

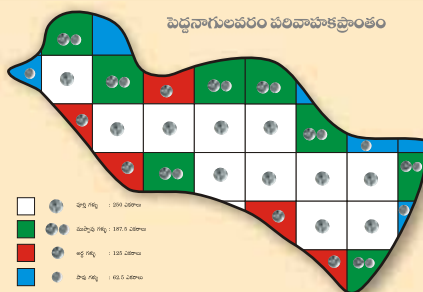
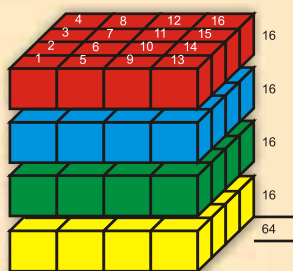


Demystifying Science for Sustainable Development

Andhra Pradesh Farmer Managed Groundwater Systems Project (APFAMGS)



USEFUL IMPLEMENTS AND METHODS OF USE IN CONDUCTING GROUNDWATER TRAINING SESSIONS AS PART OF FIELD SCHOOL METHODS



FFS - FMGS TOOL KIT

Andhra Pradesh Farmer Managed Groundwater Systems Project (APFAMGS)

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INTRODUCTION

Water is very important investment for agriculture sector. Though water is very much required to the increasing industrialization and urbanization needs, however it is required in large quantities for the agriculture. 69% of the available water is being used only for agriculture. Developing nations like us are utilizing groundwater resources indiscriminately for food production. Added to this in order to stay in cut throat competition, the digging of borewells has increased, clearing the forests for residential places etc. have contributed to the ecological imbalance throughout the world. Due to this, there is a sharp decline in the rainfall leading to dwindling groundwater levels day by day. At this juncture the farmers are at the receiving end, because they are not in a position to estimate the groundwater levels (in bores), and unable to utilize the existing groundwater resources properly. BIRDS Nodal Institute has started a unique initiative of educating the farmers about the existing groundwater resources and managing the same by themselves by farming Andhra Pradesh Farmers Management of Groundwater "APFAMGS" with the financial support of FAO of UN and with the active cooperation of nine NGOs in 650 villages of 7 famine districts of Andhra Pradesh. Started in August, 2003, the project has linked "Field School Method" (Polambadi Vidhanam) with groundwater management in order to achieve its developmental objectives, and educated the farmer, honed their skills in understanding the concept of groundwater resources, and the factors that influence groundwater recharge and draft etc.

Farmers calculate total groundwater recharge and draft during the end of the Kharif Season and estimate the water requirements for the crops for the forthcoming Rabi season in the Field School method. They estimate whether the remaining water of Kharif would suffice for Rabi crops, and estimate the groundwater availability by the end of May by taking into consideration the ensuing rainfall during "October to May". In this way the farmers either modify or change their Rabi crop plans or manage the water of the hydrological unit area by following water saving methods.

The project staff and the management have formulated the schedule of topics to be discussed with the farmers to improve their subject knowledge as well as skills in groundwater resources. A scheme is formulated to conduct the training sessions for one hydrological year (June to May). According to this scheme the partnership institutes working in their respective Hydrological Unit area selected minimum 30 farmers (Men, Women) and conducted Field School Sessions with 30 farmers in every Hydrological Unit area level, every fortnight. Field School sessions were also conducted at the village level to educate village farmers with 30 farmers every fortnight. Farmers who got trained at Hydrological Unit area level were conducting the Field School sessions at village level. The aim of the project is this only the Hydrological Unit area level Groundwater Management Committees tried their level best to see that at least 40 percent women participation in the Field School sessions. Not only this, some of the field school sessions held at the village sessions held at the village level were conducted by women only.

All the participatory institutes have conducted 10 meetings by combining with crop irrigation water plan at all the places to inform the farmers about the available groundwater resources for the Rabi season.

A well planned scheme was prepared in advance by the participating institutions to conduct the meetings of the Hydrological Unit area level successfully. Opinions and ideas of the farmers have been taken into consideration while preparing the agenda for every meeting scheme well in advance with the active participation of farmers as well. Every information that is put for discussion is explained in lucid way to the farmers with the help of some plays, games models and instruments which are prepared by the farmers themselves. Some of the implements are invented by farmers with the active guidance of project staff by utilizing the locally available resources. Farmers came forward to perform plays which are easily understandable to farmer.

In this background, farmers have created some games and methods for the understanding of their farmer friends. Farmers with minimum education were able to understand the technical information and improved their skills as well as knowledge.

Various models, lessons and games that have been prepared and used by the farmers during the Field School sessions have been painstakingly collected and incorporated into this book. We hope that this book will be very much useful for next Field School sessions for the coming hydrological year.

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1. HYDROLOGICAL UNIT AREA

Objective: To discuss about the Hydrological Unit area.

Rationale: To discuss about various types of resources, water inflow and water outflow by the members through a model.

Material Required: Mud heap, colours - Blue, Red, Green & Yellow, Water, and Mug.

Process: Give a shape of a model Hydrological Unit area to a heap of mud / soil portion of earth selected previously (rising and falling ground).

- ❖ Show streams, rivulets of the Hydrological Unit area with blue colour, villages with red colour, trees, forests and fields with green colour, roads with yellow colour.
- ❖ The water poured on the elevated area flows down through various routes and ways and finally reaches the plain area.
- ❖ Discuss with the members how a Hydrological Unit area looks like, water inflow, water outflow of the Hydrological Unit area.



A model of the Hydrological Unit area can be prepared as shown below and discuss about it.

Material Required : 12 mm Plywood (3 x 2 feet), Wood beading (10 feet), Plaster of Paris (10 kgs.), 1 inch Nails, 2 inch Nails, Packaging rope, Foot Rubber, Paints of different hues, HU Toposheet, Paint, Brush, Carbon Paper.

Method of Preparation:

- ❖ Fix wood beading round the plywood board (3 x 2 feet) already readied. Fix plastic rubbers below.
- ❖ First place a carbon paper on the board, then put a HU map on it and identify borders or extent of the Hydrological Unit area, Rivulets or water courses, streams, lakes, ponds, roads, villages, rainfall recording centres and observational bores.
- ❖ Fix 2 inch Nails to identify the upper reaches and middle are of the Hydrological Unit area and lower or last area with 1 inch nails. Put a plastic rope around the nails.
- ❖ Apply Plaster of Paris paste on the board and make it smooth by hand or with a brush.

- ❖ Let it dry for an hour and apply white paint on it. Place a map of the Hydrological Unit area on the board after the white paint dries. Identify streams, rivulets, villages, rainfall recording centres, observational borewells and roads, and apply different colours to all these landmarks

Process:

- ❖ The model of the Hydrological Unit area (villages, streams, rivulets, lakes, ponds and other water resources) prepared can be used to discuss about various issues or landmarks.
- ❖ Ask the members to identify various landmarks and ask them to discuss among themselves.

2. WATER INFLOW, WATER OUTFLOW IN THE HYDROLOGICAL UNIT AREA

Objective: Discussion about water outflow and water inflow into the Hydrological Unit area.

Rationale: The General belief is that the large percentage of the rain water that lashed earth would sink into the ground. But, only a fraction of it would sink and form as groundwater. The rest of the rain water is released into oceans through rivers. The following experiment will allow you to understand this concept.

How rain water reaches Hydrological Unit area?

How a part of it absorbs into the ground?

How it flows out of Hydrological Unit area?

Material Required:

- ❖ 45 x 30 cm. Tray with a hole on one side
- ❖ Polythene cover
- ❖ Empty bottle
- ❖ 4 litres water
- ❖ Mud
- ❖ Small pebbles, small twigs
- ❖ Pin heads

Method of Preparation

- ❖ Wet the mud with water
- ❖ Prepare a model of the Hydrological Unit area by keeping a tray on the wet mud
- ❖ Put a hole to the tray towards slope portion

Process:

- ❖ Pour 2 litres of water in polythene cover and hold it on the tray at a height
- ❖ Prick the polythene cover with pin head to show it as pouring of rain
- ❖ The water that fall on the tray comes out of it through the slope

Advice: More water would come out of the tray if the mud is wetted more.

Discuss about water inflow, water outflow of the Hydrological Unit area by preparing the following module:

Material Required: Plastic tray, polythene cover, vessel to receive water, pin heads, mud, pebbles, and leaves.

Method of Preparation:

- ❖ Fill the plastic tray upto the brim with wet mud. Create elevated areas and mountains with pebbles with slope.
- ❖ Put leaves, twigs (Flora) in the mud to show it as Hydrological Unit area.
- ❖ Show the origin of the stream at height, and the last area of the stream towards the slope of the tray.
- ❖ The tray module prepared as a Hydrological Unit area model should be kept at height to the farmers to view from the distance also.
- ❖ Prick the polythene cover filled with water, hold it on the tray to make fall as Rain on the Hydrological Unit area.
- ❖ Pouring Rain Water (In Flow) will dampen the most part of the area, flows down the course and see that it comes out of the tray (Out Flow).
- ❖ Explain to them that rain water received by the mountains and upper reaches of the area would enter rivers via rivulets and streams and finally merges into the seas (confluence).



3. GROUND WATER

Objective: Creating awareness on Groundwater Recharge through rainfall in a Hydrological Unit

Rationale: Generally the rain water after a heavy down pour would reach lakes, ponds and canals. At the same time a portion of it will sink through the surface earth. Farmers would understand this phenomenon more easily by showing a model given below:

Materials Required : Thermocool sheets - 2 (3 / 4 inch), Plastic cover sheet, Hexa Blade, Colours, Plastic pipe (small), Pin heads.

Method of Preparation:

- ❖ Fix two rectangular shaped thermocool sheets one above the other with Fevicol.
- ❖ Delineate Hydrological Unit area with the help of a toposheet kept of the thermocool sheet.
- ❖ Cut the delineated Hydrological Unit area of the thermocool sheet with the help of a hexa blade.
- ❖ Draw streams, rivulets, canals, ponds and lakes of the Hydrological Unit area on the lower thermocool sheet.
- ❖ Remove the thermocool sheet along the lines drawn for indicating streams rivulets, lakes, ponds on the lower sheet.
- ❖ Make small holes on lakes, ponds, streams and rivulets with a pin head.
- ❖ Show the village and other important resources of the Hydrological Unit area with different colours.
- ❖ Take a plastic cover and wrap around, below the thermocool sheet surface to prevent water leak.
- ❖ Make a small hole at the mouth point and fix a plastic pipe to outside.

Process:

- ❖ Pour water slowly like on artificial rain on the Hydrological Unit area of the model.
- ❖ Some of the water will be retained by the lakes, ponds and the rest comes out of the plastic pipe at mouth point through streams and rivulets. Some water reaches down through the holes made by pin head.
- ❖ Thus the part of rain water flows through streams and rivulets and crosses the boundary of Hydrological Unit area (Discuss with members about inflow, outflow).



- ❖ Discuss also with the members about the recharge of rain water into the sub surface depends upon the rock types, nature of soil and also on the rocky layers inside our earth.
- ❖ Groundwater recharge can also be discussed by using the following module.

Material Required: Thermocool sheets (02), colours, tape, paint brush

Process:

- ❖ Paste two thermocool sheets
- ❖ Draw picture vessels, 100 in number by leaving 10 cm. space from the top.
- ❖ Leave a 5 cm. space below the 100 vessels and draw pictures of land topography (Trees, Mountains, Water). Draw 4 vessels below this.
- ❖ Discuss with farmers that out of 100 vessels of water only 4 vessels of water will sink into the earth layers and 96 vessels water reach seas.
- ❖ Thus, using this model it can be discussed that out of 100% of rain water only 4% would go down into earth layers and form as groundwater.

4. GROUND WATER RECHARGE METHOD

Objective : Discuss about the way rain water seeps into the earth.

Rationale: Farmers generally believe that most of the rain water seeps into the earths but contrary to this popular belief most of the rain water reaches rivers through streams and rivulets. Explain farmers about the phenomenon that only part of rain water (1-12%) seeps into the earth by conducting an experiment.

Materials Required : Sponge, water, glass

Process :

- ❖ Take a dry sponge
- ❖ Pour 100 ml. of water on sponge like rainfall.
- ❖ Collect water into a glass by squeezing the sponge
- ❖ Observe that less water is collected in the glass. Explain to farmers that entire rainfall will not seep into the earth, but it depends upon the rock layers of the area.



5. FACTORS THAT INFLUENCE GROUNDWATER RECHARGE

Objective : Discussion about the factors that influence the groundwater recharge.

Rationale : Entire water that reaches earth as rain water will not seep into the earth. There are various factors that influence groundwater recharge. Water holding capacity will change according to earth slope, rocky layers and type of the soil. The following experiment will be useful to the farmers to understand the factors that influence groundwater recharge.

Materials Required : Three plastic trays, two types of soil (Red soil, sand), Bucket full of water, Mug

Process :

- ❖ Take three plastic trays (30 x 20 cm)
- ❖ Fill the two trays (fully) upto the brim with red soil
- ❖ Fill the third tray with sand and red soil mixed (1 : 1) in ratio
- ❖ Keep earth tray in a big tray respectively to collect water separately.
- ❖ Keep one of the two trays filled with red soil in a slope position, and other tray, tray with red soil + sand in horizontal position only.
- ❖ Pour 3 mugs of water with same speed into the trays
- ❖ Collect the water gathered in the three trays and measure their volume after two minutes
- ❖ Observe more water being collected in the tray in slope, less water in tray with red soil, very less water in tray with red soil with sand.



6. EXPLANATION OF CUBIC METER

Objective : Discussion about cubic metre

Rationale : As part of crop irrigation water plan farmers measure water in cubic meters. In order to make farmers to convert the cubic meters into litres, explain to them what is a cubic metre, how many litres a cubic metre makes, etc. through pictorial diagrams and models.

Materials Required : Picture of a cubic metre (1/4 metre 64 cubic metres), 1/4 metre cube model, 1 litre measuring cylinder, 1 vessel with water.

Process :

- ❖ Chart should depict that length, width and height is 1 metre on all sides is a cubic metre.
- ❖ There are 64 such 1/4 metre cubicles in one cubic metre.
- ❖ Introduce 1/4 metre cube made of iron sheet
- ❖ 1000 litres of water fill into a space of 1 cubic metre. Extract from farmers that how many litres will fill in 1/4 cubic metre.
- ❖ Pour water into 1/4 cubic metre model and ask them to measure using one litre measuring cylinder.
- ❖ Explain that there are 64 such 1/4 cubic metres in the picture and multiply the water measured by 64 times that will be equal to 1000 litres.



Tell the members that the cubic metre model can be prepared in the following way.

Materials Required : Match box, colour pens, iron box / iron sheets.

Method of Preparation :

- ❖ Make a cardboard box with length, width and height equal on all four sides.
- ❖ 16 squares on all 4 sides (16 x 4) would make a cubic metre on the box.
- ❖ Make an iron box of one cube which is 64th of a cubic metre.

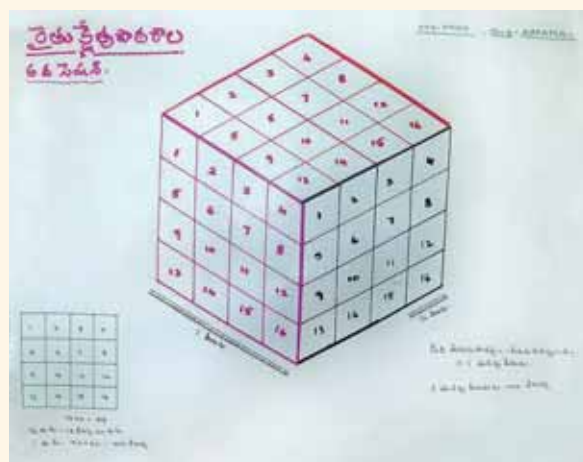
Process :

- ❖ Give a cube made of card board to members in small groups and ask them to count how many cubes are there in it.

- ❖ Tell them that any cube can be equally divided into 64 cubes.
- ❖ Give the cube made of iron sheet to the members and ask them to measure how many litres it would accommodate.
- ❖ 15.65 litres will fill and ask farmers total no. of cubes in cubic metre, and how many litres would accommodate in cubic metre can be calculated, ask farmers.
- ❖ Show these two models to the members and discuss that 1000 litres of water would fill a cubic metre.

Other information :

It is difficult to carry the model of the cubic metre to all places where the sessions are conducted, and farmers understand easily if discussed with them.



7. OBSERVATIONAL BOREWELL

Objective : Discussion about drum discharge measurement of an observation borewell.

Rationale : Farmers have to measure drum discharge measurements and water levels in observational borewells as part of groundwater management. Since the water levels of the borewells are not visible from the surface, static, pumping water levels and drum discharge measurement methods should be discussed with farmers using the model who can understand very easily.

Materials Required :

- ❖ An electric motor with stand (in the form of a box), glowing red light indicating motor is working.
- ❖ 1/2 metre glass / fibre cork (tank)
- ❖ Plastic cup on the cork, a crucible type of arrangement to pour water into the cork.
- ❖ Inches / feet tape
- ❖ Electric wire
- ❖ Section pipe
- ❖ Valve to the section pipe (small)
- ❖ Stop watch
- ❖ Decolum sheet
- ❖ Tape

Method of Preparation :

- ❖ Take a square box with electric motor (small) fitted
- ❖ Tighten 1/2 metre length glass / fibre tank (Beaker) on it
- ❖ Fix feet / inches tape on the tank
- ❖ Section pipe fixed on top of the tank (with electric wire)
- ❖ Section pipe is fixed to other end of the box from the top of the tank (electric wire, small valve can be rotated with hand are fixed to the section pipe)
- ❖ Small pipe (near the valve) is fixed in the centre of the section pipe for the discharge of water
- ❖ Place plastic plants, grass on top of the box

Process :

- ❖ Show upper surface of the rectangular box upon which electric motor fixed as ground level

- ❖ Show glass tank as bore casing on earth
- ❖ Pour water into the glass tank (use colour water so that people can see from distance also)
- ❖ Show the static water level (feet, inches) with the help of scale on the cork before motor on.
- ❖ Water will pour into discharge drum through section pipe when motor on.



- ❖ Show the pumping water level with the help of scale on the cork.
- ❖ Show this time (as example) measurement of discharge water with the help of a stop watch.

Other Information :

- ❖ Using this model static water level, pumping water levels, drum discharge measurements can be discussed in sessions.
- ❖ Above topic point can be best addressed on important occasion like Crop-Irrigation water plan workshops, World Food Day that we celebrate, world water day in which our farmers would attend in large numbers and during meetings of our Hydrological Unit areas. Children & Farmers can understand easily.

8. DRUM DISCHARGE MEASUREMENT

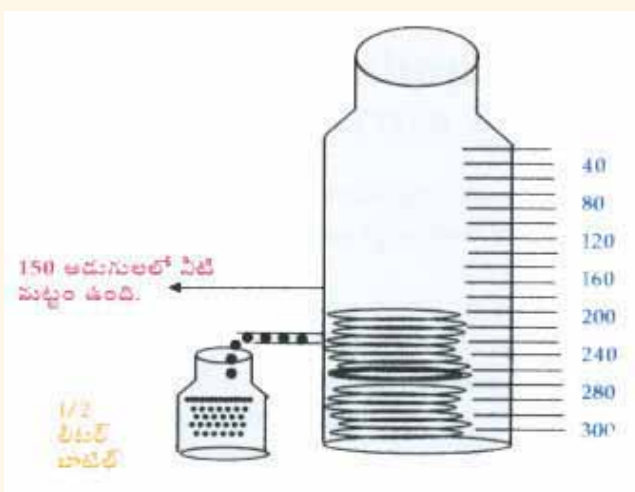
Objective : Inform the members about water discharge measurement of observation borewell.

Rationale : In the past cultivation was done by seeing the water position in lakes and ponds. But borewell farmers doesn't know the water levels. The following experiment is much useful explain to farmers if there is no observation borewell nearby.

Materials Required : Graduated 2 litre bottles with side tap, 1/2 litre bottle, stop watch.

Process :

- ❖ Take some water into the 2 litre bottle, observe the water level and close the tap. Keep 1/2 litre bottle below the tap.
- ❖ Open the tap and switch on the stop watch simultaneously. Stop the stop watch after the 1/2 litre bottle filled with water.
- ❖ Observe decrease in water level after seeing the reading.
- ❖ Tell the members that in the same way time taken to fill a 100 litre drum near a borewell can be measured.



9. WATER REQUIREMENT FOR VARIOUS CROPS

Objective : Discussion about amount of litres of water required for various crops, per acre.

Rationale : The difference in the quantity of water used for various crops and the water for various cultivated crops could be easily understood by the following process.

Materials Required :

- ❖ Glass tank
- ❖ Fix metre scale on glass tank vertically
- ❖ Wooden stand for the glass tank
- ❖ Water mixed with Potassium Permanganate or Blue colour
- ❖ Plastic trays with various crops for exhibition

Method of Preparation :

- ❖ Prepare a glass tank in rectangular shape
- ❖ Paste the edges (leak proof) to prevent leakage of water
- ❖ Paste a metre scale on one side of glass tank.
- ❖ Pour water mixed with Potassium Permanganate or blue.
- ❖ Keep plastic tray with crop saplings on glass tank

Process :

- ❖ Explain to them that the extent of glass tank is equal to one acre field. The water accumulated in pits dug in metres in one acre would be sufficient to the same as crops shown in exhibition.
- ❖ While the water required for a crop is shown in metres explain to them the water required for that crop.
- ❖ Show the water requirement for various crops (in metres), first show the crops which require minimum quantity, followed by crops with maximum quantity of water.
- ❖ Explaining in litres and comparing with the capacity of a water tank which is quite familiar or known to the members in the Hydrological Unit area required for various crops.
- ❖ Exhibiting water requirement for every crop in this way make farmers to understand exact water requirements for all crops.



The following picture can be used for discussion about the crops and their water requirements.

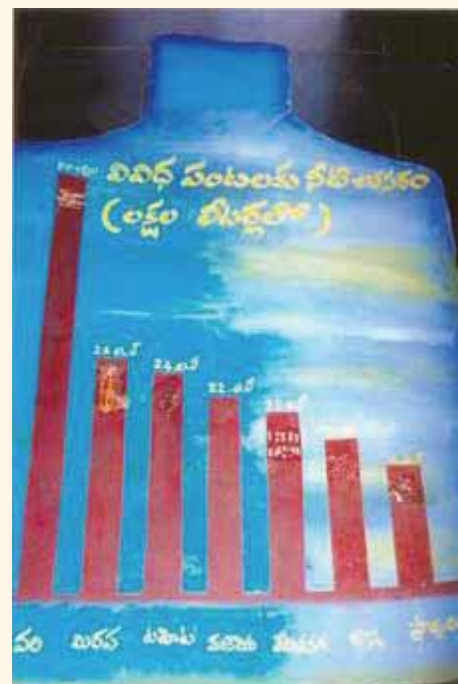
Materials Required : Card Board (Big), Colours, Different crops (plants, seeds, fruits, vegetables)

Method of Preparation :

- ❖ Cut the card board to bottle shape, show the water requirements for various crops in bars.
- ❖ Put seeds or fruits of each crop on the bar for easy recognition
- ❖ Mention water requirement details for various crops on top of the graph bar.

Process :

- ❖ This model can be used in Farmer Zonal School (**Rythu Kshetra Pathasala**) or Crop-Irrigation water plan (**Panta Neeru Pranalika**) workshop to explain water requirements for various crops per acre / hectare.
- ❖ Ask farmers how many wets they are giving to each crop, and discuss in terms of lakhs of litres.
- ❖ Discuss about the water requirement differences between various crops, dry crops and crops which require maximum water.



10. WATER HOLDING CAPACITY

Objective : Discuss that soils which use organic fertilizers will have maximum water holding capacity.

Rationale : Farmers are using chemical fertilizers in large quantities and because of this not only the character of soils will change but also the water holding capacity would also decrease. Whereas the use of organic fertilizers would increase the water holding capacity of the soil and discuss the same with the members.

Materials Required : Transparent plastic bottles (3 No's), Soil, Vermi-Compost, Water, Three Cloth pieces, Physical Balance, 250 grams measuring weight, 1 litre bottle, Three trays

Method of Preparation :

- ❖ Take three transparent plastic bottles
- ❖ Take same type of soil and make it into three parts
- ❖ Put 500 gm. soil in one bottle, 250 gm soil + 250 gm Vermi-Compost in second bottle, 250 gm soil + 250 gm fertilizers in third bottle.

Method of Preparation :

- ❖ Pour 1 litre water in each bottle, keep it for 5 minutes
- ❖ Place thin cloth cover on top of the vessels
- ❖ Keep each vessel upside down in a tray
- ❖ Bottle with only soil will give off more water into the tray
- ❖ From this experiment it become very clear that the soils which used organic fertilizers has maximum water holding capacity.



The following experiment will help to explain the important of organic fertilizers.

Materials Required : 6 water bottles, 6 plastic trays, cotton cloth, three soil varieties (each 500 grams), thread, water

Method of Preparation :

- ❖ Remove the lower base portion of all water bottles
- ❖ Close the mouth portion of the bottle with cotton cloth tightly

- ❖ Fill the three bottles with three soil varieties
- ❖ Fill the other three bottles with soil mixed with organic fertilizers (3 parts soil + 1 part organic fertilizer)
- ❖ Hang the soil filled bottles upside down with the help of coir thread tied to it.
- ❖ Keep a tray under each plastic bottle

Process :

- ❖ Pour water slowly on top of the soil in each bottle
- ❖ Collect water after a brief period and measure
- ❖ Measure water collected from 3 bottles with soil and discuss the difference
- ❖ Measure water collected from 3 bottles filled with organic fertilizers and discuss the difference.
- ❖ Discuss with members about the water holding capacity of different soil types and their differences in holding the water.
- ❖ At the same time, explain and discuss with the members about how organic fertilizers increase the water holding capacity of soil.

11. DRIP AND DOUBLE RING IRRIGATION METHOD

Objective : Discussion about drip and double ring irrigation method.

Rationale : If it is not possible to take farmers to demonstrate drip and double ring irrigation method practically, then show this model and discuss with them.

Materials Required : 12 mm Plywood (2 x 2 feet), wood board (2 feet x 7 cm) L x W, Thermocool sheets, Plaster of Paris powder, Plastic tree, Paint.

Process :

- ❖ Fix 2 x 7 wood plank or plywood with the help of nails and hammer.
- ❖ Release two thermocool sheets into the box, make a hole of 20 gm. circle.
- ❖ Keep plastic tree in the hole, and put plaster of Paris mixed with water.
- ❖ Fix a drip pipe and show drip irrigation for mosambi (Bathayi) plant.
- ❖ Discuss with members about drip and double ring irrigation method to Mosambi plantation and highlight the water that could be saved by this process.



12. “ SRI VARI ”RICE CULTIVATION

Objective : Discussion about Sri Vari Rice Cultivation.

Rationale : Show the model to members first and then proceed with intense discussion with them.

Materials Required : PVC, 2 kg boxes (2), Rice saplings, water, rice grain and charts.

Process :

- ❖ Keep ordinary variety of Rice saplings in one PVC box, and Sri Vari saplings in another PVC box, and write on the boxes the name of the plants.
- ❖ Fill the two boxes with water and then keep 250 gm and 750 gms of rice grains by the side of it.
- ❖ Discussion should be on the differences between general rice variety and 'Sri Vari' rice cultivation.
- ❖ Discuss with farmers about quantity of water required, crop yield and cultivation methods between the two varieties of rice.



13. ALTERNATE RIDGE AND FURROW METHOD

Objective : General irrigation practices in Mirchi crops and alternative ridge and furrow irrigation method.

Rationale : Instead of prolonging discussion about general irrigation practices and alternate ridge and furrow with farmers. It is better to show models or take them to a nearby field for better understanding.

Materials Required : PVC tins (2), water mirchi / chilli plants.

Process :

- ❖ Graduate the empty PVC tins from below with 10 - 20 - 30 - 40 - 50 numbers.
- ❖ Write general irrigation practices on first tin, pour water upto level 30. Keep a plant in this tin.
- ❖ It may be informed that 30 lakh litres of water is required by this process to cultivate mirchi crop.
- ❖ Write year after year water (Alternate years) on second tin and pour water upto level 20. Keep a plant in it.
- ❖ It may be informed that only 20 lakhs litres of water is required by this method.
- ❖ The difference between the water requirements of Mirchi crop by the two methods can be understand quite easily by showing this model.



LESSONS



14. COMMITTEE MEMBERS COOPERATION IN THE IMPLEMENTATION OF DECISIONS

Objective: To inform everybody the importance and their cooperation in implementing the decisions taken by the committee.

Rationale: Decisions taken by the committee can be implemented successfully by the President of the Committee with a firm backing of its members and also by the every user of groundwater resources. This concept can be best understood by all members through a playlet.

Materials Required: Three glass bottles with water

Playlet :

- ❖ The first person introduces himself as President of the village committee and inform the villagers that coming two days the supply of drinking water won't be there due to motor repair and should use water judiciously.
- ❖ Next, three persons show three bottles with water and enact that they are working.
- ❖ After a while, the first person drinks some water, and empties the entire water for washing his face.
- ❖ The second person, does the same as the first person and empties the bottle.
- ❖ The third person drinks little and store the rest of the water.
- ❖ After some time the first person approaches the second person to drink water from his bottle. He shows his empty bottle. He also feels thirstily.
- ❖ The two persons go to third person and drinks from his bottle.
- ❖ After some time, three of them feel thirsty and express their anguish at the empty bottles in their hands.

Process:

- ❖ Select three persons, explain them briefly about the significance of the playlet and its importance and ask them to play before the committee members.
 - ❖ Discuss with the members that all should unite and work together in managing the groundwater resources. Compare the playlet with the water consumption.
- The cooperation of committee members can be expressed also by the following game.

Process :

- ❖ Divide the members into the groups and explain the following information.

- ❖ Some signs are given two groups and they should show immediately in unison whenever they asked for. They lose marks for wrong sign. Explain 3 signs to them.

- ❖ Paper means palm should be shown
- ❖ Scissors - show fingers scissors shape

- ❖ Stone - show fist

- ❖ Suppose first group show stone, in response second group show paper. Since stone can be wrapped with paper, group which show paper gets marks. Otherwise, if scissors is shown, then marks to the group which showed stone.

- ❖ Suppose one group shows paper, second group scissors, since paper can be cut with scissors group will get marks.

- ❖ Members expressed that they discussed among themselves before scoring marks and needs.



15. BRAIN TEASER

Objective : To make all the members active during meetings.

Rationale : Mind is like an ape, mind will be roaming on various issues after concentrates on the topic that the meeting is discussing. It is a universal problem ask them to some a puzzle under these circumstances, in order to make members active and dynamic.

Material Required : Charts, Markers

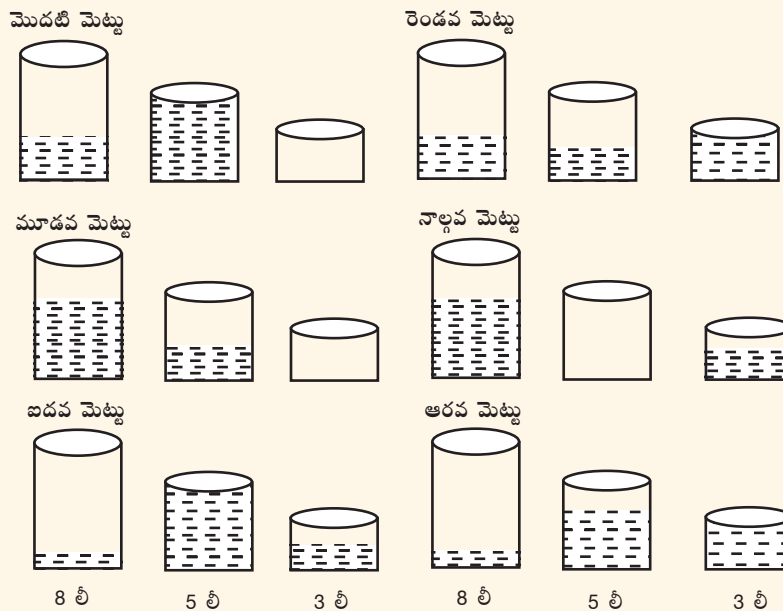
Process :

- ❖ Draw an 8 litre vessel with water full, 5 litre vessel and 3 litre vessel.
- ❖ Ask small groups to divide equally the water in 8 lit. vessel using other two vessels.

Method of Equal Sharing :

- ❖ First step : Fill 5 litre vessel from 8 litre jar
- ❖ Second step : Fill 3 litre vessel from 5 litre jar
- ❖ Third step : Pour 3 litres into 8 litre vessel, there are total 6 litres water in 8 litre vessels.
- ❖ Fourth step : Pour 2 litres water from 5 litres vessel into 3 litre vessel
- ❖ Fifth step : Pour 5 litres from 8 litre vessel into 5 litre vessel. These will be 1 litre water left in 8 litre vessel.
- ❖ Sixth step : Pour 1 litre water into 3 litre vessel from 5 litre vessel leaving 4 litres in it. Transfer 3 litres water into 8 litres vessel. Total 4 litres equal in both vessels.

In the following way 8 litres water can be shared equally.



16. GOOD LEADERSHIP QUALITIES

Objective : Discussion about various types of leaderships and their qualities.

Rationale : A good leader is a rationale for any public committee and so also for ground-water management committee. The following exhibition will make farmers to understand easily about the concept.

Material Required : 3 Glass tumblers, Sugar, Stone, Lime

Exhibition :

- ❖ Take three empty glasses, pour water equally in all the three.
- ❖ Put small stone in one glass
- ❖ Put little bit of lime in second glass
- ❖ Add sugar in third glass

Process :

- ❖ Make members to show the above exhibition
- ❖ Ask farmers what happened after some time
- ❖ Compare stone, lime and sugar with three types of leaders after extracting answers from farmers.
- ❖ The stone in the first glass remain as such. In the same fashion, some leaders take decisions without the consent of the members. These leaders won't consider ideas of the members. Members of the committee are at loss than benefited by such leaders. This type of leadership is known as autocratic leadership.
- ❖ Lime in the glass mixes well with water but that water becomes unusable. This type of leaders are not transparent, they pollute the suggestions given by members and take wrong decisions.
- ❖ Sugar in the third glass mixes well. The good leaders mixes well with the public, brings a good name to the society as well as committees. This we call democratic leadership.
- ❖ Resolutions are passed with the approval of all the members in this set up so that no members will be at loss.

The following experiment can also be shown to discuss about the leadership qualities.

Materials Required : 3 disposable glasses, water, one spoonful of sugar, stone, soil

Process :

- ❖ Pour water in three disposable glasses. Put stone in first glass, soil in second glass, and sugar in third glass.

- ❖ Members may observe the following phenomenon, assume water as committee members, glass as committee, soil and stone, sugar as three types of leader. Discuss the issues the members observed keenly.
- ❖ First glass - leader - stone, won't mix well with the members. His high headedness, and autocratic style of functioning are not well with the committee seeing him the members would ran away.
- ❖ Second glass - leader - soil - this leader spoiled his committee members by his bad vices.
- ❖ Third glass - leader - sugar - mixed well with the members of the committee. Showed his skill, characters and leadership qualities slowly. He was a role model to his members and brought a change in them too.
- ❖ Emphasize the need of good leaders and good leadership qualities for the present society and discuss at length with the members. Another method to discuss about the good leadership qualities.



Materials Required : Coir thread of 5 to 6 metres.

Method of Preparation :

- ❖ Blind fold 4 male, female members
- ❖ Give them coir thread to make a rectangular shaped structure (like a cot) with knots at four ends.
- ❖ They should do this feat blind folded, but they can discuss among themselves.
- ❖ This game should be played on big / small groups.
- ❖ Discuss with the members after the completion of the game about the significance of the play and leadership qualities.

The inference from the game is that members should see a person as their leader; he or she, and can complete the game with the active cooperation of others. In the same fashion the decision of committee leader would lead to development and progress.

Other Information:

- ❖ This game can be created as energizer as well as leadership qualities.

17. GROUNDWATER MANAGEMENT COMMITTEE - DIFFERENT LEVELS

Objective: Groundwater management committee discussion about various levels.

Rationale: This exercise can be used to discuss how different groundwater committees are working at different levels and their levels of cooperation among themselves.

Material Required: Two Books, Slates or Charts, 4 disposable glasses or bottles.

Process:

- ❖ Keep 4 glasses on four corners of the book on floor. Keep the second book on top of it.
- ❖ Ask a member to pull the book on the floor by doing so, the glasses as well as the book on top may fall.
- ❖ It can be viewed from the above incident that equal representation should be given in the three tier system of committees, just like a basement, walls, and are roof of a house under construction.

Village level (Basement)

Hydrological Unit area level (walls)

District level (Roof)

Explain them that committees mentioned above have equal representation as well as responsibilities.

18. MEN, WOMEN EQUAL PARTICIPATION

Objective : Discussion about equal participation of men and women.

Rationale : Majority of the decisions in a family are taken by the men only, but when both husband and wife take decisions together then they should take precautions to avoid conflicts. In the same fashion, men and women should consult each other about the decision regarding management of groundwater resources. This can be aptly described by this game.

Materials Required: A stone that can be lifted with one hand

Process:

- ❖ Ask a member, he or she to come forward to show their right hand.
- ❖ Imagine and treat fingers of hand and ask them to show as follows:
Thumb finger as Mother
Index finger as Father
Middle finger as Son
Ring finger as Daughter in law
Little finger as Grandson
- ❖ Ask the men to lift the stone without the help of women with index, middle and little fingers.
- ❖ Ask the members they observed after the game is over.
- ❖ Equal participation of men and women in groundwater management paves way for the progress of the entire Hydrological Unit area.



19. DELINEATION OF HYDROLOGICAL UNIT AREA

Objective: Farmers can understand the phenomena easily by showing this model about the delineation of Hydrological Unit area.

Materials Required: Clay, water bottles, small pebbles, big stones, water

Process:

- ❖ Make clay into a shape of an elevated area with mountains and hillocks.
- ❖ Place small pebbles, stones to mimic real mountains and hillocks.
- ❖ Create fencing with clay at the lower portions of the mountains.
- ❖ Pour water on top of the mountains from the plastic bottles like rainwater are whose bases are having holes like a sieve. The rain water reaches the base of the mountains and hillocks but not cross the fencing. Hydrological Unit area can be described basing on the water course in the region.
- ❖ Farmers can understand easily the character of a Hydrological Unit area, its boundary, the past glory of the Hydrological Unit area, and the present situation. They also grasp how streams and rivulets originate in the Hydrological Unit area.

20. HYDROLOGICAL UNIT AREA MODEL

Objective: Discussion about the measurement of Hydrological Unit area.

Rationale: Farmers measure the extent of a Hydrological Unit area before they calculate the accumulated groundwater. In order to measure the extent of Hydrological Unit area the farmers have to transform the Hydrological Unit area in toposheet form into this model form.

Materials Required: Card board, Hydrological Unit, Area Toposheet, Scale, Colour, Pens, and Paint

Method of Preparation:

- ❖ Draw Hydrological Unit area by 1: 50,000 scale on a card board sheet
- ❖ Draw square boxes just like in a graph sheet on the Hydrological Unit area
- ❖ Identify full squares, 1/2 square, 1/4 square and 3/4 square by different symbols.

Full square = 1 rupee

1/2 square = 1/2 rupee (50 NP)

1/4 square = 1/4 rupee (25 NP)

3/4 square = 3/4 rupee (75 NP)



Process:

- ❖ Ask the members to count the squares in the Hydrological Unit area by showing the model.
- ❖ Ask them to count full squares, 1/2 squares, 1/4 squares and 3/4 squares separately.
- ❖ Convert 1/2, 1/4 and 3/4 squares into squares and count.
- ❖ Tell them that 1 square is equivalent of 62.5 acres (As per 1: 50,000 scale) and ask to count Hydrological Unit area spread in acres.

Model of the Hydrological Unit area can be prepared as follows:

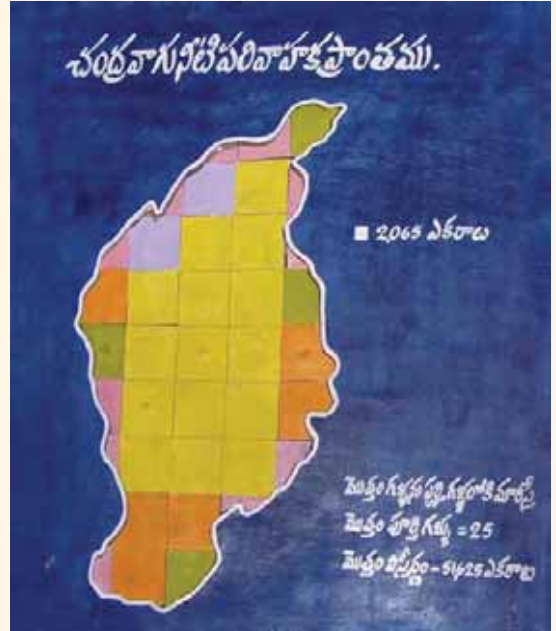
Materials Required: Map of Hydrological Unit area, 12mm plywood (3 x 2 feet), 18mm plywood (3 x 2 feet), wood beading (11mm by 10 feet), 1 inch nails, carbon paper, and charts.

Method of Preparation:

- ❖ Fix 1 inch wood beading on 12mm plywood (3 x 2 feet) draw squares on white chart by 7.5 cm distance. Place the map of Hydrological Unit area unit and draw boundary line around it.

- ❖ Plywood board is sized to 3 x 2 feet (By keeping on 18 mm board), keep a carbon paper on it and draw the map of Hydrological Unit area including squares by pencil.
- ❖ Hydrological Unit area map is ready on 18 mm plywood board after the marking is over.
- ❖ Cut the 18mm board upto HU boundary with the help of a carpenter to get the shape of HU area. Now cut the square portions.
- ❖ Slide in 18mm board into the already readied 12mm board. The Hydrological Unit area map is empty in the centre of the board.
- ❖ Keep the cut squares into the empty place to create map.
- ❖ Give different colours to full, 1/2, 1/4 and 3/4 squares.

(Or) Show Full Square with one rupee coin, 3/4 square with 50 + 25 NP, 1/2 square with 50 NP, 1/4 square with 25 NP. Write area of the square as the backside. Total area can be calculated in this way.



21. ESTIMATION OF RAINFALL FOR RABI SEASON

Objective: Estimation of Rainfall during Rabi Season (October to May).

Rationale: Rainfall estimation during Rabi Season can be estimated by taking into consideration recharge of water by rain in Rabi Season as part of Crop-Irrigation Water plan by calculating the average rainfall of the area during the last decade would be expected in this Rabi Season also. This can be explained to the members including the estimation of average rainfall by a small game.

Materials Required: 50 small size stones, rainfall details of the last decade, One Tin.

Method of Preparation:

- ❖ Keep 50 small stone in the tin and ask 10 members to collect some from the tin.
- ❖ Ask them to count the stones with them and turn other members.
- ❖ Tell the members that no two persons are having the same number of stones with them. Ask them to put in all stones in the tin again.
- ❖ Distribute 50 stones equally to 10 members
- ❖ Now, ask members how many stones they have
- ❖ Explain to them that the stones they collected first time were equal to rainfall of the decade and the stones distributed equally among the members were equal to average rainfall of the year.
- ❖ In this way by adding the rainfall details of 10 years and divide equally would give estimate for average rainfall for the coming Rabi Season. Discuss with members. Estimation of Rainfall for Rabi Season can also be done by using the model given below:

Material Required: Water bottles, paper, water, sketch pens, potassium permanganate or Blue

Exhibition:

- ❖ Remove the caps of 10 water bottles
- ❖ Mention year on a paper and paste it on each bottle
- ❖ Prepare water solution mixed with potassium permanganate or blue
- ❖ Pour this colour water with each bottle as yearly rainfall (Rabi Season) in mm. Write millimeters on paper and paste on the bottles.

Process:

- ❖ Discuss with members about the rainfall by showing bottle after bottle, rainfall in Rabi Season for that year etc. show all bottles.
- ❖ Pour the water from all 10 bottles into a bucket and ask them to distribute equally among the 10 bottles.

- ❖ The average of that one is the rainfall estimation for the coming Rabi Season.

Rainfall can be estimated by farmers themselves by the following process:

Materials Required: 10 transparent vessels, One big vessel, water, blue colour, table, 10 paper pieces, pen, gum, rainfall details for 10 years (November to May).

Process:

- ❖ Write yearly water fall details on a piece of paper
- ❖ Paste one paper piece on every transparent vessel
- ❖ Take water into a big vessel, and add blue colour to it to be visible to people from distance.
- ❖ Basing on the yearly Rainfall details, pour this colour water into each transparent vessel
- ❖ Read out the rainfall details by reading from the bottles
- ❖ Pour out the 10 bottles water into a big vessel in order to know the total rainfall for the past decade.
- ❖ Empty the water in the big vessel into 10 transparent bottles
- ❖ Tell the members that water in every bottle is the average rainfall for that year
- ❖ Tell them that this average rainfall is going to be next year rainfall.



22. FARMER DESTROYERS

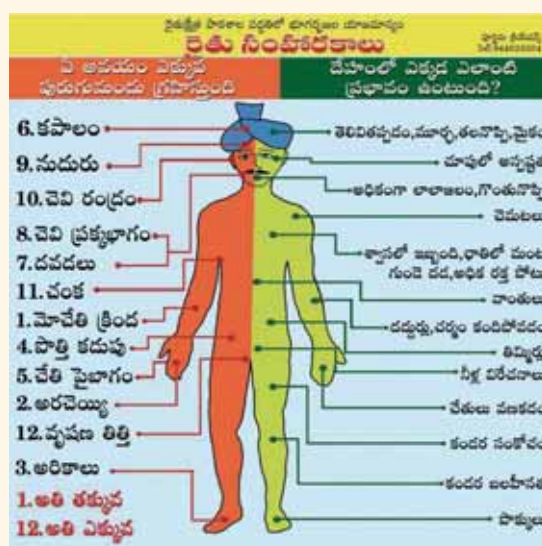
Objective: Inform the dangerous effects of chemical fertilizers / insecticides on human beings.

Rationale: Farmers are spraying large amounts of insecticides / pesticides in the form of chemical fertilizers on crops. However, the chemical pollution has spoiled environment and polluted the groundwater. Farmer should know about the harmful effects of these chemicals by the following play.

Materials Required: Big Brown chart, Markers

Process:

- ❖ Ask a farmer from a small group to lie down on the brown chart.
- ❖ Draw a shape of a human being using marker pens
- ❖ The dangerous effects of spraying pesticides on various body parts are identified and ask the members to write it with red ink.
- ❖ All these dangerous effects are codified and ask them to share this vital information with big groups.
- ❖ Apart from the deleterious effects mentioned by the members, information not known to the members can also be discussed.



23. TEST FOR WATER POLLUTANTS

Objective: Preparation of safe drinking water after removing different pollutants from the water.

Rationale: Most of the villages have no facility for protected drinking water. By knowing the quality and purity of water we can take precautions. Members can understand by seeing the experiment.

Materials Required: 2 Glass tumblers, 20 gms (Patika), 1 glass of drinking water from village, and 1 glass pure water.

Process:

- ❖ Pour village drinking water into a glass
- ❖ Pour pure water into the second glass
- ❖ Pulverize 20 gms. of Alum Powder and make it two equal halves.
- ❖ Put Alum powder (halves) into two glasses
- ❖ Observe the glasses after 30 minutes observe for residue if any pollutants are remained at the bottom of glass.
- ❖ Discuss with members about the precautions and protected drinking water.

24. WEED MANAGEMENT

Objective : Weed plants in crops and its management.

Rationale: The following experiment will reveal to members about how weed plants in crops of major varieties complete for micro and macro nutrients and weed plants management.

Materials Required : 100 ml bottles (3), 2 or 3 weed plants (nearby field), Rice plant, Blade, Cotton plug, Kesari Colour, 1 litre water, Permanent markers, Charts.

Process:

- ❖ Ask members to pluck and bring two varieties of weed plants and one Rice plant along with roots.
- ❖ Wash the root system in water and cut a portion of roots in an angle.
- ❖ Fill 3 bottles (90%) with colour water. Keep the plants in 3 bottles with stem portions rapped with cotton plugs very tightly.
- ❖ Write names of the plants on bottles. Observe the change in plants and discuss the same with members.
- ❖ Discuss how weed plants consume all fertilizers in large quantities, leaving little to the major crops. Weed plants should be removed immediately.





GAMES



25. INTRODUCTION PROGRAM

Objective: Self Introduction

Rationale: Farmers may feel a little discomfort introducing themselves in front of a huge gathering at meetings. The following programme of games may remove inhibitions in them and prepare themselves for self introduction.

Materials Required: Charts of various fruits.

Method of Preparation:

- ❖ Collect fruit cards in equal numbers to the number of members (for example, 15 types of fruits for 30 members in pairs i.e., 30 picture cards).
- ❖ Paste them either on small cards or thick card board sheets
- ❖ Keep the cards in a card board box

Process:

- ❖ Facilitator should ask members to collect one picture each from the card board box.
- ❖ Ask members to become a pair if they receive some picture.
- ❖ Likewise every member asks others about their picture card and asks them to pair accordingly.
- ❖ Members should ask details of his / her partner (Name, Village, Crops etc.)
- ❖ Members in pairs should come forward in front of the gathering and introduce their partner with known details.



26. MAJOR ISSUES IN FIELD SCHOOL METHOD

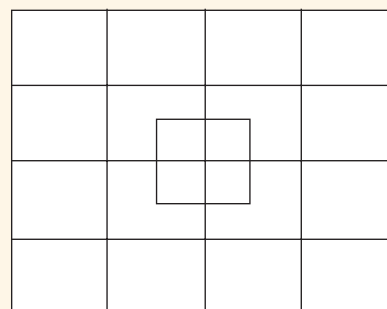
Objective: Discussion about the major issues in Field School Method.

Rationale: Major issues in Field School Method like “Observation Analysis”, Discussion and implementation of decisions are not understood by farmers if they are introduced as big lectures. These can be best understood by puzzle method easily.

Materials Required: Chart, Scale, Markers

Process:

- ❖ Draw squares of equal size with the help of scale as shown below.
- ❖ Ask the members to count carefully and feel exact squares.
- ❖ Give five minutes time to members and asks them tells no. of squares.
- ❖ Writing the answers given by members on the board, each member will given different answers and ask them, whether they have discussed with each other or not?
- ❖ Discuss with your partner and then tell that they have told the no. of squares! In the same fashion, major issues in Farmers Zonal School like “Observation”, “Analysis”, “Discussion”, Decision making” and Implementation are to be discussed highlighting their benefits.



27. CREATION OF SMALL GROUPS

Objective: Dividing all members into groups.

Rationale: Some people talk in big group and other feel shy and can't speak properly that's why small groups are created in order to give a chance to every member to speak freely without any fear about their experiences, ideas and opinions.

Materials Required: Different types of stones, locally available

Process:

- ❖ Gather different types of stones available locally. Total no. of stones equals the total no. of members.
- ❖ Place the stones in a box, and ask every member to collect one.
- ❖ Make a small group with members who have got some type of stone.
- ❖ Likewise make ten small groups basing on the type of rocks they collected.

Other Information:

- ❖ Members participate very actively and form into small groups.
- ❖ One can use different types of leaves or other resources which are available locally.

Members can be grouped too the following process:

Materials Required: 10 stones of weighing 2 Kgs. each.

- ❖ Divide members into two groups. 5 members in one group, and rest of them (25) in the second group.
- ❖ Keep 10 stones at one place (each stone weighing 2 Kg.)
- ❖ Ask the first group to arrange the stones in order.
- ❖ Next, Ask the members of the second group to arrange the stones in order at another place.
- ❖ Ask the following questions, after the game is over.
- ❖ What did you observe in the game?
- ❖ What it the different between the first and second group?
- ❖ Basing as the answers given by members, small groups work actively and emphasize the importance of small groups to all the members.

28. IMPORTANCE OF GROUNDWATER MANAGEMENT COMMITTEE

Objective: Discussion about the Importance of Groundwater Supervisory Committee.

Rationale: Instead of highlighting the importance of Hydrological Unit area level groundwater supervisory committee through non-stop lectures or sessions, it is best understood by a small story, pictorial photographs etc.

Materials Required: 4 Buffaloes, one lion, story chart, markets, and charts.

Story:

Buffaloes of the village go into a nearby jungle for grazing. The lion in the forest kills buffalo who is grazing away from his group. They observed that day by day their number is decreasing. They want a solution to end this cruel act by lion. They decided to graze as a group at one place only and plan to attack lion at once. They enter forest and according to their plan all are grazing at one place only. Buffaloes unitedly retaliate and attack lion. Lion retreats back

Process:

- ❖ First the facilitator should show the picture chart to members and put some questions.
- ❖ Write on the chart what they observed
- ❖ Compare the 4 Buffaloes with 4 village level Groundwater Committees and Lion as water problem and discuss with members intensely.
- ❖ United we can achieve impossible things also, and emphasize the need of the hour and encourage them to take decisions unitedly.
- ❖ The power of four buffaloes can be compared with Hydrological Unit area level groundwater management committee and discuss about the ways by which Hydrological Unit area level groundwater management committee can solve the problems.

The following game also will highlight the importance of the organization and the significance of united groundwater management.

Materials Required: Nine sticks (Fire wood) of equal length

Process:

- ❖ Select 7 members participating in the meeting and introduce them as representatives of each village.
- ❖ Give a stick to them, as they are singing or they are trying to overcome the hurdles.

- ❖ Call one from the members and ask him to break the two sticks from two persons. He has to break and leave.
- ❖ Give two sticks to two persons and now collect all sticks from 7 members, make it as a heap and call the member to break the entire heap. He could not break it.
- ❖ He has to tell the reasons for unable to break the heap.
- ❖ Individual sticks are compared to village level groundwater supervisory committee, heap of sticks to Hydrological Unit area level groundwater management committee and discuss about the importance of CLAGWM.



29. BOOK KEEPING

Objective: Rationale of Book keeping for the management of committee.

Rationale: Book keeping is an important work to keep track of the decisions taken by the committee, issues that were discussed in the last meeting, tasks given to persons, cash balance with the committee. If the account books are maintained properly, then it is very easy to get bank loans. Inform all these to members and use the following game for pinpoint discussion.

Materials Required: Different objects (About 20). Ex: Lid, Pen cap, Broken comb, dry leaf etc.

Process:

- ❖ Call two members male / female to come forward
- ❖ Give all the articles to one member
- ❖ After one minute asks the first member to give to second person.
- ❖ Collect all articles after one minute
- ❖ Ask first member he / she that what articles they first collected.
- ❖ Put the same questions to second person also
- ❖ Ask the members what they observed in the game.
- ❖ Codify all the answers given by members and inform them of the importance of book keeping.

30. HYDROLOGICAL MONITORING RECORD [HMR] BOOK

Objective: Recording of information in registers and their rationale.

Rationale: Farmers can understand easily if water levels, rainfall details are recorded properly and maintained. The following game can make farmers to understand better.

Materials Required: 20 small articles available (Pen, Book, Stone, Paper, Seeds etc.)

Process:

- ❖ Keep all 20 articles on the floor, cover it with a cloth
- ❖ Ask the member to watch / see the articles for 2 minutes. Cover again with cloth.
- ❖ Ask the members to note down to names of the 20 articles they had just seen.
- ❖ Members may not be able to tell all 20 articles.
- ❖ We can ask that we can't remember things that we just saw, and then how can we remember one year data collected every fortnight ?
- ❖ Because we require all this information during crop-irrigation water plan at the Hydrological Unit area level. We request all the members that they should record all their data in NMR Book / Register.
- ❖ Measurements taken by farmers of observational borewells regarding static water levels, pumping water levels, rainfall details, crop-irrigation, water plan etc. are very much essential during the meetings. This information should be collected for one year. All this information should be exchanged with all other members and records should be maintained properly.


31. COOPERATION OF COMMITTEE MEMBERS - ITS SIGNIFICANCE

Objective: Member cooperation in solving problems, its significance.

Rationale: One or two persons can't solve a problem together. It should be brought to the notice of the committee, put for wide discussion and then only a solution may emerge. Farmers can understand the concept easily by the following game.

Materials Required: Thread, Narrow mouth bottle (cool drink bottle), pens

Process:

- ❖ Put thread into 3 meter pieces.
 - ❖ Give threads to all members present
 - ❖ This game can be played in small groups and give threads depend on the members present in the small group.
 - ❖ Tie all the thread pieces into one and tie to open. The ends of all threads should be tied to wrists of all members.
- 
- The image shows a group of people, including men and women, standing in a circle in an open field. They are participating in a cooperative game. The people are dressed in casual clothing, and the background shows a line of trees and a clear sky.
- ❖ Ask all members of small groups to stand in a circle form.
 - ❖ Keep narrow empty bottle in the centre of the circle
 - ❖ All members of all groups start playing only when a signal is given
 - ❖ With the active cooperation of all members they should drop pen into the bottle.
 - ❖ Those who drop pen fast into bottle are the winners.
 - ❖ Ask the members the reasons for their team's success?
 - ❖ What are the reasons behind the teams that lost the game?
 - ❖ We can tell that only through active cooperation we can solve all problems.