum) %
- moisture (maximum) %



## UNIT 1.6: Basic Principles in the Production of Various types / Class of Seed

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- The similarity and differences in the production C/S and T/L seed production.
- Understand the importance of notification of any variety by the government of India in respect of seed certification.

### Say

#### Basic principles

- Production technology adopted for various class of seed Nucleus seed
- Nucleus seed or basic seed is the original or first seed of a variety
- Produced by breeder who developed that variety or by any other recognized breeder.

Only limited area is planted.

- Multiplied and maintained by selecting individual pods / plants and growing the seeds of individual plant / pods.
- Only true to type progeny are selected for multiplication. Plants grown in this method is called progeny.
- Seeds of true to type plants collected and used as Nucleus seed.

#### Breeder seed

##### Progeny of N/S.

- Production is directly controlled by the originating plant breeder who developed that variety or by any designated breeder.
- Minimum seed standards are less stringent than Nucleus seed but more than the foundation seed produced by NSC or SSCs under the direct supervision of breeder.
- Inspected by a team called breeder seed monitoring team seeds are collected from the approved plots.
- Breeder issues a label indicating the germination etc. called golden yellow label.
- Foundation and certified seed production technology is the same except that breeder seed is used for F/S multiplication and foundation seed is used for C/S production.
- In both cases no breeder involvement for regular inspection or monitoring.

##### Seed plots are registered with seed certification agency.

- Both F/S and C/S plots are inspected by the certification officer.
- With the approval of the certification officer, the seeds are harvested.
- Lot number is given. there is a slight variation in the seed standard between F/S and C/S.







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## 2. Ensure Proper Working Condition With In Setter Room

Unit 2.1 - Recap

Unit 2.2 - Seed Production Cycle

Unit 2.3 - Land and other Basic Resources

Unit 2.4 - Source of Parental Seed

Unit 2.5 - Quantity of Seed to be Used

Unit 2.6 - Other Inputs Required For Seed Production

Unit 2.7 - Factors Which Influence Seed Production



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## Key Learning Outcomes

After completing this session the trainees will be able to:

- Identify basic biological resources and other physical resources for seed production.
- Need for an advance planning to indent the resources
- Identify the appropriate inputs like type of pesticides, fertilizer in advance based on the crop being selected.
- Plan an alternate arrangement in case of delay / Non availability of inputs from identified resources.

## UNIT 2.1: RECAP

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Recap the learning of the module "land and other resources".

### Say

- Let us revise the topic land and other resources through a small quiz
- Here are few chits written inside about various resources needed for seed production. You need to match them and put it in order each category listed on the board.

### Do

- Divide the class into 3 or 4 groups. Make a chart on the board having 3 columns (ie)
- Class of seed, producer, type of label/tag, used as parental seed for the production of.
- Jumble up the chits and distribute the chit to the group. Give them five minutes to discuss, First call for the class of seed group. Ask the group having the chit to place it on the desk against the first column in the order of seed production chain. Read it to the class. Next the other groups have to arrange their chit in other column according to the details in the first column.
- For every correct response placed on the desk the group will get 10 points. No point for incorrect answer.
- In case the groups are unable to respond correctly, tell them the correct answer.
- Note the score for each group and announce the scores at the end of the quiz.



## UNIT 2.2: Seed Production Cycle

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Identify problem soils and reject them for seed production
- Select the appropriate irrigation method.
- Workout various inputs /resources needed for seed production and the sources for each input.

### Ask

Seed production cycle

- What is the difference between seed production and commercial crop production.

### Say

- Seed production involves maintenance of quality as per seed standard right from sowing upto storage of the cleaned seed. Commercial production does not include any quality control measure at the field.

### Explain

Various point to the considered for the selection of land.

- How to decide the seed rate for each crop.
- Various operations to be taken in crop maintenance.
- Field Inspection and its importance in quality seed production as per seed standard
- Decision on the date of harvesting and machinery to be used for the harvesting.
- Various seed cleaning procedure.
- Packing and seed storage.



## UNIT 2.3: Land and Other Basic Resources

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Select the most appropriate field for seed production.

### Say

**Let us see about the type of soil and basic resources required for seed production.**

- Fertile soil supports a good crop growth
- Specify factors which affect soil quality.
- Major problem soils are classified as acidic and alkaline soil
- Explain the chemical nature of various problem soil
- Explain how the seed quality is affected if production is taken in a problem soil.

#### **A. Selection of appropriate field**

- Fertile soil
- Land should be leveled and facilitate easy & proper irrigation
- Desirable irrigation and drainage
- Sufficient sunshine
- No serious disease or insect pests especially those forbidden by seed act/ quarantine law.
- Soil should be tested for pH
- Should be free from soil born insect pest and diseases.
- Should be free from weed growth
- No voluntary plants from previous crop.
- Have sufficient isolation distance

### Do

- Take the class to a nearby seed production area and ask them to identify whether the soil is suitable for seed production. If so for which crop.
- Ask them to identify the weed plants if any and advise them to remove the same.

**Do**

- Take the class to a nearby seed production area and ask them to identify whether the soil is suitable for seed production. If so for which crop.
- Ask them to identify the weed plants if any and advise them to remove the same.

**Say****A. About various other basic Resources**

- Now we may discuss about other basic resources required for seed production

**Do**

Take the trainees to an agro service centre. Ask them to identify an insecticide, a fungicide and a fertilizer from the input available in the centre.

Ask them the use each of the above inputs in seed production.

**(i) Basic seed requirements.**

- To obtain the right class of good quality seed a proper class of seed has to be sown as parental seed.
- Breeder seed used for foundation seed production (F/S)
- Foundation seed used for certified seed production (C/S)
- C/s used for truthfully labeled seed production. (T/L)

**(ii) Irrigation**

Various methods are followed in seed production based on the nature of the crop and its water requirement.

- flood irrigation – ex paddy
- Controlled irrigation – through ridges and furrows for irrigated and dry crop – ex. maize.
- Sprinkler irrigation – for vegetables
- Drip irrigation – for vegetable and hybrid seed production.
- Source of irrigation : Irrigation source differs depending upon the location type of land / topography of land.
- Channel irrigation
- Tank irrigation,
- ground water irrigation
- Decide the crop based on the type of water source available.
- Check quality of water before use for pH, soluble ions etc.

**Do****(iii) Machinery**

- Identify the sources for various machineries.
- Machineries required for
  - Land preparation
  - Sowing/ planting
  - interculturing
  - plant protection operation
  - harvesting
  - seed cleaning / processing

advance indent for the machinery required for your production taking into consideration the time of various operations has to be placed with the correct source.

**IV. Other inputs**

- Fertilizers - for basal application and for top dressing
- bio fertilizers like azotobacter, rhizobium for seed treatment application.

**V. Man Power availability**

Ensure the availability of farm workers for manual weeding, spraying, harvesting and other operations if needed.

Availability of semiskilled or skilled worker for seed cleaning, processing packing and storage.

- Take the students to any seed production plot.
- Ask them to select a crop based on the availability of all the above inputs.
- Ask them to draw a plan as to how to get all the above inputs at the appropriate time.

**Notes for Facilitation**

- Arrange to show various types of machineries used in seed production. Arrange to show the prototype of drip & sprinkler irrigation.
- Show photographs of field affected by high pH, by alkaline condition. Show seed obtained from a fertile soil and problem soil.



## UNIT 2.4: Source of Parental Seed

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Identify the source of seed for the production planned and take appropriate action to get the parental seed from such sources

### Say

- Now we will discuss about the various class of seed to be used as a parental seed for the proposed seed production and identify the sources.

### Explain

- Deciding parental seed source is fore most important in the quality maintenance.
- Various parental seed required are
- Breeder seed if production is planned for foundation seed.
- Foundation seed for certified seed production.
- Certified seed for truthfully labeled/ quality seed production.
- Approach breeder in the respective institution for breeder seed requirement.
- Such indents are placed at least 2 years in advance to the breeder through govt.
- For foundation seed contact institutions like Agriculture universities, research stations, state seed corporation and NSC.

### Do

Take the trainees to any breeder and inspect the breeder seed plot or to any seed corporation and inspect foundation seed plot. Make the trainees to understand why breeder seed is used for F/S production and F/S for C/S production.

Ask the trainees to check the seed pachs and note the type of label tags attached and match with the class of seed.

- Ask them to identify the class of seed based on the type of label and tag
- Golden yellow label for Breeder seed
- White tag for foundation seed.



## UNIT 2.5: Quantity Of Seed To Be Used

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- A position to decide the quantity of parental seed to be used for the production being organised.

### Say

- Now we may learn as to how to decide the quantity of parental seed to be used our production.

### Explain

Parental seed quantity is decided based on

- The seed multiplication ratio of the given crop (SMR)
- Based on the quantity of seed to be produced.
- In case of seed with less germination than the standard.

**SMR**

- denote the number of seed produced from single seed when sown and harvested.
- SMR depends on the nature of the crop.

### Do

- Give the SMR of few crops like paddy, wheat and jute. Give them the seed production target for these crops and the class of seed to be produced.
- Ask them to work out the quantity of parental seed required and verify.

## Notes



A large rectangular area containing numerous horizontal lines for writing notes.

## UNIT 2.6: Other Inputs Required For Seed Production

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- A Position to decide about various other inputs required for the seed production and identify the sources from which these inputs can be obtained.

### Say

Various inputs other than the parental seed are also required for a successful production of any kind of seed.

#### A Manures and Fertilizers

- Required for basal application as well as for top dressing

#### Chemicals :

- Required for seed treatment.
- Insecticide and fungicides for spraying to control the pest & diseases in the field.

#### C. Data Collection

- Collection of data on various aspects of seed production is utmost important.
- Data has to be collected on various factor related to the area where seed production is organized.
- Popular varieties.
- Newly introduced varieties
- Weather pattern in the last few seasons.
- recurrence of any serious pest or disease in that location.
- fast moving fertilizers & pesticides in that location any technical advisory in the near by city/town.
- Proximity to the breeders/research institution to approach them in case any epidemics.

## Notes



A large rectangular area with a thin orange border, containing numerous horizontal lines for writing notes.

## UNIT 2.7: Factors Which Influence Seed Production

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- A Position to decide about various other inputs required for the seed production and identify the sources from which these inputs can be obtained.

### Say

Let us now discuss about various factors which affect the seed production both quality & quantity.

- The broad classifications of these factors are
- Agro climatic
- Agromineral
- biotic

#### Agro climatic factors

- Optimum weather condition facilitates good quality seed production
- Extreme weather like high temperature, hot wind extreme cold, heavy rain interferes with seed production and affects both quality and quantity.
- Extreme temperature cause cell damage and leads to desiccation
- Hot wind affects pollen development and fertilization.

excess rainfall – wash the pollen grain and cause rotting of the plant due to excess soil moisture

high humidity - encourage insect & pest damage

low humidity - affect crop growth and pollen activity during pollination and fertilization

#### Biotic factor

- Insect pest Damage the crop affect the
- Disease causing fungi and bacteria growth and cause low yield
- Nematodes & Virus also cause deformation like crinkling, rosette, and browning etc.

#### Weed Plants

##### Agronomic factors

- method of planting. In appropriate method cause germination failure and low population.
- Plant density affects total yield if the population is less than the recommended number





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## 3. Prepare Field and Sow Seed

Unit 3.1 - Recept

Unit 3.2 - Criteria For Selection

Unit 3.3 - Agro-Climatic Condition of the Site-Objective

Unit 3.4 - Methods of Seed Bed Preparation

Unit 3.5 - Steps Involved In Land Preparation

Unit 3.6 - Soil Sample and Soil Testing

Unit 3.7 - Soil Testing



AGR/N7102

## Key Learning Outcomes

After completing this session the trainees will be able to:

- Discuss about various factors that may influence the selection of land for seed production
- Finalise various mechanical operation to be taken for seed bed preparation based on the type of crop and nature of soil in the selected field.
- Discuss about the advantage of various sowing methods
- Identify the most suited implements for your use.
- Demonstrate how to avoid the ill effect of climate for the seed crop by various precautionary steps.

## UNIT 3.1: RECAP

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Recap The Learning of The Module Grow and Manage Seed

### Say

- Let us revise the topic on "collect information and resources for seed production"

### Do

- Divide the class into 4 groups and give one topic to each group.
- Let the group discuss for 5 minutes and request the participant from the group to present the topic step by step to the class.
- Form question for each topic
- Land selection
- Seed requirement for the seed production
- Other inputs required for seed production
- Factors which influence seed production

### Notes for Facilitation

- Encourage participants
- Recall the importance of each resources during presentation.



## UNIT 3.2: Criteria For Selection of Land

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Select Land For Seed Production.

### Say

Selection of land for seed production has to be based on various factors.

Fertile soil, assured irrigation system and good drainage properly leveled land

- Soil texture
- Soil structure
- Suitability to the crop being multiplied
- Intensity and duration of light
- Temperature fluctuation
- Rainfall and climate
- Influence of pest and disease
- Easy approach
- Isolation distance required from other crops

### Ask

What is the ideal soil for production of maize hybrid seed?

### Say

- The ideal soil is the loamy soil with proper drainage.
- Maize is the crop which needs well drained soil with good soil aeration.



## UNIT 3.3: Agro- Climatic Condition of The Site -Objective

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- In a position to select area having a moderately favorable weather condition at every growth stage particularly during the critical growth phase.

### Say

- For a good seed production a crop variety need to be grown in an area having a suitable photoperiodic and temperature condition.
- Regions of moderate rainfall and humidity are suitable for seed production
- Most crop require a sunny and dry period and a moderate temperature.
- The requirement of weather condition for the seed production varies with the crop
- For crop like vegetable and legumes hot, dry weather condition affects the seed setting and the yield.
- Vegetable and legume crops invariably require cool condition with moderate humidity to flower and pollinate.
- Excessive rain and dew causes hindrance in normal pollination
- Too high temperature cause desiccation of pollen grain leading to poor seed setting
- Likewise cold temperature affects the seed quality especially at the time of maturity of the seed.
- As the crop nears maturity, heavy wind and high temperature lead to shattering of seed.
- Selection of seed plot / area / region should be such that, the agro climatic condition must allow a full crop growth and higher productivity.

### Ask

- What are the major type of crops grown during winter season and explain the reason?

**Expected answers**

- Major winter crops are wheat, gram, Cole vegetables, mustard, peas
- These crops require a low temperature for the vegetative growth and for flowering and therefore grown during winter.



## UNIT 3.4: Methods of Seed Bed Preparation

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- in a position to identify the proper seed bed for the seed production allotted to them.

### Say

**Seed bed preparation is done to**

- Ensure proper sowing of the seed at the appropriate depth.
- To promote good germination of the seed sown and encourage vigorous growth of the seedling.
- To incorporate the fertilizer applied to the soil before sowing
- To improve the physical condition of the soil
- To control the soil borne pest and diseases.
- To control weed plants and voluntary crop plants.

### Ask

**How to prepare the land for sowing?**

- Prepare the land to fine tith by deep ploughing 3-4 times
- Follow this operation with harrowing
- Attend leveling if required.
- Ensure that the field is free from weeds.
- In case the seed is smaller the filed preparation should be finer
- Seed bed may be either raised bed or ridges and furrow or simply leveled field based on the crop to be sown.



## UNIT 3.5: Steps Involved In Land Preparation

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- a position to understand the various steps in land preparation.

### Say

There are various steps in the land preparation (i.e) primary tillage or primary ploughing and secondary ploughing or secondary tillage.

- There are various steps in the primary tillage. These steps are followed based on the nature of soil.
- Deep tillage
- Sub soiling
- Year round tillage

#### Deep tillage

- Normally done during summer
- Improves soil structure and soil moisture.
- Deep tillage required for sowing deep rooted crops
- Moderate tillage required for shallow rooted crop

#### Sub soiling

- Done to break the hard pan below the top soil without disturbing the top layer.
- Breaking hard pan like silt pan or iron pan facilitates deep root growth.

#### Year round tillage

- Tillage operation carried out throughout the year.
- Done to avoid weed growth.
- Normally carried out in dry farming region.
- Facilitates percolation of rain water into the soil and easy land preparation.
- Various equipment are used for land preparation.

#### Deep tillage

- Disc plough
- Mould board plough



## UNIT 3.6: Soil Sampling and Soil Testing

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- in a position to understand the importance of fertility status of the soil in the seed production plot and the procedure to be adopted for soil sampling.

### Say

**Soil is an important component in the seed production program.**

- The quality of the seed produced depends mainly on the nature of the soil and its fertility status.
- Soil used for the seed production should contain all the nutrients required for crop growth not only in significant quantity but also in the available form.
- The availability of various nutrient is called fertility status of the soil.
- In case any nutrient is either not available or available in traces it should be supplemented to the soil.
- The nutrients are mainly grouped as primary nutrient and a secondary nutrient
- Some nutrients are required in traces which are called minor nutrients
- To know the fertility status of the soil, the soil should be tested for various nutrients.
- Proper sampling of the soil for testing is an essential part of the soil testing.
- Disc plough
- Mould board plough

#### Soil sampling

- Soil test and their interpretation based on the soil test result is most important.
- Collection of soil following the right procedure a must
- Time of soil sampling depends on the type of land selected
- In case of uncultivated land which is brought for cultivation, sampling should be done before taking up any operation like leveling.
- Apply any amendment like lime if advised well before sampling so that the pH of the soil to be tested is stabilized.
- In case of any established area, take sample at any time.
- if any abnormal growth is exhibited by the crop during cultivation, take sample immediately for testing.

**Drawl of sample**

- Sample should be true representative of the soil to be tested
- Traverse the field before taking sample.
- Any variation in colour, soil texture crop management, cropping pattern need to be considered before testing.
- Divide the field into different portion.
- Number of portion depends upon the area of the field.
- Example -4-portion for one acre of land to be tested.
- Tools used for soil sampling; soil tube, an augur or pickaxe

**Explain:**

- Soil sampling has to be done from a depth up to which the plants draw its nutrients normally.
- Sampling has to be done either by using an augur or soil tube some time make 'V' shape cut using spade or pickaxe
- Thorough mixing the sample is essential.
- Explain how to divide the soil collected into 4 equal parts and finally select the proper one for testing.

**Ask**

- Where to send the sample for testing?
- The obvious answer will be to a soil testing laboratory.

**Say**

- The sample has to be sent along with sample information sheet giving the details of test required to be done.

**Do**

- Take the trainees to a seed production field and demonstrate the procedure of sampling
- Ask them to traverse the field and select a suitable spot for sampling and ask them on what basis the spot was selected for sampling.



## UNIT 3.7: Soil testing

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Parameters for which the soil is tested and decides the type and quantity of fertilizer to be used to compensate the nutrient deficiency.

### Do

Take the trainees to a soil testing laboratory and show them the procedure adopted for soil testing.

- Receiving the soil sample
- Allotment of lab test number
- Analysis for primary nutrients
- testing for secondary nutrients
- Procedure adopted for micro nutrient analysis if any requested.

### Demonstrate

- Testing pH show the use of pH meter to test the part.
- Testing electrical conductivity
- How to undertake testing for any specific nutrient requested by the farmer.
- Show various types of reagents used for soil testing

### Say

There are specific standardized procedures to test the soil sample.

- Testing is normally done for.
- soil pH
- Total available salts (which is nothing but electrical conductivity)
- inorganic carbon
- Available phosphorous





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## 4. Grow and Manage Seed Crop

Unit 4.1 - Recap

Unit 4.2 - Various Methods of Sowing and Seed Crop Management

Unit 4.3 - Factors Which Affect The Quality of Seed

Unit 4.4 - Field Inspection and Its Relevance to Quality

Unit 4.5 - Pest and Disease Management

Unit 4.6 - Field Inspection and Its Relevance to Quality

Unit 4.7 - Management of Pest and Diseases and Basic Principles of Control

Unit 4.8 - Weed Management and its Control In Seed Crop



AGR/N7103

## Key Learning Outcomes

After completing this session the trainees will be able to:

- Compare the advantages of various methods of sowing to select the suitable method based on seed size.
- Identify an of type from a normal plant in any seed production plot.
- Analyse the basic principle involved in keeping isolation distance in the seed production.
- Discuss about the role of seed certification officer in seed quality maintenance.
- The difference between a normal weed plant and an obnoxious weed.
- Discuss about seed born disease its effect on seed certification.

## UNIT 4.1: Recap

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Revisit the materials learned in the previous module "Grow and manage seed crop"

### Do

**Ask the participant how the weed plants affect the quality of seed.**

- Also ask them to explain the best measure to control weed plants.
- write on the poster /black board about various methods of insect pest control based on type of feeding
- Make chits written with various pests grouped based on type of feeding
- Divide the participants in to as many groups as these are types of insect given in the chit.
- Mix the chit and ask participant in one group to pick one chit
- Allow him to discuss with in his group
- Then ask him to come with an answer as given in the black board.
- If the answer is not correct explain the group the correct answer.

**Pest to be listed on the black board control measure**

- |                                  |                                  |
|----------------------------------|----------------------------------|
| • Leaf eating pest               | spraying a contact insecticide   |
| • Borers like stem borer,        | spraying a systemic insecticide  |
| • Storage insect pest (Bruchids) | seed treatment with insecticide" |
| • Spraying with malathion        |                                  |



## UNIT 4.2: Various Methods of Sowing and Seed Crop Management

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- a position to understand about different sowing methods and select the right method for sowing based on the crop selected for seed production.

### Do

Various methods of sowing is adopted

Method selected for any production is based on the nature of crop, size of seed and its growth habit. (Give example)

Major aims of adopting a particular sowing method is to

- Maintain spacing between plants and rows
- Control the quantity of seed used for sowing/ unit area
- Achieve an uniform sowing depth

### Say

Take the trainees to a nearby plot and ask them to attend sowing using various methods may be dibbling and drilling.

#### Board casting

- Age old method
- Seeds are broadcasted over the field prepared for sowing
- Used mostly for smaller seeds
- Less expensive, but uniformity in germination is not checked.

#### Dribbling

- Sowing the seed manually in row with desired space
- Explain the advantage and disadvantage of this method.

**Drilling**

- Drilling the seed in line is done by machine called seed drill.
- Facilitates uniform depth and proper spacing.
- Explain the merits and demerits of this method.

**Planting**

- Seed is placed in the soil by machine at required depth
- used for seeds of bigger size like maize.

**Transplanting**

- Seedlings are removed from the nursery and planted in the main field.
- Adopted in case of crop in which taking care of the germinating seed over a large area is difficult.
- Seedlings grown in smaller area and grown.
- Transplanted at the optimum growth of the seedlings

**Say****Board casting**

- Age old method
- Seeds are broadcasted over the field prepared for sowing
- Used mostly for smaller seeds
- Less expensive, but uniformity in germination is not checked.

**Dribbling**

- Sowing the seed manually in row with desired space
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**Planting:**

- Seed is placed in the soil by machine at required depth
- Used for seeds of bigger size like maize.

**Transplanting**

- Seedlings are removed from the nursery and planted in the main field.
- Adopted in case of crop in which taking care of the germinating seed over a large area is difficult.
- Seedlings grown in smaller area and grown.
- Transplanted at the optimum growth of the seedlings
- Some seeds require special type of treatment
- Removal of fuzz – from seed e.g. cotton
- Splitting the seed into two halves. ex. coriander.
- Mixing sand or clay to increase the volume of sowing material for even distribution of the seed.

**Ask** 

Why should we sow the seed at an optimum depth?

**Expected answer**

- Will ensure proper germination
- Support seedling growth due to availability of moisture
- If sown on the soil, germinated seeds will dry due to non availability of moisture to the growing seedlings.

What sowing method has to be adopted for the following seed?

Paddy, sorghum, maize, chillies, gingelly.

If the trainees are not able to give a proper answer, explain to them

- |          |   |  |
|----------|---|--|
| Paddy    | - | Sowing nursery and transplanting                 |
| Sorghum  | - | drilling   |
| Chillies | - | Nursery and transplanting                        |
| Maize    | - | dibbling manually or planting                    |
| gingelly | - | broad casting after mixing with sand or drilling |



## UNIT 4.3: Factors which affect the quality of seed

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Understand various factors which affects the quality of the seed produced and steps to prevent them.

### Say

- Quality of the seed is of two types.
- Physical purity /
- genetic purity / quality
- Physical quality is affected

- a) due to admixture of other varieties
- b) Presence of discoloured seed
- c) Seed due to agro climatic condition

- Genetic quality is affected by
- Developmental variation
- Mutation
- Natural crossing
- Selective influence of certain diseases

Explain

- How the mechanical admixture takes place.
- Use of same seed drill for sowing different varieties.
- Seeds from voluntary plants that grows along with seed crop
- At the threshing floor or at drying yard.
- Use of same storage space for different varieties.
- Harvesting / threshing using same machinery for different varieties'.
- Improper cleaning of gunny bags or any other packing material for packing the seed. Explain
- How the mechanical admixture takes place.
- Use of same seed drill for sowing different varieties.
- Seeds from voluntary plants that grows along with seed crop
- At the threshing floor or at drying yard.
- Use of same storage space for different varieties.
- Harvesting / threshing using same machinery for different varieties'.
- Improper cleaning of gunny bags or any other packing material for packing the seed.

**Ask** 

**How to avoid such mechanical admixture.**

- The probable answer will be
- Avoid using same place or machinery or packing material for different varieties without proper cleaning
- Attend proper roughing in the seed fields.

**Do** 

- Take the trainees to a seed production plot and ask them to identify any rogue plant or plants of other crops.
- Mix seeds of two varieties of any crop and ask the trainees to confirm whether there is any admixture.
- Genetic purity

**Say** 

- Can't be judged by naked identified
- Can be identified when the seed is sown and the crop starts exhibiting various characters.
- Can be identified from the variation in the genetic composition of the crop

**Explain**

- Developmental variation is caused due to continuously growing a variety at various location or season or in different soil with varied fertility.

**Mutation**

- sudden heritable change
- Caused due to natural factors
- Or by various agents called mutant
- These changes lead to variation in seed quality and character and affect uniformity of crop in the next generation.

**Natural crossing also cause genetic variation leading to quality variation deterioration.**

- Explain what is natural crossing
- Certain diseases like virus and smut etc. cause deformation of seed resulting genetic deterioration.



## UNIT 4.4: Field Inspection and its Relevance to Quality

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Understand the importance of field inspection in maintaining quality at field level and the various technical aspect of field inspection.

### Say

Field inspection is an essential step in checking the conformity of seed crop to the prescribed certification standard.

**Explain the objectives of field inspection**

- To verify the source of seed
- To check the field condition of the seed production plot and the neighboring fields about the presence of off types/ Voluntary plants.
- To check isolation distance
- To check the presence of rogue plants or off types in the seed crop.
- To check the incidence of any serious insect or disease which may affect the seed quality.

### Ask

What is an off type?

Expected answer

- Off type is plants which differ significantly in character from the variety grown in the field.

### Say

Field inspection has to be done at different crop stages.

- The number of such inspection depends upon the nature of the crop.
- Self pollinated crop – minimum of 2 inspections
- Cross pollinated crop minimum of 2-3 minimum
- Hybrid seed production –4 inspections

**Self pollinated crop**

- 1<sup>st</sup> inspection when the plant is nearing to flowering
- 2<sup>nd</sup> inspection from the time of flowering to harvesting

**Cross pollinated crop**

- 1<sup>st</sup> - before flowering
- 2<sup>nd</sup> - during 50% flowering
- 3<sup>rd</sup> - at maturity prior to harvesting

**Hybrid**

- 1<sup>st</sup> infection - before flowering
- 2<sup>nd</sup> & 3<sup>rd</sup> - during flowering (to check isolation, pollen shedder)
- 4<sup>th</sup> - at maturity prior to harvesting

(Explain what are the characters and other aspects to be checked during every inspection given above)

**Ask** 

What are the contaminants to be observed during field inspection suggest this following answers

**off types**

- Pollen shedder
- Shedding tassel
- Inseparable other crop plants
- Objectionable weed
- Serious diseases.

Explain each in detail

**Say** 

For a quality seed production inspection for the crop at the stages explained above should be done and check for the contaminants given above.

- Remove such contaminants and keep the crop free from any such contaminant.



## UNIT 4.5: Pest and Disease Management

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Understand about various pest and disease that attack a seed corp.
- Decide various measure to be taken to control them.

### Say

- Various organisms which affect the crop are commonly called as pest.
- Pest includes – Insects (which affect the crop)
- Disease causing organisms like fungi bacteria, viruses etc.
- Other organisms like nematodes.

### Explain

- The attack by the insects or diseases is mainly influenced by the seed borne nature of the fungi, bacteria, viruses, inoculums available in the soil, wind borne nature of the fungi, bacteria and by conducive weather conditions.

### Ask

- Whether Rodents / rats which affect the crop can be taken as a pest?
- If the answer is 'Yes' – Confirm it to the trainees.

### Say

- It is essential to understand the plant parts which the pest attack so as to decide the control measures.



## UNIT 4.6: Field Inspection and its Relevance to Quality

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Understand about various pests and disease that attack a seed crop.
- Decide various measure to be taken to control them.

### Say

- Various organisms which affect the crop are commonly called as pest.
- Pest includes - insects (which affect the crop).
- Diseases causing organisms like fungi bacteria, viruses etc.
- Other organisms like nematodes.

### Explain

- The attack by the insects or diseases is mainly influenced by the seed borne nature of the fungi, bacteria, viruses, inoculums available in the soil, wind borne nature of the fungi, bacteria and by conducive weather conditions.

### Ask

- Whether rodents/rats which affect the seed crop can be taken as a pest?
- If the answer is 'yes' - confirm it to the trainees.

### Say

- It is essential to understand the plant parts which the pest attack so as to decide the control measures.
- Foliage pest - affect the vegetative part like leaves.
- Pest that attack or bore the stem root etc. (stem borer and shoot borer)

- Pest which attacks the ear head, pod etc. (pod borer)
- Storage pest - which appears on/in the stored grain.
- Based on the nature of the plant part the pest attack and the nature of feeding, these control measures are decided.
- Like the insect pests, diseases also attack various plant parts.
- Foliage disease, - leaf spot, blast, bacterial leaf blight
- Stem disease - blast
- Root rot - root rot of groundnut.
- Wilt disease - wilting of the plant due to blocking of xylem vessel - wilting of red gram (arhar)
- damping off - damping off tobacco (normally occurs in seedling stage)
- Certain other diseases deform the plant part it attacks
- (eg,) Smut- in sorghum - grains are converted into smut ball, downy mildew - in bajra. (floral parts are converted into leaf like structure)
- Certain viral and nematodes deform the whole plant affected by them.
- (eg) Tomato leaf curl virus disease (leaf changed to curled structure)

## Explain



- Diseases are spread through various means.
- The fruiting bodies are carried by wind (wind borne) Cercospora leaf spot in paddy.
- Carried by the seed obtained from the affected plant - seed borne. Kamal bunt - in wheat
- Spores remain in the soil and germinate and spread the disease (soil borne) False smut in paddy.
- Some diseases are spread by vectors.
- Bhindi yellow vein mosaic - (transmitted by white fly)
- Both the pest and diseases is influenced by the climatic conditions at the crop's growth stage.

## Say



- Various major climatic factors are
- Rainfall
- Heavy fog
- High humidity
- Water stagnation in the fields.
- Cloudy weather alternated with light shower.



## UNIT 4.7: Management of Pest and Diseases and Basic Principles of Control

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Understand various methods of pest and disease control.
- Selecting an appropriate control measures keeping in mind the extend of damage and the cost benefit outcome.

### Say

Pest and disease control aims to control the agents which cause damage to crop.

- The principle of pest control is to suppress the pest or disease and not to annihilate them.
- Two relevant aspects need to be considered
- Economic injury level beyond which the damage to crop can't be allowed / tolerated and therefore desirable to initiate control measure.

Economic threshold level - it is the level at which control measure should be initiated to prevent increase in the pest/disease population.

There are various methods of pest and disease control

It involves 4 aspects

(1) Avoidance of pest and diseases

(2) Actual control by adopting

- Physical and mechanical methods
- Cultural methods

(3) Chemical methods

(4) Biological methods.

Insect pest and disease control

#### Avoidance

- (a) Avoid, using seeds having insect eggs or fungal spores
- (b) Sanitize the soil and kill the living insects, egg mass and spores
- (c) Use proper seed treatment.

**Cultural methods (Explain what is a cultural method)**

- (a) Tillage - deep ploughing to kill egg mass of insect or fruiting body of fungia
- (b) Use of clean seed
- (3) Application of manures and fertilizers
  - To regulate the growth in order to avoid incidence of pest or disease and increase resistance.

**Luxury vegetative growth attracts both pest and diseases**

- (4) Crop rotation
- (5) Trap cropping
- (6) Inter cropping
- (7) Time of planting
- (8) Destruction of crop residues.

**Mechanical and physical methods****Hand picking**

- Pick the insects/larvae if accessible and kill. (eg.) Prodenia larva in castor
- Use of mechanical traps
- Used to collect and kill the insects like beetle

**Sieving and winnowing**

- To separate insect pest if any from stored grains.

**Chemical methods**

- Use of chemicals called insecticides to control the insect pest and fungicides to control diseases
- Insecticides are grouped either
  - (a) Based on mode of entry such as stomach poison, contact poison and fumigants or
  - (b) based on mode of action such as physiological poison, protoplasmic poison
- Respiratory poison, and nerve poison or based on mode of action such as contact or systemic insecticides

**How to use the insecticides or fungicide**

- Used mainly in 2 ways (a) seed treatment (b) as spray
- Seed treatment done mainly for storage pest to avoid infestation of seed during storage and for diseases the smut, bunt

**Spraying**

- Fungicides or insecticides are selected based on the nature of the insect pest or disease and spray liquid is prepared as per recommendation
- The chemicals are sprayed either as routine spray depending up on the intensity of incidence of pest in any crop or the extend of growth of disease causing fungi or bacteria
- spraying of systemic or non systemic pesticide is done depending up on the nature of the insect pest.
- (e.g.) Spraying of contact insecticide malathion to control rice Gandhi bug.
- Spraying of non-systemic fungicide like hitacin to control paddy leaf spot or systemic fungicide bavistin to control wilt or root rot.

**There are various equipment used for application of insecticides**

- Two types of equipments are used based on the type of insecticides.

Dusters – for application of dust formulation

Sprayers – for application of liquid formulation

- In both dusters and sprayers there are hand operated one and power operated one.
- The concentration of the spray chemical especially liquid form depends on the type of sprayers used.



## UNIT 4.8: Weed Management and Its Control In Seed Crop

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Understand the damages caused by various weed in a seed production plot.
- Differentiate the weeds into objectionable weed and normal weed plant.
- Divide the method of control of weed to be adopted in the seed production organized by them.

### Say

Weed is an unwanted, uneconomical plant which competes with crop plant for water, nutrients, space and light affecting the productivity of the crop.

Weeds are classified as

- Objectionable
- Non objectionable

Objectionable weeds are those the presence of which leads to rejection of seed plot.

(3) Application of manures and fertilizers

- To regulate the growth in order to avoid incidence of pest or disease and increase resistance.

### Explain

- To obtain a good quality seed, weed control is a must.

### Ask

What are all the ill effect of weed plants in a seed production plot

- In case the trainees are not able to give suitable answer, tell them the answers given below.
- Depletes crop's environment of nutrients, water and light
- Reduces the yield
- Interfere with agricultural operations like spraying and increase cost of operation.
- Contaminates the seed produced and lead to quality loss.
- Act as host for various pest and diseases and lead to crop loss.

## Say

### Methods of weed control

- Various methods of weed control are available
- Cultural method
- Physical method
- Chemical method
- Biological control

Cultural method: Aims to prevent weed growth and its establishment by adopting various cultural practices

- Field preparation – to kill the weed plant, weed seed and up root deep rooted weeds.
- Planting method
- Seed without weed seed
- Transplanting – after destroying all weed population by puddling the seedlings are transplanted
- Plant density – high plant population which suppress weed growth.

### Irrigation and drainage

- Weed seed free channel, proper amount of water applications and prompt drainage of excessive water to avoid weed growth.

### Physical method

- Hand weeding
- Hand hoeing
- Inter cultivation
- Rouging the weed plant

### Chemical control

- Chemicals called weedicides are used.
- Explain chemicals are classified with 2 group based on the molecular composition.
- Organic herbicide (Sulphuric acid)
- Inorganic herbicide (Diesel oil)
- (Take with you some more examples of above herbicide and tell the class)
- Weedicides are also classified based on the selectivity in action as selective herbicide non selective herbicide
- Selective herbicide – Kills only weed plant and not crop – 2-4 D, butachlor.

**Non-selective** - Kills all vegetation either weed or crop plant (eg) paraquat.

Weedicides are classified based on the translocation (i.e.) movement in the plant system.

- Systemic herbicide move within the plant
- contact herbicide acts when it comes into contact with the plant.
- Systemic herbicides are mostly selective (eg.) 2-4-D,
- Contact herbicides are non selective.

Weedicides are used either before the germination of the crop seed and emergence of the seedlings or after the germination of the crop seed and accordingly called pre emergent and post emergent.

- Pre-emergent - Butachlor (in paddy)
- Post emergent - Propanil (in wheat)

**Ask** 

How a weedicide act on the weed and control the weed.

**Give the answer**

Weedicides interfere with any one or more of the biological activity of a weed plant like photo synthesis, or respiration or synthesis of fat/protein/ vitamins or cell division or germination or tissue development.

**Warn the trainees that using the recommended dosage of the weedicide is utmost important to achieve proper weed control.**

- Excessive dosage – may destroy crop also or lead to resistance development.
- Use of proper spray equipment and use of appropriate quantity of water for diluting the weedicide is essential

**Ask** 

How a weedicide act on the weed and control the weed.

**Give the answer**

Weedicides interfere with any one or more of the biological activity of a weed plant like photo synthesis, or respiration or synthesis of fat/protein/ vitamins or cell division or germination or tissue development.

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**Do** 

Conduct a demonstration in the class

- Show various types of sprayer for spraying weedicide.
- Knapsack spray
- Power sprayer
- ULV Sprayer

Ask the class on what basis the sprayers have been named differently.

- Tell them it is based on the volume of liquid used for spraying.





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# 5. Harvest and Thresh The Seed Crop

Unit 5.1 - Recep

Unit 5.2 - Harvesting and Threshing the Seed Crop

Unit 5.3 - Methods of Harvesting

Unit 5.4 - Threshing and Cleaning of Seed

Unit 5.5 - Cleaning of Threshing Seed



AGR/N7104

## Key Learning Outcomes

**After completing this session the trainees will be able to:**

- Decide the time schedule to harvest the seed crop grown by you
- Discuss about the advantage of using of a cemented threshing floor to avoid admixture.
- Identify the proper method of harvesting to be done for your crop based on the area planted.
- Demonstrate the skill required for raising a hybrid seed production to fellow farmers by attending harvesting of male and seed parent seed separately

## UNIT 5.1: Recap

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Recap the learning of the previous module grow and “Manage seed crop”

### Do

- Do a recap by putting questions on various aspects of “Grow and manage seed
- Divide the participants in to 3 groups and ask question. If the answer is not correct pass on the question to next group.

#### Questions may be

As what are the major factors which decide the type of sowing?.

b) List out two or 3 important factors which affect the seed quality.

c) What are the basic principles involved in fixing the crop stage for field inspection?

d) What is an objectionable weed? Why it is called so?

e) Why the presence of certain seed borne diseases leads to rejection of the pre seed crop?.

f) List out various methods of pest control

g) What is an IPM. What are the components? Why it is considered as more environment friendly?



## UNIT 5.2: Harvesting and Threshing the Seed Crop

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Know when the crop has to be harvested.
- Decide the method of harvesting to be done.
- The difference in harvesting procedure between a variety and a hybrid seed crop.

### Say

**Seed crop has to be harvested when the crop attains proper maturity**

- The seeds should be neither over dried or have high moisture at the time of harvesting.
- Harvesting should be done either when the crops attain physiological maturity or when it attains harvesting maturity.

**Harvesting methods**

Selection of a proper harvesting method is an essential step to ensure quality and reduce harvesting loss.

Harvesting method depends on

- Nature of crop
- Area of crop to be harvested
- Class of seed to be harvested.
- Nature of crop. For crops like paddy harvesting is done by either manually or by mechanically.
- For crops like maize, the cobs are manually harvested by hand picking
- Area of crop to be harvested
- If the area to be harvested is smaller, manually harvested.
- If the area is larger mechanical harvesting is adopted.
- Class of the seed to be harvested
- Breeder seed – normally harvested manually due to less area and to ensure quality.
- Foundation and certified seed which is normally grown on large area – mechanical harvesting done.



## UNIT 5.3: Methods of Harvesting

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Manual harvesting
- Mechanical harvesting

### Say

#### Manual harvesting

- is adopted for less area
- Time consuming
- Labour intensive
- Less loss and therefore higher yield.

#### Mechanical Harvesting

- When the area to be harvested is more, machine is used for harvesting.
- The harvest machine is called – combine harvester.

Explain the operations step wise carried out by combine.

- Combines cut the plant at a appropriate height along with the ear head and
- Separates the grain from the stalk.
- Clean it from chaff
- Lift the grain to the storage bin.
- Combine harvester is used for harvesting large area.
- Time saving
- Save labour expenditure
- However there is a possibility of shattering loss
- Yield will be reduced and possibility of admixture if the combine is not cleaned properly.



## UNIT 5.4: Threshing and cleaning of seed

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Understand about various methods of threshing and cleaning.
- Choose the right method of threshing for the production organized.

### Say

- Separating the seed / grain from the ear head is threshing
- Threshing is done either immediately after harvesting or at a later stage when the moisture content of the seed is reduced to optimum for threshing.

#### Methods of threshing

- Manual threshing
- Threshing by machine

#### Manual threshing

- Adopted when the quantity of crop to be threshed is less and can be used for breeder seed crop threshing.
- There are different hand threshing methods
- Beating the harvested crop as small bundle or the floor
- Spread the harvested crop or the floor beat with wooden pallet.
- Separating the seed by spreading the produce and running the tractor over the produce of pad thresher – with circular roller stone drawn by bullocks.
- Manual threshing
- is time consuming
- Will help to extract seed without to threshing loss.

#### Mechanical threshing

- Adopted for fast threshing
- Will help to cover more area in a given time
- Mechanical threshers are used.
- Type -of threshers depends on the nature of crop.
- Used mostly for threshing of paddy, wheat, and pulses.

**Do**

- Take the trainees to any agro -centre and show various threshers.
- Name few threshers.
- Threshing of crop like ground nut by roller thresher drawn by bullocks.

**Explain**

- Threshing is practiced only for seed which are dry.
- But seeds in the fruits inside the edible portion is called extraction.
- Various methods of extraction.
- Scooping the seed with pulp
- Ferment the scooped seed
- Separate the seed by mixing with acid
- Extract the seed from dry fruit.
- Dried fruits are threshed using mechanical thresher or by beating manually.

**Do**

Prepare a chart with 2 columns as below and ask the students to match the content in 1<sup>st</sup> column with content in 2nd columns given as below.

- |  |                                  |
|--|----------------------------------|
| 1) Wheat seed crop grown over 50 ha land | (a) Seed Thresher                |
| 2) Breeder seed plot of wheat            | (b) Scooping and Fermenting      |
| 3) Harvesting of chilies                 | (c) Combine harvester            |
| 4) Threshing of tomato                   | (d) manual threshing             |
| 5) Ground seed threshing                 | (e) beating with wooden pallets. |

Verify the answer as below

1-c, 2-d, 3-e, 4-b, 5-a.

**Notes for Facilitation**

- Arrange to show the prototype model of various threshers.

**Drying**

At the end of this session, the trainees will be able to understand that drying is done.

- To maintain the longevity of the seed during storage.
- To minimize attack by the insects during storage.
- To keep the germination and vigour of the seed intact.

**Say** 

Drying is required when the seed is harvested with higher seed moisture

Physiological maturity denotes no further growth but the seed at this stage will have more moisture.

Drying of seeds which is harvested at the physiological maturity stage is a must. Otherwise allow the seed to dry and attain safe moisture level in the plant itself. However this may lead to shattering loss. Drying is done to avoid the seed getting spoiled after separation from the mother plant. Each kind of seed has a safe moisture level.

Explain the ill effect of high seed moisture

- If the moisture content is little higher than safe moisture level.
- Lead to mould / fungal growth if more higher
- Causes heating of seed due to high respiration and increase microbial activity if the moisture much more higher
- Seed may start germinating, sprouting (vivipary)

**Do** 

Bring 4 seed samples of same crop seed are with safer seed moisture and the other three with increased seed moisture

(ex)	Paddy	
	1 <sup>st</sup> sample	12%
	2 <sup>nd</sup> sample	>12 to 14%
	3 <sup>rd</sup> sample	>14 –18%
	4 <sup>th</sup> sample	>18 –up to 30%

keep the sample for 4-5 days and observe.

- Ask the students to observe the change & record.
- Harvest to dry the seed (Methods of drying)

## Say

### Seeds are dried by 2 methods

- Natural drying
- Artificial Drying

### Explain Natural drying

- Drying the seed under natural condition – sun drying

### Useful for seeds of smaller lots

- For seed with moderately less initial moisture
- Can be done only in area / region where the sun shining is proper – (tropical area)
- But can't be used during rainy season.
- Drying process is slow and can't be used for bigger seed lot mechanical admixture is drying year – a risk.

### Artificial drying

Explain uses artificially generated hot air

- To reduce the seed moisture.
- Heated air is used.
- Involves two major steps
- Generating air and blowing the same run a heater to heat the air meant for drying.
- A systematic procedure based on the calculation of the temperature of the hot air and the quantity (e.g. size of seed material to be dried) is to be adopted.
- Seed driers are of the following five types of Bag drier
- Seed is kept in bag particularly in gunny bag and the hot air blown over, the bag.
- drying bed is only one sack deep, Cheap and easy

### Box drier

- Instead of bag, box with perforated bottom is used.
- Boxes are kept on the drier and dried one by one.

### Bin Drier

- Bins with perforated floor widely used. Some time multiple bins used.
- Continuous drier.
- When the quantity to be dried is more continuous drier is used.



## UNIT 5.5: Cleaning of Threshing Seed

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- To decide the method of seed cleaning to be used and to decide
- Whether pre conditioning of the seed is required before cleaning.

### Say

- Cleaning refers to separation of physical impurities like trash, weed seed, broken seed, mud particles etc.
- There are various methods of cleaning as pre cleaning (b) basic cleaning (c) up grades. the raw.
- Some time the raw seeds conditioning before cleaning – called pre conditioning or pre cleaning
- Pre-cleaning – done by scalp (having single sieve) or rough cleaner (multiple sieves)

### Explain

- Scalper/ rough cleaner – Remove only large trash
- Huller Scarifier – Removes large trash
- Debearder – Rubbing the seed to make it smooth
- pebble mill – Remove cob webby hairs

### Say

**Basic cleaning**

- Basic cleaning refers to actual cleaning and grading
- Unlike pre cleaning, basic cleaning is a must in seed cleaning.
- Done by using an air screen machine called “Air screen cleaner”
- Explain Basic principles of air screen cleaner based on the difference in the seed size and weight. Some time shape also

**How a cleaning machine work?**

Aspiration – removes chaffy material from good seed through aspiration  
 Scalping – seeds are dropped through sieves but larger trash, clod etc are carried over.

Grading – Good seed moves over sieve and smaller particles like broken

Seed, under size and shriveled seed are dropped

- Sieves are other wise called screens
- Various types of screens
- Oblong holes
- Round holes
- Triangular hole
- Wire mesh

Give examples of seed used for above sieves

**Upgrading**

- Not necessary in all cases
- Upgrading done in certain cases by the removal of specific contaminants or by precise size grading

The upgrading operation depends on the type of contaminants.

Various important equipments used for upgrading are

- Disc separators
- Cylinder Separators
- Gravity separators
- Spiral separators
- Magnetic separators
- Vibrator separators

**Ask**

- Ask the trainees to explain the procedure for cleaning the seeds scooped out from the fruits with flesh like tomato.







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## 6. Post-Harvest Management of Seeds

Unit 6.1 - Recept

Unit 6.2 - Storage of Seed Starts

Unit 6.3 - Stacking of the Seeds

Unit 6.4 - Factor Affecting the Quality of Stored Seed

Unit 6.5 - Measure For Maintaining Seed Store



AGR/N7105

## Key Learning Outcomes

After completing this session the trainees will be able to:

- Decide the optimum crop condition for harvesting the crop for a safe storage of seed.
- Discuss about the role of moisture in stage of seed and the precautions to be taken to avoid such loss.
- Identify the right storage method for any seed based on the importance of the seed and its value irrespective of the class of seed.
- Able to design your seed godown keeping in mind the factors which affect the seed quality and the environmental condition in the production area.
- Identify the ill effect of over staking of the seed bags and follow the optimum level of stacking based on nature of seed and quality of bags.



## UNIT 6.2: Storage of Seed Starts

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Understand about various storage methods
- Select the right system for storage of seed depending up on the quantity of seed to be stored It an to maintain a storage place.

### Say

Good storage is the basic requirement of maintaining viability and vigour of a seed.

#### Storage of seed starts

Even when it is on the plan when it is physiologically matured

From the time of harvest to processing and storage in a seed godown

In storage (ware house)

During transit

In the seed sale part and in the farm where it is sown.

At each of the above stages care should be taken to keep the seed free from any spoilage.

There are 2 types of seed storage

- Conventional godown
- Air conditioned godown

### Do

- Recall the pre requisites for the seed to be stored safely
- should be free from any foreign material
- Should have safe moisture level
- Packed properly in a suitable packing material

## Say

Conventional storage godowns are used for commercial storing of seed

Air conditioned godown are used mostly for storage of high value seeds like hybrid seeds, used by the research institution to store breeder seed or any other research variety seeds.

### Basic requirements of a storage godown

- Dry and cool condition
- Protection from pest damage
- Dry the seed to safe moisture before storage
- Sanitation of the seed before storage
- Storing only well cleaned seed.

## Explain

- Conventional storage
- Site selection very much important
- Should not have high humidity
- Provide proper ventilation
- Insulation of the ceiling using exhaust fans
- Storage structure should be properly cleaned and disinfected
- An ideal storage facility should satisfy the following requirements.
- Should provide maximum protection from ground moisture, rain, insects, moulds, rodents, birds
- Easy access for inspection, disinfection, loading, unloading, cleaning and reconditioning
- Should protect grain from excessive moisture, and temperature
- Should be economical

## Say

Seeds are stored by two ways

- Bulk storage – temporary and mostly for bulk seed for short time.
- Bag storage – Commonly used
- (explain the merits and demerits of both the methods)
- List out some of the conventional storage structures
- Discuss the merits and demerits and these structure.
- Some improved rural level storage structures have been developed for seed storage.

### Bituman / Coal tartins

- Nagpur bins
- Udhaypur bins
- Bamboo bins
- Pusa bin

### Pusa Cubicles

- The above structures are used for storing a limited quantity of seed meant for next sowing
- Metal bins of smaller capacity are also used for storage of seed.
- Air conditioned stores/ Refrigeration
- Air temperature controlled stores are used for breeder seed or any high value or research seed
- Meant for storing the seed for a long time.
- Temperature is maintained as per requirement.
- In case of seed herbarium maintenance the temperature is maintained at as low as  $-200^{\circ}\text{C}$

## Do

Take the trainees to a seed store maintained by a reputed seed company and discuss about the location, quality of the building, ventilation, sanitation etc.



## UNIT 6.3: Stacking of the seeds

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Understand How to stack the seed in a storage godown.
- Precaution to be taken to avoid moisture penetration into the seed sack
- The optimum height of stacking the seed.

### Say

- Stacking the seed to a proper height is as important as any other operation.
- Higher stacking may lead to cracking of the seed bags and subsequent spoilage.
- Type of packing material and size of packing decides the stacking method:
- Seed should be stacked in a proper storage godown.

### Ask

Ask the trainees to list out the type of packing material used.

- Probable answer will be gunny bags (Jute bags)
  - Polyethylene bags
  - Tins
  - If you don't get a full response. Tell them the various types of packing material such as jute, cloth and paper bags – moisture permeable
- b) Polythene bags of smaller gauge, laminated, Jute bags, HDPE woven bags
- which are moisture vapour resistant
  - Tin container, polythene bags of higher gauge, aluminium foil which are moisture vapour – proof.
  - Aluminum pouches – highly vapour proof.

**Explain**

After giving an idea about the packing material, explain the relation between stacking height and nature of packing material.

**Stacking**

- Normally done up to 15-20 layers
- (used for gunny (Jute bags) cloth bags which are not slippery)
- For HDPE woven sacs which are slippery it should be not more than 12 layer.
- for sensitive seeds like soyabean, irrespective of nature of packing material, stacking should not be more than 8-10 layers.

**Other consideration**

- Stacking height should be such that allow easy spraying, inspection, sampling seed
- should not be stacked in area where relative humidity is high.
- Should not be stacked on the ground / floor as it may lead to movement of moisture from the floor to seed bags.
- Pellets (wooden, plastic on iron) should be used.

**Do**

- Organize a field visit to a seed godown new by and show the stacking done in the store.
- Explain the scientific aspect of the stacking.

**Notes for Facilitation**

- Prepare a chart giving the names of various packing material and the level of seed moisture for the seed to be stored in each type of material.
- Arrange various type of pallets used.

**Notes**



A large rectangular area containing numerous horizontal lines for writing notes.

## UNIT 6.4: Factor Affecting The Quality of Stored Seed

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Understand about various factors which affect the seed during storage.

### Say

There are a number of factors which affect the quality of the stored seed.

- Physical condition of the stored seed
- Seed moisture
- Storage temperature
- Storage atmospheric humidity
- Insects and pests.

**Storage structure**

- Packing material used, packing method and size of packing storage micro organisms like fungi

### Do

Prepare 3 types of chits each having 4 characters one for various seeds with moisture content, 2nd for various packing material and the 3rd for suggested storage place. Divide the trainees into 3 groups and ask them display the chits on a blackboard.

The black board should have 3 columns as below.

Type of seed	Type of	Suggested
With moisture	Packing Material	STORAGE Place/ method

## Ask

- Ask the group having the seed type to place the chit in the first column.
- Instruct the group having the type of packing material against each seed in the 2nd column. Finally ask the 3rd group to fix for corresponding storage method in the 3rd column.
- For every correct answer allot 10 points.
- Announce the marks at the end the exercise.

### Answer

Type of seed	Type of packing material	Suggested storage method
Paddy	Gunny / Jutje bags	Normal storage godown
maize	Poly thene bags	Air condition godown
Chillis with % moisture	Aluminium packets	Refrigerated store

Explain various factors which affect quality of seed.

### Physical condition of seed

Maintaining germination and vigour is the main aim of a good storage mechanically injured seed leads to faster viability loss / deterioration. Mechanical damage acts as a port for the entry of pests and disease causing organisms and affects the seed.

Contaminants like trash, insect eggs, smut balls etc also affect storability.

### Seed moisture

A crucial factor which affect the seed quality in storage.

Higher seed moisture attracts severe incidence of insects and storage fungi

High moisture induces healing and germination

Also enhances fungal and insect activity leading to deterioration

over dried seeds are susceptible to mechanical injury.

### Storage temperature

- Another crucial factor to decide the stored seed life.
- Higher temperature increase the activities of insects and microbes leading to heat development
- Increase in the temperature in turn enhances biological activity of the seed as well as insects and fungi.
- The increase in the biological activity increases moisture content in the atmosphere increase the relative humidity.
- All the above activities compliments each other leading to faster seed spoilage.

### Relative humidity:

- Higher relative humidity leads to
- increase in Seed moisture
- Activates insects and pest
- Increases absorption of moisture from the atmosphere which will lead to faster seed deterioration.

**Formation of caking**

Storage fungi like *Aspergillus* and *penicillium* attack the seed faster at high humidity.

**Insect's pest and fungi**

Under favourable condition insect physically damage seed by boring, eating away the seed portion

Some time affect embryo.

Various fungi which affect stored seed also infest the seed and convert the nutrients into fungal structure and cause depletion of nutrients.

Leadsto loss of germination.

**Storage structure**

- Place of storage should be proper.
- To be located at higher place
- should not have any water bodies around
- must be constructed in a proper way
- should have proper ventilation
- should have well cemented floor which will not allow the ground moisture to move into the seed packs.
- In case the storage structure does not conform to any of the above, seed will be spoiled.
- Packing material and packing size
- Packing material should be clean and free from any contaminants.
- if the packing material is vapour resistant, packing seed with high moisture using this material will kill the seed/embryo.
- Packing material which allow exchange of water vapour should not be used if the seed store is located in a high humid area.

**Notes for Facilitation**

- Arrange to show samples of seed affected by insect and micro organism,
- show specimens of various packing material
- Arrange a visit to a seed godown having all provisions for a scientific seed storage.
- Measures for maintaining seed stores.



## UNIT 6.5: Measure For Maintaining Seed Store

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Practice various measures which will avoid seed spoilage in the store and maintain its quality.

### Say

Having known the factors which affect the seed quality in storage, various measures to control such loss should be taken

Ensure quality of the seed to be stored.

Moisture content of the seeds should be brought to safe limit

- Seed should be dried at optimum temperature to avoid over drying or higher seed moisture content
- Storage temperature has to be maintained
- relative humidity should be regulated by cross ventilation
- maintaining safe seed moisture and storage temperature
- Storage godown should be kept clean
- Clean and fresh packing material should be used for packing.
- Seed should be treated where ever required to avoid contamination.
- Wooden crates or plastic or iron pallets should be used to keep the seed bags.
- Appropriate stacking height should be maintained to avoid seed viability loss due to overweight at the bottom layers.
- Periodic / regular spraying / fumigation of the seeds should be done.
- Periodic inspection of the seed lots to confirm the quality physically should be done.

### Ask

- Ask the students to list all the basic requirements of any site selected for seed godown construction.
- Discuss about the inter relationship between seed moisture, storage temperature, relative humidity and storage pest activity in a seed store.





## Key Learning Outcomes

**After completing this session the trainees will be able to:**

- Identify the more safe methods of application of pesticide or fungicide to seed
- Identify risk involved in use of inappropriate dosage of pesticides to the environment & human being
- Decide yourself the time schedule to be adopted for spraying of chemical in the store place or in the field level.
- Identify your own ways to minimize the risk of based on your experience.
- The precautionary measures to be taken in advance and keep in place the materials required for attending and emergency position.

## UNIT 7.1: Recap

### Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Recall whatever learned about module – '6',

### Do

- Ask the trainees to list out factors which affect the quality of stored seed and suggest remedial measures.
- Show chart giving details of storage structure – possible merits and demerit separately and ask them to match.

	Storage structure	Merits /demerits
1.	Mud and earthen structure	a) Capacity vary, can be used for various types of seed
2.	Wooden structures	b) conventional method, less life span, insect damage, weight loss may occur
3.	Metal corrugated G.I sheet	c) neither air tight nor moisture proof

Answer

1 – b

2 – c

3 – a

Ask them to explain how they matched.



## UNIT 7.2: Safety in Handling Chemicals and Equipments

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Understand various safety measures to be adopted while handling various machineries / equipments and chemicals in seed harvesting, processing, packing, stacking / storage.

### Say

Various chemicals are used for control of insect pest, diseases and storage fungi in the field or in the seed godown.

- Certain procedure/ precaution need to be taken to handle the equipments.
- Read the operator safety manual and follow the instructions.
- Use appropriate uniform to protect the body from damage
- Don't use alcohol or chew any eatables while handling the equipments
- Always check the equipment before commencing the work and make adjustment / repairs etc if needed.
- keep the children away from the machine at all the time.
- Train the workers about handling the equipment.

### Do

- Explain the difference between an equipment and a machine.
- Select few equipments like sprayer, theater (used to mix the chemical) and tell about the risk involved in using them.
- Read the safety manual to the trainees and explain its applicability while handling the equipment



## UNIT 7.3: Safety in Handling Processing Plant Machinery and Storage place / godown

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Understand various safety measures to be adopted while handling various machineries / equipments and chemicals in seed harvesting, processing, packing, stacking / storage.

### Say

Various chemicals like fungicides and pest are used

- To treat the seed before storage (give example)
- To disinfect the storage place before storage the seed
- To control incidence of storage insects and moulds on the seed stored by taking regular spraying
- For the control of rodents etc.

### Explain

The situation in handling a chemical is quite different from that of a machine or equipment

- Chemicals have a specific shelf life
- So tell them it should be used before expiry of shelf life
- Instruction given in the pamphlets should be read carefully
- Avoid using higher dosage of chemical
- Will be toxic to the seed as well as human being if higher dosage is used

Mix the chemical as per instruction to any other chemical or water or vice versa to avoid violent chemical reaction.

#### Use mask

- No drinking of water or eating food or chewing tobacco during handling of the chemicals.

#### Use gloves

- Left over chemical and container should be disposed off carefully.
- Keep the chemicals locked and away from the reach of children
- While attending seed treatment either dry or wet, mix the seed thoroughly and do not use hand for mixing
- Use only recommended number / quantity of fumigants like celphost tablets to avoid phyto toxicity
- the area fumigated should be airtight to avoid leakage of toxic fumes.
- Ventilate the area after fumigation significantly to remove the toxic fume from the godown



## UNIT 7.4: Basic Emergency First Aid Procedure

### Unit Objectives

**After Completing This Session The Trainees Will Be Able To:**

- Understand about various safety procedure to be adopted while handling the processing machinery and storage place will be able to decide which measure has to be adopted and when.
- Understand various first aid procedure to be adopted in the work place (eg. seed production plot, processing plant, storage godown etc) and use the appropriate procedure during any emergency.

### Say

Various machinery like combines, scalpers, air screen cleaner, separators like specific gravity separator are used in seed processing.

There are possibilities of more risk while handling these machine and therefore has to maintain safety.

Use appropriate dress /Uniform code other wise loose dress may get into the machine leading to serious injury

- Always keep a distance from the machine.
- Make a trial run before starting the work and then proceed.
- Check whether the emergency switch is in condition.
- Provide barrier like wire mesh in the spots where the machine parts like belt, conveyor, wheels etc are rotating.

**Use mask to avoid dust inhalation.**

Use goggles while treating the seed in a mechanical treater like slurry treater with chemicals.

In any industry emergent situation arise due to various risk factor.

- Seed production/seed industry is no exception to the problem.
- Emergent situation arises due to
- Use of chemicals in the field or processing plant, for seed treatment or in the store.
- Handling of various equipments and machinery during seed production harvesting, cleaning, packing, storage etc.
- Various basic and first aid procedure to be adopted to handle above situation.





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## 8. Annexures

Annexure I: Training Delivery Plan

Annexure II: Assessment Criteria



AGR/N9903

## Annexure I

### Training Delivery Plan

Training Delivery Plan			
Program Name:	Certificate Course in Quality Seed Grower		
Qualification Pack Name & Ref. ID	Quality Seed Grower AGR/QN7101, AGR/N7102, AGR/N7103, AGR/N7104, AGR/N7105, AGR/N9903,,		
Version No.	1.0	Version Update Date	07-04-16
Pre-requisites to Training (if any)	No entry level barrier; 5th Standard Passed preferable One year prior experience in field (crop) operations		
Training Outcomes	<p>By the end of this program, the participants would have achieved the following competencies:</p> <ul style="list-style-type: none"> <li>• <b>Produce Quality Seeds:</b> General introduction to Seed Industry, Optimum conditions required for the production of breeder seed, foundation seed, and certified seed.</li> <li>• <b>Grow and manage crop:</b> Inputs requirement, Preparation of field, sowing, boarder crops, pollination process, quality management, crop management</li> <li>• <b>Maintain the quality of the produce (as prescribed in standards):</b> Time of Harvesting, Moisture level of the produce, method of drying, packing.</li> <li>• <b>Become well versed with Environment Health &amp; Safety:</b> Well versed with health and safety measures in terms of personal safety and others as well.</li> </ul>		

Sl. No	Module Name	Session Name	Session Objectives	NOS Reference	Methodology	Training Tools/Aids	Duration
1	Introduction	Ice Breaker	Get to know the participants	Bridge NOS	Activity	Interactive Games	30 Minutes
2	Introduction	Introduction to PMKVY & to ASCI	Introduction to course and expectation setting	Bridge NOS	Trainer Led - Information sharing, Q&A	PPT, Classroom Projector, Audio Visual Aids	30 Min
3	Introduction	Job Role Awareness	Create awareness about the role of Quality Seed Grower in the Agriculture Sector	Bridge NOS	Trainer Led - Information sharing, Q&A	PPT, Classroom Projector, Audio Visual Aids	1 Hour
4	Introduction	Reading Exercise	Develop candidates reading skills	Bridge NOS	Group Participation	Classroom, handouts to read	30 Minutes
5	Introduction	Communication Skills	Increase Conversational skills	Bridge NOS	Group Participation	Classroom	1 hour
6	Introduction	Quality Seed Grower	What is Seed Production? Types?	Bridge NOS	Trainer Led - Information sharing, Q&A	PPT, Classroom Projector, Audio Visual Aids	1 Hour 30 min

7	Collection of information and resources for seed production	Understand work requirements	<ul style="list-style-type: none"> <li>- Receiving the instructions and work requirements from company's field supervisor</li> <li>- Understanding standard practices and methods for quality seed growing</li> <li>- Understanding the methods of using tools, equipments and personal protective gears for seed growing</li> <li>- Understanding the standard precautions to be taken for quality seed growing</li> <li>- Understanding the quality parameters on which seed crop will be evaluated and payment will be made to the seed grower</li> <li>- Signing a contract with the seed processor to produce seeds of predetermined quality and standard</li> </ul>	AGR/N710 1	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	5 hour
8	Collection of information and resources for seed production	Identify and receive required resources	<ul style="list-style-type: none"> <li>- Identify for breeder / foundation seeds, fertilizers, tools, equipments, personal protective gears, containers for collecting soil samples for testing and work instructions</li> <li>- Receiving all the resources from the field supervisor</li> <li>- Documentation of the materials received as per company's work instructions</li> </ul>	AGR/N710 1	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	8 hour
9	Collection of information and resources for seed production	Store the received material	<ul style="list-style-type: none"> <li>- segregate the received material as per the work instructions</li> <li>- Unpack the material as per the requirement</li> <li>- Follow the standard precautions for handling the material like seed, fertilizers etc.</li> <li>- Storing them as per instruction</li> </ul>	AGR/N710 1	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	8 hour
10	Collection of information and resources for seed production	Achieve productivity	<ul style="list-style-type: none"> <li>- Getting complete understanding of producing the quality seeds as per</li> </ul>	AGR/N710 1	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	9 hour

11	Prepare field and sow seeds	Take soil sample for lab testing	<ul style="list-style-type: none"> <li>- Taking multiple soil samples of the field from different parts as per instructions</li> <li>- Pack and label the soil samples and send them for lab testing to the company</li> <li>- Document as per the company's instructions</li> </ul>	AGR/N710 2	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	8 hour
12	Prepare field and sow seeds	Prepare field for sowing	<ul style="list-style-type: none"> <li>- Carefully clean and plough the land as per instructions of the company</li> <li>- Receiving the soil testing report from the company along with their recommendations for preparing the soil</li> <li>- Using right kind and quantity of fertilizer(s) to improve the soil fertility as recommended by the company</li> <li>- Preparing the field as per company's instructions</li> <li>- Getting the field inspected by the field supervisor</li> </ul>	AGR/N710 2	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	10 hour
13	Prepare field and sow seeds	Sow seed crop	<ul style="list-style-type: none"> <li>- Receiving instructions from the field supervisor regarding timing of sowing seeds based on the local climatic conditions</li> <li>- Sowing the seed crop with the method suggested by the field supervisor depending on soil, topography and climatic conditions</li> <li>- Sowing seeds in rows keeping appropriate distance as per the work instructions</li> </ul>	AGR/N710 2	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	10 hour
14	Prepare field and sow seeds	Achieve productivity and quality standards	<ul style="list-style-type: none"> <li>- Prepare and plough the field so that the best possible seed bed is prepared</li> <li>- Ensure preparation of field about 2 weeks before sowing so that weed seed in the soil could germinate to form small weed plants which could be removed from the field</li> </ul>	AGR/N710 2	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	7 hour

			<ul style="list-style-type: none"> <li>• Harrow and cultivate the field to destroy young weed plants</li> <li>• Eliminate weed plants which would otherwise grow in with the seed crop</li> <li>• Sowing of seed crop with optimum rate (quantity) in a given piece of land, so that it gives high yield</li> <li>• Ensure proper documentation as per the company's SOP</li> </ul>				
15	Grow and manage seed crop	Apply fertilizer(s)	<ul style="list-style-type: none"> <li>- Get the seed crop inspected by the field supervisor</li> <li>- Receive instructions from the field supervisor regarding use of organic and inorganic fertilizers including farm yard manure</li> <li>- Apply organic and inorganic fertilizer in correct dosages on seed crop as advised by the field supervisor</li> </ul>	AGR/N7 10 3	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	8 hour
16	Grow and manage seed crop	Undertake weed control	<ul style="list-style-type: none"> <li>- Identify the types of weeds in the crop</li> <li>- Identify field patches infested with troublesome weeds which interfere with crops</li> <li>- Perform manual removal of weeds regularly while they are small</li> <li>- Apply bio-herbicides, weedicides and chemicals as advised by the field supervisor in prescribed quantity to control and remove weeds</li> <li>- Maintain records as per instructions</li> </ul>	AGR/N7 10 3	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	10 hour
17	Grow and manage seed crop	Inspect and diagnose problems related to seed crop	<ul style="list-style-type: none"> <li>- Inspect and diagnose early signs and symptoms of seed crop damage</li> <li>- Identify the extent of crop damage due to pests, insects and disease if any</li> <li>- Notify any damage to the crops to field supervisor</li> <li>- Apply chemical(s) on seed crop suggested by the field supervisor to make it disease free</li> <li>- Maintain records as per the work instructions</li> </ul>	AGR/N7 10 3	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	10 hour

18	Grow and manage seed crop	Irrigate seed crop optimally	<ul style="list-style-type: none"> <li>- Inspect seed crop regularly and identify the time of irrigation</li> <li>- Check availability of irrigation channels in the field</li> <li>- Incorporate appropriate micro-irrigation techniques (such as drip irrigation) using appropriate equipments</li> <li>- Apply smaller amounts of water more often to maintain the optimum soil moisture in the field</li> <li>- Ensure proper water drainage</li> <li>- Maintain records as per the work</li> </ul>	AGR/N7103	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	7 hour
19	Grow and manage seed crop	Achieve productivity and quality standards	<ul style="list-style-type: none"> <li>- Ensure daily regular walking back and forth through a field to timely identify</li> <li>- Ensure appropriate and uniform application of fertilizers in prescribed doses</li> <li>- Ensure pulling out weeds without damaging the crop plants</li> <li>- Maintain uniform moisture in the soil</li> <li>- Ensure proper water drainage</li> <li>- Ensure proper documentation as per the company's SOP</li> </ul>	AGR/N7103	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	5 hour
20	Harvest and thresh the seed crop	Reap seed crop at maturity	<ul style="list-style-type: none"> <li>- Ascertain that crop has matured for harvest</li> <li>- Get the seed crop inspected by the field supervisor</li> <li>- Receive instructions from the field supervisor for reaping the seed crop</li> <li>- Reap the crop as per company's set practices and methods</li> <li>- Maintain record as per instructions</li> </ul>	AGR/N7104	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	10 hour
21	Harvest and thresh the seed crop	Thresh seed crop	<ul style="list-style-type: none"> <li>- Select appropriate method for threshing the seed crop as per instructions</li> <li>- Keep the seeds of one type of variety / crop completely separated from the other variety / crop</li> <li>- Ensure proper collection of seeds as per instructions</li> <li>- Maintain record as per instructions</li> </ul>	AGR/N7104	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	15 hour

22	Harvest and thresh the seed crop	Handle threshed seeds	<ul style="list-style-type: none"> <li>- Keep the threshed seeds separate from other seeds</li> <li>- Keep seeds in a way to prevent their contamination with undesirable materials</li> <li>- Put threshed seeds into bags provided by the company and label them as per instructions for easy identification</li> </ul>	AGR/N710 4	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	10 hour
23	Harvest and thresh the seed crop	Achieve productivity and quality standards	<ul style="list-style-type: none"> <li>- Ensure maturity of seeds before harvesting seed crop</li> <li>- Ensure harvesting the seed crop without damaging it</li> <li>- Ensure threshing seed crop effectively without incurring seed loss</li> <li>- Storage of different seed lots separately</li> <li>- Stack bags of one lot are not on top of a different lot</li> <li>- Stacking of bags to any efficient storage height without causing weight or pressure damage to seed at the bottom</li> <li>- Proper upright position of seed bags</li> <li>- Ensure that bags are not dropped-off during handling</li> <li>- Ensure that the storage place is spotlessly clean all the time</li> <li>- Ensure proper documentation as per the company's SOP</li> </ul>	AGR/N710 4	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	5 hour
24	Post harvest management of seeds	Undertake sun-drying of seeds	<ul style="list-style-type: none"> <li>- Identify appropriate time for sun-drying of seeds considering weather conditions and possibility of seed shattering</li> <li>- Select appropriate place for sun-drying the seeds</li> <li>- Open bags, spread seeds and sun-dry them by following procedures, practices and methods suggested in instructions</li> </ul>	AGR/N710 5	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	2 hour

25	Post harvest management of seeds	Undertake cleaning of seeds	<ul style="list-style-type: none"> <li>- Remove dust, debris, trash etc. from dry seeds using graded sieves as per the instructions</li> <li>- Separate lightweight material and empty glumes by gentle winnowing</li> <li>- Spread the seeds on clean and well-lit surface to remove damaged seeds, seeds of different species etc. if any</li> <li>- Put dry and cleaned seeds in bags and label them as per instructions</li> <li>- Send seeds to company for further processing as per the instructions</li> <li>- Maintain the record as per the instructions</li> </ul>	AGR/N710 5	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	25 hour
26	Post harvest management of seeds	Achieve productivity and quality standards	<ul style="list-style-type: none"> <li>- Ensure drying of seeds immediately after threshing them</li> <li>- Ensure seeds are dried up to the optimum level of moisture content in them</li> <li>- Avoid breaking or damaging the seeds during post harvest management of seeds</li> <li>- Ensure proper cleaning of seeds before bagging them</li> <li>- Ensure proper documentation as per the company's SOP</li> </ul>	AGR/N710 5	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	5 hour
27	Maintain health & safety at the work place	Maintain clean and efficient workplace	<ul style="list-style-type: none"> <li>- Undertake basic safety checks before operation of all machinery and vehicles and hazards are reported to the appropriate supervisor.</li> <li>- Work for which protective clothing or equipment is required is identified and the appropriate protective clothing or equipment is used in performing these duties in accordance with workplace policy.</li> <li>- Read and understand the hazards of use and</li> </ul>	AGR/N990 3	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	10 hour

			<ul style="list-style-type: none"> <li>• contamination mentioned on the labels of pesticides/fumigants etc</li> <li>• Assess risks prior to performing manual handling jobs, and work according to currently recommended safe practice.</li> <li>• Use equipment and materials safely and correctly and return the same to designated storage when not in use</li> <li>• Dispose of waste safely and correctly in a designated area</li> <li>• Recognise risks to bystanders and take action to reduce risk associated with jobs in the workplace</li> <li>• Perform your work in a manner which minimizes environmental damage all procedures and work instructions for controlling risk are followed closely. Report any accidents, incidents or problems without delay to an appropriate person and take necessary immediate action to reduce further danger.</li> </ul>				
28	Maintain health & safety at the work place	Render appropriate emergency procedures	<ul style="list-style-type: none"> <li>- Follow procedures for dealing with accidents, fires and emergencies, including communicating location and directions to emergency.</li> <li>- Follow emergency procedures to company standard / workplace requirements</li> <li>- Use emergency equipment in accordance with manufacturers' specifications and workplace requirements</li> <li>- Provide treatment appropriate to the patient's injuries in accordance with recognized first aid techniques</li> <li>- Recover (if practical), clean, inspect/test, refurbish, replace and store the first aid equipment as appropriate</li> <li>- Report details of first aid administered in accordance with workplace procedures.</li> </ul>	AGR/N990 3	Classroom teaching, lectures, field visits, practical	Black Board, Leaflets, practical equipments, charts	10 hour

## Annexure II

### Assessment Criteria

#### CRITERIA FOR ASSESSMENT OF TRAINEES

Assessment Criteria for ASCI- Quality Seed Grower	
Job Role	Quality Seed Grower
Qualification Pack	AGR/Q7101
Sector Skill Council	Agriculture Skill Council of India

S.No.	Guidelines for Assessment
1.	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2.	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3.	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
4.	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria.
5.	To pass the Qualification Pack, every trainee should score a minimum of 70% in aggregate.
6.	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.
7.	The marks are allocated PC wise, however, every NOS will carry a weight age in the total marks allocated to the specific QP.

Assessment Outcome	Assessment Criteria	Total Marks (300)	Marks Allocation		
			Out of	Theory	Skills Practical
1.AGR/N7101 Collect information and resources for seed production	Pc1. receive the instructions and work requirements from company's field supervisor	45	3	1	2
	Pc2. understand standard practices and methods for quality seed growing		4	2	2
	Pc3. understand the methods of using tools, equipments and personal protective gears for seed growing		4	2	2
	Pc4. understand the standard precautions to be taken for quality seed growing		4	2	2
	Pc5. understand the quality parameters on which seed crop will be evaluated and payment will be made to the seed grower		4	2	2

	<p>Pc6. sign a contract with the seed processor to produce seeds of predetermined quality and standard</p> <p>Pc7. indent for breeder / foundation seeds, fertilizers, tools, equipments, personal protective gears, containers for collecting soil samples for testing and work instructions</p> <p>Pc8. receive all the resources from the field supervisor</p> <p>Pc9. document the materials received as per company's working instructions.</p> <p>Pc10. segregate the received material as per the work instructions</p> <p>Pc11. unpack the material as per the requirement</p> <p>PC12. follow the standard precautions for handling the material like seed, fertilizers etc.</p> <p>Pc13. store them as per instructions</p> <p>Pc14. get complete understanding of producing the quality seeds as per predetermined quality and standard</p> <p>Pc15. Identify missing resources or their shortages for producing the seed yield as per the contract</p> <p>Pc16. ensure proper handling and storage of received resources.</p>				
<b>2.AGR/N7102</b>	PC1. take multiple soil samples of the field from different parts as per instructions		4	1	3
Prepare field and sow seeds	PC2. pack and label the soil samples and send them for lab testing to the company		4	1	3
	PC3. document as per the company's instructions		4	1	3
	PC4. carefully dean and plough the land as per instructions of the company		4	1	3
	PC5. receive the soil testing report from the company along with their recommendations for preparing the soil		1	1	0
	PC6. use right kind and quantity of fertilizer(s) to improve the soil fertility as recommended by the company		6	3	3
	PC7. prepare the field as per company's instructions		4	2	2
	PC8. get the field inspected by the field supervisor		2	2	0
	PC9. receive instructions from the field supervisor regarding timing of sowing seeds based on the local climatic conditions		2	2	0
	PC10. sow the seed crop with the method suggested by the field supervisor depending on soil, topography and climatic conditions		2	1	1
	PC11. sow seeds in rows keeping appropriate distance as per the work instructions		2	1	1
	PC12. prepare and plough the field so that the best possible seed bed is prepared		2	1	1

	PC13. ensure preparation of field about 2 weeks before sowing so that weed seed in the soil could germinate to form small weed plants which could be removed from the field		2	2	0
	PC14. harrow and cultivate the field to destroy young weed plants		3	3	0
	PC15. eliminate weed plants which would otherwise grow in with the seed crop		2	1	1
	PC16. sowing of seed crop with optimum rate (quantity) in a given piece of land, so that it gives high yield		2	1	1
	PC17. ensure proper documentation as per the company's SOP	50	4	1	3
			50	25	25
<b>3.AGR/N7103</b> Grow and manage seed crop	PC1. get the seed crop inspected by the field supervisor		2	1	1
	PC2. receive instructions from the field supervisor regarding use of organic and inorganic fertilizers including farm yard manure		2	1	1
	PC3. apply organic and inorganic fertilizer in correct dosages on seed crop as advised by the field supervisor	75	4	2	2
	PC4. identify the types of weeds in the crop		4	2	2
	PC5. identify field patches infested with troublesome weeds which interfere with crops		2	1	1
	PC6. perform manual removal of weeds regularly while they are small		2	1	1
	PC7. apply bio-herbicides, weedicides and chemicals as advised by the field supervisor in prescribed quantity to control and remove weeds		4	2	2
	PC8. maintain records as per instructions		4	2	2
	PC9. inspect and diagnose early signs and symptoms of seed crop damage		4	2	2
	PC10. identify the extent of crop damage due to pests, insects and disease if any		3	1	2
	PC11. notify any damage to the crops to field supervisor		2	1	1
	PC12. apply chemical(s) on seed crop suggested by the field supervisor to make it disease free		4	2	2
	PC13. maintain records as per the work instructions		4	2	2
	PC14. inspect seed crop regularly and identify the time of irrigation		3	1	2
	PC15. check availability of irrigation channels in the field		2	1	1
	PC16. incorporate appropriate micro-irrigation techniques (such as drip irrigation) using appropriate equipments		2	1	1
	PC17. apply smaller amounts of water more often to maintain the optimum soil moisture in the field		2	1	1
	PC18. ensure proper water drainage		2	1	1
	PC19. maintain records as per the work instructions		4	2	2
	PC20. ensure daily regular walking back and forth through a field to timely identify problems related to seed crop		3	1	2
	PC21. ensure appropriate and uniform application of fertilizers in prescribed doses		3	2	1
	PC22. ensure pulling out weeds without damaging the crop plants		3	1	2
	PC23. maintain uniform moisture in the soil		3	1	2
	PC24. ensure proper water drainage		3	1	2
	PC25. ensure proper documentation as per the company's SOP		4	2	2
			75	35	40

4. AGR/N7104 Harvest and thresh the seed crop	PC1. ascertain that crop has matured for harvest	45	3	1	2
	PC2. get the seed crop inspected by the field supervisor		2	1	1
	PC3. receive instructions from the field supervisor for reaping the seed crop		2	2	0
	PC4. reap the crop as per company's set practices and methods		4	2	2
	PC5. maintain record as per instructions		3	1	2
	PC6. select appropriate method for threshing the seed crop as per instructions		2	1	1
	PC7. keep the seeds of one type of variety / crop completely separated from the other variety / crop		3	1	2
	PC8. ensure proper collection of seeds as per instructions		3	1	2
	PC9. maintain record as per instructions		3	0	3
	PC10. keep the threshed seeds separate from other seeds	45	2	2	0
	PC11. keep seeds in a way to prevent their contamination with undesirable materials		3	1	2
	PC12. put threshed seeds into bags provided by the company and label them as per instructions for easy identification		2	1	1
	PC13. ensure maturity of seeds before harvesting seed crop		1	1	0
	PC14. ensure harvesting the seed crop without damaging it		1	1	0
	PC15. ensure threshing seed crop effectively without incurring seed loss		1	1	0
	PC16. ensure storage of different seed lots separately		1	1	0
	PC17. ensure that stack bags of one lot are not on top of a different lot		1	1	0
	PC18. ensure stacking of bags to any efficient storage height without causing weight or pressure damage to seed at the bottom		1	1	0
	PC19. ensure proper upright position of seed bags		1	1	0
	PC20. ensure that bags are not dropped-off during handling		1	1	0
	PC21. ensure that the storage place is spotlessly clean all the time		1	1	0
	PC22. ensure proper documentation as per the company's SOP		4	2	2
		45	25	20	
5. AGR/N7105 Post-harvest management of seeds	PC1. identify appropriate time for sun-drying of seeds considering weather conditions and possibility of seed shattering	60	2	2	0
	PC2. select appropriate place for sun-drying the seeds		3	3	0
	PC3. open bags, spread seeds and sun-dry them by following procedures practices and methods suggested in instructions		5	2	3
	PC4. remove dust, debris, trash etc from dry seeds using graded sieves as per the instructions		7	3	4
	PC5. separate lightweight material and empty glumes by gentle winnowing		7	3	4
	PC6. spread the seeds on clean and well-lit surface to remove damaged seeds, seeds of different species etc. if an		9	3	6
	PC7. put dry and cleaned seeds in bags and label them as per instructions		9	3	6
	PC8. send seeds to company for further processing as per the instructions		2	0	2
	PC9. maintain the record as per the instructions		5	0	5
	PC10. ensure drying of seeds immediately after threshing them		2	2	0
	PC11. ensure seeds are dried up to the optimum level of moisture content in them		2	2	0
	PC12. avoid breaking or damaging the seeds during post-harvest management of seeds		3	3	0
	PC13. ensure proper cleaning of seeds before bagging them		2	2	0
	PC14. ensure proper documentation as per the company's SOP		2	2	0
		60	30	30	

6.AGR/N9903 Maintain Health & Safety at the work place	PC1. undertake basic safety checks before operation of all machinery and vehicles and hazards are reported to the appropriate supervisor	25	3	1	2
	PC2. work for which protective dothing or equipment is required is identified and the appropriate protective clothing or equipment is used in performing these duties in accordance with workplace Policy.				
	PC3. read and understand the hazards of use and contamination mentioned on the labels of pesticides/fumigants etc.		3	1	2
	PC4. assess risks prior to performing manual handling jobs, and Work according to currently recommended safe practice.		1	1	0
	PC5. use equipment and materials safely and correctly and return the same to designated storage when not in use		3	1	2
	PC6. dispose of waste safely and correctly in a designated area		1	1	0
	PC7. recognize risks to bystanders and take action to reduce risk associated with jobs in the workplace		1	1	0
	PC8. perform your work in a manner which minimizes environmental damage all procedures and work instructions for Controlling risk are followed closely.		1	1	0
	PC9. report any accidents, incidents or problems without delay to An appropriate person and take necessary immediate action to reduce further danger.		1	1	0
	PC10. follow procedures for dealing with accidents, fires and Emergencies, including communicating location and directions to emergency.		1	1	0
	PC11. follow emergency procedures to company standard / workplace requirements		1	1	0
	PC12. use emergency equipment in accordance with manufacturers' specifications and workplace requirements		3	1	2
	PC13. provide treatment appropriate to the patient's injuries in accordance with recognized first aid techniques		1	1	0
	PC14. recover (if practical), clean, inspect/test, refurbish, replace and store the first aid equipment as appropriate		1	1	0
	PC15. report details of first aid administered in accordance with Workplace procedures.		1	1	0
		<b>25</b>	<b>15</b>	<b>10</b>	
	<b>TOTAL</b>	<b>300</b>	<b>300</b>	<b>1500</b>	<b>150</b>



