Practical Manual
On
Crop Production Technology - I (*Kharif* Crops)

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THE NEOTIA UNIVERSITY

By

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PRACTICAL NO. 1 **Date:**

PREPARATION OF NURSERY BED FOR RAISING RICE SEEDLING IN WET BED METHOD

1.1 Objectives:

To raise the rice seedling in nursery following wet bed method

1.2 Materials Required:

Tillage implements and tools (power tiller, spade, rake etc.), ladder/plank, measuring tape, weighing balance, manures and fertilizers, bucket, pre-germinated rice seeds etc.

1.3 Steps:

Preparation of wet bed

a. At first select a level or gently sloping area near a convenient water source for preparation of the bed.
b. Clean the field properly selected for raising the rice seedlings.
c. Plough the land for 2-3 times with the help of power tiller in standing water condition followed by planking to obtain a fine seedbed.
d. Measure a bed width of 1 m along with a convenient length or as per the requirement.
e. Form channel of 50 cm width between the beds for application of irrigation water as needed on regular interval and to perform all the post-sowing management in seedbed.
f. Apply 25-30 g of urea and 50 g of SSP for unit square meter area and mix thoroughly.
g. Break any remaining coarser soil aggregates by hand and level the beds with the help of a wooden board keeping gentle slopes toward both sides to drain out excess water.

Sowing of seeds

a. Broadcast the pre-germinated seeds uniformly all over the bed by hand.
b. Cover the seeds completely with a thin layer of soil or fine dust of well decomposed farm yard manure.
c. If heavy rains or birds threaten prevails, cover the beds with banana leaves.

1.4 Maintenance of nursery beds:

a. Allow the water to run in channels for first 5 days to saturate the soil of beds and then raised the level of water slowly up to 5 cm with the increase in seedling height.
b. If Nitrogen deficiency is there, apply 5-10 g urea per square meter area.
c. Apply two spray of $ZnSO_4$ at 10 days interval if there is a deficiency symptom of Zn.
d. Excess water must be drained out immediately after heavy rains.
e. Weak unhealthy seedlings should be removed.
f. Seedlings will be ready for transplanting within 20-25 days after sowing.

1.5 Conclusion:

Video link:

https://www.youtube.com/watch?v=QY1FBieUrq0

https://www.youtube.com/watch?v=CrCGjeoNyYk

Fig. Wet Bed Nursery

Signature

PRACTICAL NO. 2 **Date:**

TRANSPLANTING OF RICE SEEDLINGS IN MAIN FIELD

2.1 Objective:

To know the techniques of transplanting rice seedlings from nursery to main field

2.2 Materials Required:

Healthy rice seedlings of 3-4 weeks age (3-4 leaf stage), planting rope, peg, straw or banana twine etc.

2.3 Steps for transplanting rice seedlings in main field:

a. After pulling out of the seedlings at an average of 25 to 30 days after seeding from nurseries, seedlings are made into bundles and transport them to the main field.
b. Transplant the seedlings soon after pulling from the nursery in a puddled and leveled field (any delay will lead to slow revival or even death of some seedlings).
c. The planting rope is placed along any base line and each end of the rope is tied to a bamboo pole so that the rope is about 10 cm above the soil level.
d. Seedling bundles are distributed throughout the plot.
e. Seedling bundle is held in such way as to facilitate detaching the seedlings. Right numbers of seedlings are detached from the bundle, protecting the roots by holding them in three fingers while inserting them into the soil.
f. Transplant 3–4 seedlings per hill at shallow depth and optimum spacing.
g. When the first row has been planted, shift the planting rope to the next row and move backward to plant the subsequent row. When the last row has been planted, remove planting rope.

2.4 Maintenance of field after transplanting:

h. After transplanting, keep water depth at about 5 cm for 3 to 4 days until the plants recover.
i. Ten days after transplanting, replace all missing hills with extra seedlings previously saved.
j. Handle seedlings carefully to ensure their fast revival and rapid growth after transplanting.

2.5 Observations:

Crop variety	Age of seedling	Seedling treatment	Spacing	Depth of planting	Other practices followed (if any)
Short duration					
Medium duration					
Long duration					

2.6 Conclusion:

Video link:

https://www.youtube.com/watch?v=M5TvZZy44aU

https://www.youtube.com/watch?v=BomO2rDg25M

Fig. Transplanting of Rice

Signature

PRACTICAL NO. 3 **Date:**

CALCULATION OF FERTILIZERS REQUIRED FOR *KHARIF* RICE

Problem 1:

Calculate the amount of urea, SSP and MOP required for cultivation of rice in 1 acre of land (Recommended dose of NPK for rice is 80:40:40 kg/ha).

Solution:

Recommended dose of NPK for rice is 80:40:40 kg/ha.

Amount of urea required for 1 ha of rice crop –

$$= \frac{80 \times 100}{46}$$ [Urea contains 46% of N]

$$= 173.9 \text{ kg}$$

Amount of SSP required for 1 ha of rice crop –

$$= \frac{40 \times 100}{16}$$ [SSP contains 16% of P_2O_5]

$$= 250 \text{ kg}$$

Amount of MOP required for 1 ha of rice crop –

$$= \frac{40 \times 100}{60}$$ [MOP contains 60% of K_2O]

$$= 66.67 \text{ kg}$$

Therefore, amount of urea required for cultivation of rice in 1 acre of land

= (173.9 x 0.4) kg [As, 1 acre = 0.4 ha]

= 69.6 kg

Therefore, amount of SSP required for cultivation of rice in 1 acre of land

= (250 x 0.4) kg

= 100 kg

Therefore, amount of MOP required for cultivation of rice in 1 acre of land

= (66.67 x 0.4) kg

= 26.7 kg

Problem 2:

Calculate the amount of urea, DAP and MOP required for 1 ha of rice field when P_2O_5 is applied through DAP (Recommended dose of NPK for rice is 60:30:30 kg/ha).

Solution:

Recommended dose of NPK for rice is 60:30:30 kg/ha.

Amount of DAP required –

$$= \frac{30 \times 100}{46} \qquad \text{[DAP contains 46\% of } P_2O_5\text{]}$$

$$= 65.2 \text{ kg}$$

Now, amount of N supplied by 65.2 kg DAP

$$= \frac{65.2 \times 18}{100} \qquad \text{[DAP contains 18\% N]}$$

$$= 11.74 \text{ kg}$$

Therefore, amount of N is to be applied through urea = (60 – 11.74) kg = 48.26 kg

Amount of urea required –

$$= \frac{48.26 \times 100}{46} \qquad \text{[Urea contains 46\% of N]}$$

$$= 104.9 \text{ kg}$$

Amount of MOP required –

$$= \frac{30 \times 100}{60} \qquad \text{[MOP contains 60\% of } K_2O\text{]}$$

$$= 50 \text{ kg}$$

Therefore, amount of urea, DAP and MOP required for 1 ha of rice field is 104.9 kg, 65.2 kg and 50 kg respectively.

Signature

PRACTICAL NO. 4 **Date:**

TOP DRESSING OF NITROGEN FERTILIZER IN *KHARIF* RICE

4.1 Objectives:

To know about the method of top dressing of N-fertilizer in rice

4.2 Materials required:

Nitrogen fertilizer, plastic bucket, weighing balance etc.

4.3 Steps/Procedure:

a. Weigh the required amount of fertilizer on balance and take the amount in a plastic bucket.
b. Throw a handful of fertilizer through the horizontal movement of the hand, thereby covering a width of area of 3m by one throw.
c. Move forward with a constant speed.
d. If wind blows, broadcast the fertilizer across the wind direction by keeping the hand low.

4.4 Observation:

Crop variety	**Recommended dose of NPK (kg/ha)**	**Amount of nitrogen/urea (kg/ha) required to be top dressed**	
		1st	**2nd**
Short duration			
Medium duration			
Long duration			

4.5 Conclusion:

Video link:

https://www.youtube.com/watch?v=bKanpftoxiY

https://www.youtube.com/watch?v=6GfA321AGFg

Fig. Top Dressing of N-Fertilizer

Signature

PRACTICAL NO. 5 **Date:**

STUDY ON MORPHOLOGICAL CHARACTERISTICS OF RICE

5.1 Objective:

To study the morphological description of rice in the field

5.2 Materials Required:

Practical manual, ball point pen or pencil, camera etc.

5.3 Steps/Procedure:

a. Observe the standing crop throughout the growth period of the crop.

b. Note the plant characteristics of crop and verify with the information provided in the classes.

c. Take the snaps of different plant parts in the field and paste the photographs on the practical notebook.

d. Draw the sketches of the crop plant and its different parts.

5.4 Morphology characteristics:

(i) Underground parts: Shallow, deep, tap root, adventitious root, rhizomes, nuts, bulb etc.

(ii) Stem: Colour, size, nature (erect, prostrate, angular trailing etc.), nodes and internodes, solid, hollow, woody, tender

(iii) Leaf: Colour, size, shape, arrangement

(iv) Flowers: Colour, size, type of inflorescence

(v) Fruits / seeds: Colour, size, shape

(viii) Special points: Nature of plant sap (milky, juicy, gum etc.) and its colour, special modification on the plant etc.

5.5 Observation:

Table 5.1 Record the following observations

Sl. No.	Crop variety	Plant habit	Seed	Under-ground parts	Stem	Leaf	Flower	Special features
1								
2								
3								
4								

5.6 Conclusion:

Video link:

https://www.youtube.com/watch?v=_Dv-DQh0OP8&t=284s

https://www.youtube.com/watch?v=MqFuWDMYcrg

Figure:

Draw different morphological parts of a rice crop and point out its all distinct part

Signature

PRACTICAL NO. 6 **Date:**

STUDY OF YIELD CONTRIBUTING CHARACTERS AND ESTIMATION OF YIELD OF RICE

6.1 Objective:

To study about the yield contributing characters and yield estimation of rice by yield component method

6.2 Materials Required:

Field with well matured rice crops, meter scale, harvesting equipment (sickle, knife, etc.), gunny bags or baskets, balance, etc.

6.3 Steps:

a) Select a unit area with the help of a meter scale from the matured rice crop field at least from 5 places.
b) Then count the total number of plants from the selected 1 m^2 area.
c) Count the number of panicle at least from 10 plants and calculate the number of panicle per plant simply by doing the average.
d) Take at least 10 panicles from the selected 1 m^2 area and collect all the filled grains from those and make the average to get number of filled grains/panicle.
e) Measure the 100 seed weight (seed index) with the help of a weighing balance.
f) Calculate the grain yield and other estimates of rice on the basis of following formula.

$$\text{Yield (t/ha)} = \frac{10000 \times \text{No. of effective tillers/m}^2 \times \text{No. of filled grains/panicle} \times \text{Seed index (gm)}}{100 \times 1000 \times 1000}$$

$$\text{Hulling Percentage} = \frac{\text{Average yield of husked rice}}{\text{Total yield of rice}} \times 100$$

$$\text{Filled grain Percentage} = \frac{\text{No. of filled grains}}{\text{Total no. of grains}} \times 100$$

6.4 Problem:

Calculate the yield of rice, hulling percentage and grain filling percentage of rice with the following data given-

No. of effective tillers/m^2 = 248

No. of filled grains/panicle = 76

Seed index (gm) = 2.3

Total no. of grains/panicle = 96

Average yield of husked rice = 3.2 t/ha

$$\text{Yield (t/ha)} = \frac{10000 \times 248 \times 76 \times 2.3}{100 \times 1000 \times 1000}$$

$$= 4.34$$

$$\text{Hulling Percentage} = \frac{3.2 \times 100}{4.34}$$

$$= 73.73\%$$

$$\text{Filled grain Percentage} = \frac{76 \times 100}{96}$$

$$= 79.17\%$$

6.5 Conclusion:

Signature

PRACTICAL NO. 7 **Date:**

IDENTIFICATION OF WEEDS ASSOCIATED WITH *KHARIF* CROPS

7.1 Objective:

To identify different types of weeds found in *kharif* season crops

7.2 Materials Required:

Practical manual, ball point pen or pencil, camera etc.

7.3 Steps:

a. Observe the *kharif* season crop fields at the early growth stages of crop for identification.

b. Identify the weed in the field and study their habitat, morphology and mode of propagation.

c. With the help of books, manuals, herbaria and other references, correct and scientific reporting of weed specimen can be done.

d. Make a visual observation & understand its basic characteristics.

e. Take the snaps of each weed observed and paste those photographs in practical notebook.

7.4 Observations:

Table 7.1.Make a list of all weeds and note down the salient characteristics

Sl. No.	Name of weed (Local/English)	Botanical name	Family	Type	Basic characteristics /Identification features
1					
2					
3					
4					
5					

7.5 Conclusion:

Video link:

https://www.youtube.com/watch?v=WaClq6Xe8SY

https://www.youtube.com/watch?v=gKPylyhZ53A

Cynodon dactylon

Digitaria sanguinalis

Eleusine indica

Dactyloctenium aegyptium

Euphorbia hirta

Amaranthus viridis

Signature

PRACTICAL NO. 8 **Date:**

CALCULATION ON SEED RATE OF DIFFERENT *KHARIF* SEASON CROPS

Seed rate is calculated by using the formula –

$$\text{Seed rate (kg/ha)} = \frac{\text{Test weight (g)} \times 10000 \times 100 \times 100}{\text{Spacing (m}^2\text{)} \times \text{Germination (\%)} \times \text{Purity (\%)} \times 1000 \times 1000}$$

Problem 1: Calculate the seed rate (kg/ha) of maize from the data given below –

Spacing	:	60 cm x 30 cm
Germination (%)	:	88
Purity (%)	:	90
Test weight (g)	:	260
Seed required for gap filling	:	5% of seed quantity required for sowing

Solution:

Therefore, the seed quantity required to sow 1 ha of maize field is

$$= \frac{260 \times 10000 \times 100 \times 100}{0.60 \times 0.30 \times 88 \times 90 \times 1000 \times 1000}$$

[60 cm = 0.60 m and 30 cm = 0.30 m]

$$= 18.24 \text{ kg}$$

Amount of seed required for gap filling @ 5% of seed weight is

$$= \frac{18.24 \times 5}{100}$$

$$= 0.91 \text{ kg}$$

Total seed requirement for 1 ha of maize field = (18.24 + 0.91) kg

= 19.15 kg

Therefore, the seed rate of maize is 19.15 kg/ha.

Problem 2: Calculate the amount of pigeon pea seed required to sow 1 acre of land from the following data –

Spacing	:	60 cm x 30 cm
Germination (%)	:	85
Purity (%)	:	90
Test weight (g)	:	106

Solution:

Seed quantity (kg) required to sow 1 acre of pigeon pea field is

$$= \frac{106 \times 4048 \times 100 \times 100}{0.60 \times 0.30 \times 85 \times 90 \times 1000 \times 1000}$$ [1 acre = 4048 m^2] [60 cm = 0.60 m and 30 cm = 0.30 m]

$$= 3.12 \text{ kg}$$

Therefore, the amount of pigeon pea seed required to sow 1 acre of land is 3.12 kg.

Signature

PRACTICAL NO. 9 **Date:**

METHODS OF SOWING SEEDS OF DIFFERENT *KHARIF* CROPS

9.1 Objectives:

To know the techniques/methods of sowing of different *kharif* crops

9.2 Materials Required:

Seeds of different *kharif* crops, measuring tape, rope, hand tyne, weighing balance etc.

9.3 Different methods of sowing

Seeds may be sown directly or transplanted. The methods of sowing are enlisted and detailed as under-

9.3.1 Broadcasting

Broadcasting is one of the oldest and most common methods of seed sowing, where the seeds are just spread on the soil; the seeds may or may not be covered with soil. Broadcasting may be done manually or through mechanical spreader.

9.3.2 Dibbling

Dibbling is the placing of seeds in holes or pits at equal predetermined distances and depths. This is done by dibbler, planter or manually.

9.3.3 Drilling

It is the practice of dropping of seeds in holes, the seeds are then covered and compacted. Drilling is done with seed drill or seed-cum-fertilizer drill. Seeds can be drilled continuously in a row or drilling can be done at set distances. Rows can be set according to requirements.

9.3.4 Sowing behind the country plough

In this method, the seeds are placed into the furrows ploughed in the field either continuously or at specific distance manually by a man working behind plough. The depth of sowing depends on the depth of plough.

9.3.5 Transplanting

For transplanting, the seeds are sown in nursery and later transplanted to main field. Transplanting is the practice of planting seedlings in main field after pulling out the seedlings from the nursery.

9.4 Steps of sowing seeds of different *kharif* season crops:

- ✓ Collect the seeds of different crop varieties from the farm or authentic sources.
- ✓ Calculate the amount of seeds required for the allotted land/plot based on the recommended seed rate of a particular crop and take the seeds of required amount after weighing on a balance.
- ✓ Make furrows with optimum soil depth and desired row spacing by hand tyne.
- ✓ Place the seeds maintaining optimum plant to plant spacing within the furrows.
- ✓ Cover the furrows with loose soil thereafter.

9.5 Details of sowing seeds of different *kharif* crops

Serial No.	Crops	Time of sowing	Method of sowing	Seed rate (kg/ha)	Spacing	Depth of sowing (cm)
1						
2						
3						
4						
5						
6						
7						

9.6 Conclusion:

Video link:

https://www.youtube.com/watch?v=gWs-FhrzMGI&t=750s

https://www.youtube.com/watch?v=kG9fN5mN3qU&t=105s

Fig. 1 Broadcasting

Fig. 2 Dibbling

Fig. 3 Sowing behind the country plough

Fig. 4 Drilling

Signature

PRACTICAL NO. 10 **Date:**

STUDY ON MORPHOLOGICAL CHARACTERISTICS OF *KHARIF* PULSE CROPS

10.1 Objective:

To study the morphological description of *kharif* pulse crops

10.2 Materials Required:

Practical manual, ball point pen or pencil, camera etc.

10.3 Steps/Procedure:

a. Observe the standing crop throughout the growth period of the crop.

b. Note the plant characteristics of crop and verify with the information provided in the classes.

c. Take the snaps of different plant parts in the field and paste the photographs on the practical notebook.

d. Draw the sketches of the crop plant and its different parts.

10.4 Morphological characteristics:

(i) Underground parts: Shallow, deep, tap root, adventitious root, rhizomes, nuts, bulb etc.

(ii) Stem: Colour, size, nature (erect, prostrate, angular trailing etc.) nodes and internodes, solid, hollow, woody, tender

(iii) Branches: Branched, unbranched, pattern and arrangement

(iv) Leaf: Colour, size, shape, arrangement

(v) Flowers: Colour, size, type of inflorescence

(vi) Fruits / seeds: Colour, size, shape

(viii) Special points: Nature of plant sap (milky, juicy, gum etc.) and its colour, special modification on the plant etc.

10.5 Observation:

Table 10.1 Record the following observations

Sl. No.	Crop Name	Plant habit	Seed	Under-ground parts	Stem	Leaf	Flower	Special features
1								
2								

3								
4								
5								

10.6 Conclusion:

Video link:

https://www.youtube.com/watch?v=_Dv-DQh0OP8&t=284s

https://www.youtube.com/watch?v=MqFuWDMYcrg

Figure:

Draw different morphological parts of a pulse crop and point out its all distinct part

Signature

PRACTICAL NO. 11 **Date:**

YIELD ESTIMATION OF *KHARIF* PULSES ON THE BASIS OF YIELD COMPONENT METHOD

11.1 Objective:

To estimate the grain yield of *kharif* pulses by yield component method

11.2 Materials Required:

Field with well matured *kharif* pulse crops, meter scale, harvesting equipment (sickle, knife, etc.), gunny bags or baskets, balance, etc.

11.3 Steps:

a) Select a 1 m^2 area with the help of a meter scale from the matured *kharif* pulse crop field at least from 5 places.
b) Then count the number of plants from the selected 1 m^2 area.
c) Count the number of pods at least from 10 plants and calculate the number of pods per plant simply by doing the average.
d) Take at least 10 pods from the selected 1 m^2 area and count the number of seeds from those pods and make the average to get number of seeds/pod.
e) Measure the 100 seed weight (seed index) with the help of a weighing balance.
f) Calculate the grain yield of *kharif* pulses on the basis of following formula.

$$\text{Yield (q/ha)} = \frac{10000 \times \text{No. of plants/m}^2 \times \text{ No. of pods/plant} \times \text{No. of seeds/pod} \times \text{Seed index (gm)}}{100 \times 1000 \times 100}$$

11.4 Calculation:

Crop	No. of plants /m^2	No. of pods /plant	No. of seeds /pod	Seed index (gm)	Estimated grain yield (q/ha)
Pigeon pea					
Mung bean					
Urd bean					

11.5 Conclusion:

Signature

PRACTICAL NO. 12 **Date:**

EFFECT OF SEED SIZE ON GERMINATION AND SEEDLING VIGOR OF *KHARIF* SEASON CROPS

12.1 Objectives:

To know the effect of seed size on germination and seedling vigor of *kharif* season crops.

12.2 Materials required:

Well prepared fine seedbed, seeds of different *kharif* crops, water, pen, paper etc.

12.3 Steps:

a. Take different sized seeds of few *kharif* crops for sowing in well prepared fine seedbed.
b. Put the seeds uniformly at the desired depth as informed in the class.
c. Cover the seeds completely with a thin layer of soil.
d. Apply irrigation water immediately after sowing to make moisture available to the seeds.
e. Take observations on germination and seedling growth and write down in your practical notebook.

12.4 The effects of seed size on germination and seedling vigor

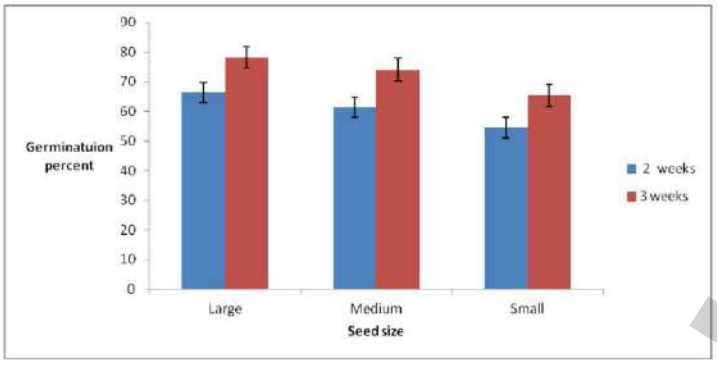
a. The effects of large seed size on plant growth are unanimously positive. It has been observed that large seeds increase germination, seedling growth, and survival. As a consequence, large seeds can produce more vigorous and competitively superior seedlings.
b. Seedlings coming from large seeds had larger shoots and a greater probability of producing leaves.
c. Larger seeds produce seedlings that emerge faster, are bigger and have better access to nutrient sources.
d. Seedlings from large-seeded species would have better access to light and/or to reliable water supply than seedlings from small-seeded species.
e. The large seed increased coleoptile length and shoot dry weight of seedlings; however, small seed size helps to germinate and emerge more rapidly than large seed.

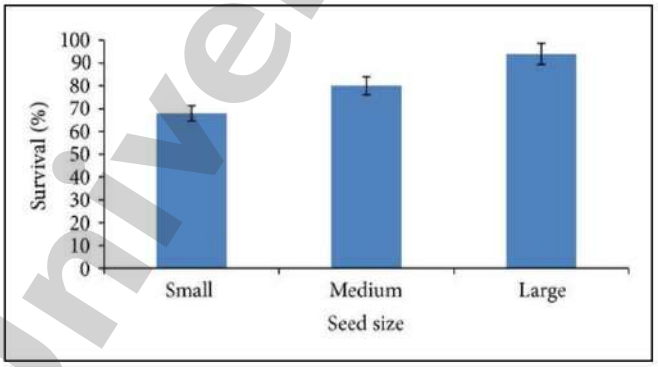
12.5 Observations:

Sl No.	Crop	Seed size (Small, Medium, Large)	Germination (%)	Seedling vigor (in terms of dry mass at 15 DAS)
1				
2				
3				

4				
5				
6				
7				

12.6 Conclusion:





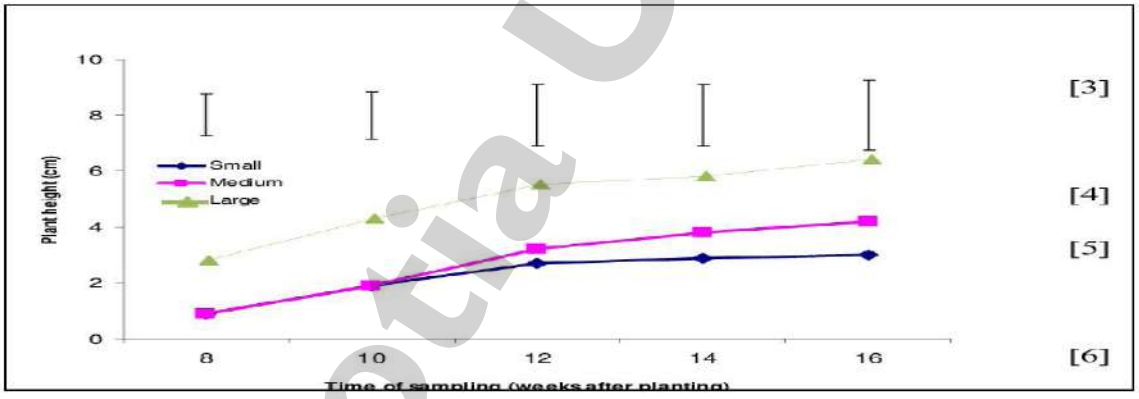


Fig. Effects of seed size on germination and seedling vigor

Signature

PRACTICAL NO. 13 **Date:**

EFFECT OF SOWING DEPTH ON GERMINATION OF *KHARIF* CROP SEEDS

13.1 Objectives:

To know the effect of sowing depth on germination of seeds of the different kharif crops

13.2 Materials Required:

Well prepared fine seedbed, seeds of different kharif crops, water, scale, pen, paper, etc.

13.3 Steps:

a. Take seeds of different *kharif* crops for sowing in well prepared fine seedbed.
b. Put the seeds of a particular crop at different depth in the seedbed along with its optimum depth of sowing.
c. Cover the seeds completely with a thin layer of soil.
d. Apply irrigation water immediately after sowing to make moisture available to the seeds.
e. Take observations on germination and write it down in your practical notebook.

13.4 Effect of sowing depth on seed germination

a. Planting the seed at too shallow can result in inconsistent water imbibitions and resulting in reduced, uneven emergence as because the top inch of soil fluctuates drastically in both temperature and moisture.
b. Planting too shallow can also negatively affect nodal root development, creating standability issues later in the season.
c. Again if the seeds are sown superficially, it can be eaten up by birds and other organisms.
d. Poor germination can be caused by planting at a greater depth which creates the conditions of over watering within the soil that blocks the intake of oxygen inhibiting the respiration process of the sprouted seeds.
e. Altering any of the three necessities of seeds viz. air, moisture and temperature culminates in failed germination, especially if planted at a greater depth.

13.5 Observations:

Sl No.	Crop	Sowing Depth (cm)	Germination (%)	Seedling emergence (at DAS)
1				
2				
3				

4				
5				

13.6 Conclusion:

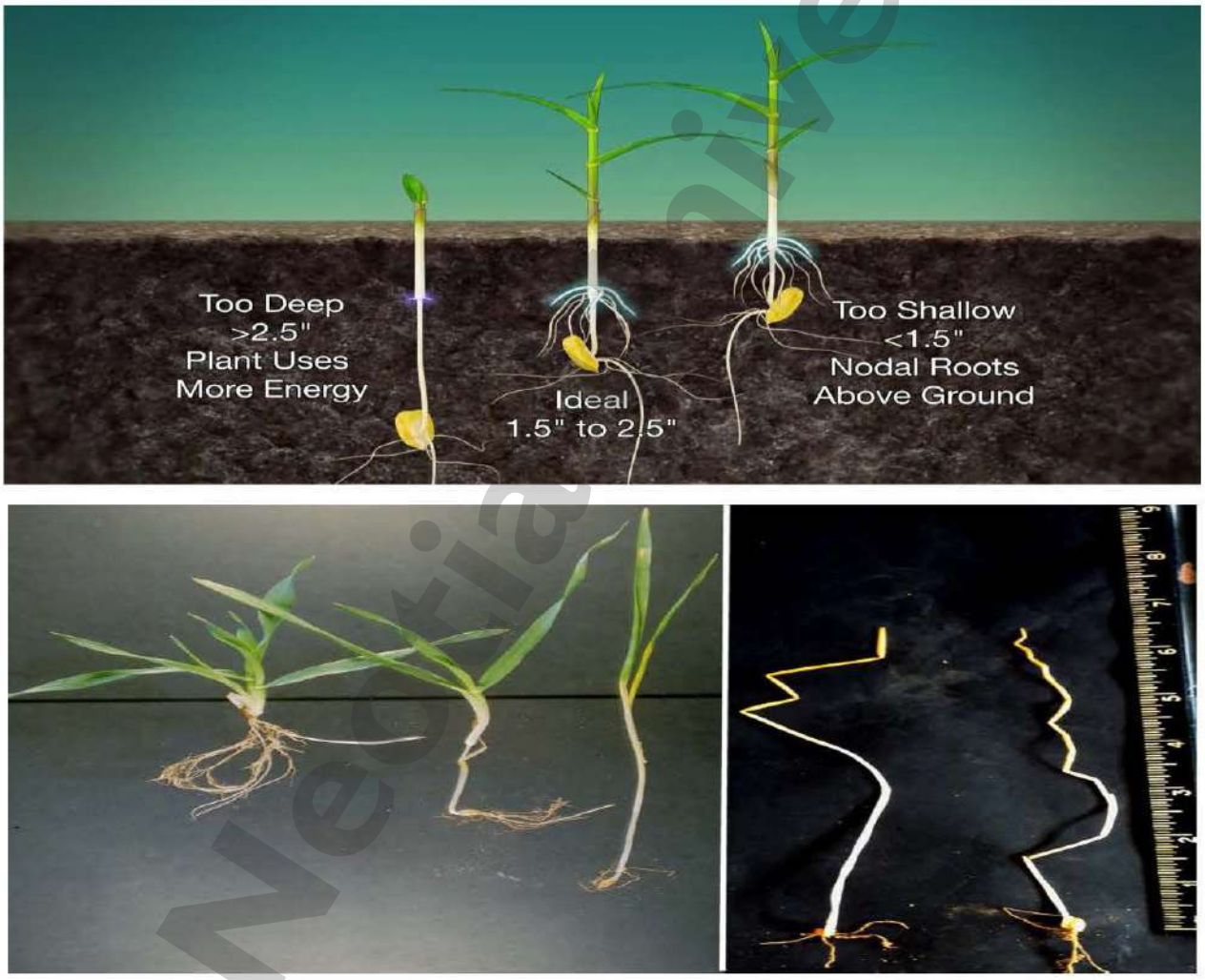


Fig. Seedling growth at different sowing depth

Signature

PRACTICAL NO. 14 **Date:**

STUDY ON CROP VARIETIES OF DIFFERENT *KHARIF* CROPS

14.1 Objective:

To study on different varieties of *kharif* season crops

14.2 Materials Required:

Ball point pen and paper sheet

14.3 Steps/Procedure:

a. Visit a farm or agriculture field nearby side of your house/residence during vacation.

b. Contact with the farm manager or farmers (at least two) of different places in the area.

c. Ask them to know about at least four-five crop varieties commonly grown in the area along with their duration and average yield.

d. Write down the information collected from them and also know about the other cultivation practices followed for the crops grown in the area.

14.4 Observation:

Sl. No.	Crop	Variety	Duration (Days)	Average yield (Kg/ha)	Other practices followed (if any)
1					
2					
3					
4					
5					
6					
7					

14.6 Conclusion:

Video link:

https://www.youtube.com/watch?v=eH3CV04tTMU

https://www.youtube.com/watch?v=UaPct_g91i0

Fig. Varieties of Rice

Fig. Varieties of Soybean

Fig. Varieties of Mungbean

Signature

PRACTICAL NO. 15 **Date:**

SOWING OF *KHARIF* FORAGE CROP SEEDS

15.1 Objective:

To know about the sowing methods of *kharif* forage crop seeds

15.2 Materials required:

Tillage implements and tools (spade, hand hoe, rake etc.), ladder/plank, measuring tape, weighing balance, seeds, manures and fertilizers etc.

15.3 Steps:

a) Prepare the land well after incorporating the required amount of manures and fertilizers as recommended for the crop.

b) Calculate the required quantity of seed as per recommended seed rate.

c) Take the required amount of seeds after weighing on a balance.

d) Treat the seeds very well with seed treating chemicals or biological inoculants specifically for the legume forage crops.

e) Spread the seeds by hand all over the prepared field.

f) Cover up the seeds with the help of wooden plank or harrow for better contact with the soil.

15.4 Observations:

Crop	RDF	Seed rate (kg/ha)	Seed treatment	Depth of sowing (cm)	Other management practices followed (if any)
Sorghum					
Cowpea					
Cluster bean					
Napier grass					

15.5 Conclusion:

Video link:

https://www.youtube.com/watch?v=XQ3yXwCsXik

Fig. Planting of stem cuttings and root slips of Napier grass

Signature

PRACTICAL NO. 16 **Date:**

HARVESTING OF *KHARIF* FORAGE CROPS

16.1 Objective:

To know about the criteria and methods of harvesting of *kharif* forage crops

16.2 Materials required:

Field with well matured *kharif* forage crops, harvesting equipment (sickle, hansua etc.), gunny bags or baskets, balance, etc

16.3 Steps:

a) Visit the field of different *kharif* forage crops at the maturity stage.

b) Check and verify all the criteria for harvesting as discussed in the class from the matured standing crops.

c) Then cut the crop with the help of a sickle or hansua leaving 20 cm of the basal part above the ground for quick re-growth.

d) Keep the harvested crop on the drying floor for storage as a hay.

e) In case of multi-cut system always leave the basal part of 15-20 cm above the ground during each cutting.

16.4 Observations:

Crop	No. of cuttings	Crop stage for first cutting	Time for subsequent cuttings	Green forage yield (kg/ha)
Sorghum				
Cowpea				
Cluster bean				
Napier grass				

16.5 Conclusion:

Video link:

https://www.youtube.com/watch?v=HAax4Y3cUjw

https://www.youtube.com/watch?v=ftQ-DGn8wWA

Fig. Harvesting of Napier grass

Signature

PRACTICAL NO. 17 **Date:**

VISIT TO AGRONOMIC PLOTS OF *KHARIF* CROPS IN RESEARCH FARM

17.1 Objective:

To study the agronomic plots of different *kharif* crops in the research farm

17.2 Materials Required:

Notebook, questionnaire, ball point pen or pencil, etc.

17.3 Steps:

a. Carry all the necessary things and reach within time at the farm.

b. Introduce yourself and discuss the purpose of your visit with the farm manager or in-charge of the farm after arrival and get the details about the farm.

c. Observe the whole area to acquaint with all the ongoing experiments/trials at the farm.

d. Note down special research invention made available at the farm if any.

e. Get all the information as written in the questionnaire prepared early at the classroom.

17.4 Observations:

(i) Area of the farm (ha)

a. Under cultivation _____ha

b. Single crop area _____ha

c. Double crop area _____ha

d. Under building, roads, channels, threshing floor etc _____ ha

(ii) Area under irrigation _____ha

(iii) Source of irrigation _____

(iv) Crop rotation followed _____

(v) List of equipment/farm machinery

17.5 Conclusion:

Table 17.1 Details of the *kharif* crops under research at the farm

Sl. No.	Common name	Botanical name	Family	Area under the crop (ha)	Area under seed production (ha)	Variety grown	Seed rate (kg/ha)	RDF (kg/ha)	Average yield (kg/ha)	Remarks (If any)
1										
2										
3										
4										
5										
6										
7										

Signature

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