RESEARCH PROGRAM ON
Dryland Systems

CGIAR

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Participatory Methodology- Gender preference in dual purpose crops in Niger

Food security and better livelihoods
for rural dryland communities

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1. INTRODUCTION

Nigerien women face systematic discrimination in terms of access to land, livestock and other assets. Female represents 36% of the economically active population in Agriculture (FAOSTAT, 2013) despite the fact that most household are male headed. Also, the gender gap tends to be widest among Niger's most productive farmers. The primary factors that contribute to the gender productivity gap in Niger are: (i) farm labor, with women facing significant challenges in accessing, using, and supervising male farm labor; (ii) the quantity and quality of fertilizer use, with men using more inorganic fertilizer per hectare than women; and (iii) land ownership and characteristics, with men owning more land and enjoying higher returns to ownership than women (Yetna et al 2015). Based principally on subsistence rain-fed farming and livestock keeping, the country's agriculture is still largely at the mercy of the varied climate. The main food crops are: pearl millet, sorghum, peanuts, cowpeas and rice. Other important product is livestock which occupies about 87% of the rural population not only as a way of life but also as an economic social and cultural activity. The last census of livestock highlights the growing proportion of livestock which is in sedentary zone (approximately 66% of total) against the nomadic livestock (Ministère de l'Elevage, 2012). Against such a backdrop, it is important to understand the gender preference on the locally available crops (food for human and feed for animal) for food security and income. What are the crop germplasm available in these villages, and which varieties are preferred for why, what and by whom? Thus the general objective of this work is to establish a participatory diagnosis of dual purpose crops dynamics in two local agrosystems of Gazaoua (Niger).

The **specific objectives** of the work are:

1. Analyze the social, environmental and economic dynamics of the local agrosystems in link with crops-livestock integration;
2. Describe the agrobiodiversity of the main dual purpose crops, including related aspects of farmers' knowledge, preferences and practices;
3. To test the performance for grain and fodder yield of farmer preferred varieties under farmer conditions through laboratory analysis.
4. Establish a participatory identification of local constraints, needs and opportunities to improve crops and livestock resilience in the local agrosystems.

Materials and Methods: Socio-Economic and Gender Analysis approach (SEAGA), will be used for the analysis of socio-economic patterns and participatory identification of women's and men's priorities and potentials. The study

will conducted in the total of two villages in Maradi action sites of Niger using qualitative –quantitative methodologies. The two villages are selected using purposive samples considering villages that were adopted in the CRP-DS project. Seeds of the local dual purpose crops and fodder samples will be collected from the farmers of these 2 villages for grain and fodder quality analysis along with the production data. Further seed also be collected for conservation in the gene bank and for further multiplication.

1.1 SITE SELECTION -

a. Please collect the following information- for the following villages:

Name of the circle	Name of the villages
1. **Maradi**	a. Milli b. Gourjia

1.2 VILLAGE INFORMATION REQUIREMENT-

In the villages following information is required

1. Population – Male, female and children
2. Total number of families
3. Total number of farm families
4. Other main occupation in villagers
5. Facility of communication
6. Facility of schooling

7. Facility of medical aid
8. Facility of drinking water
9. Attitudes and belief of rural population
10. Total area under cultivation and area under different crops
11. Yield of different crops
12. Average size of landholding
13. Total number of livestock under different species
14. Herd and flock demographies- herd structure, fertility and mortality
15. Livestock output a) Milk yield b) Meat yield of different livestock c) Days/hours worked by draft animals
16. Distribution of tree species and their yield
17. Number of fish ponds, fish species

1.3 Secondary Sources:

Please collect the data from secondary sources:

For agriculture development
1) Total area under cultivation in the village

2) Size of an average agricultural holding
3) Types and quality of crops grown including- cropping programmes, crop rotation and types of quality of livestock
4) Soil types suitable for different crops and problems connected with soil fertility , soil erosion, drainage, soil improvement etc.
5) Cattle feed, feed rations and crops grown as cattle feed
6) Utilisation of grassland
7) Disease and pest control- important diseases and pests and their control measures
8) Irrigation resources- types of irrigation sources and problems and drainage
9) Financial position of farmers – long term and short term debts, borrowed capital
10) Credit facilities- sources and facilities of securing credits
11) Agricultural machinery- types of traditional and improved agricultural implement used
12) Position of farm labour – problems of farm labour, landless labour in the village

1.4 For technology assessment and refinement

1. Population- classified by sex, age group, caste structure,size of landholding , population and socio-economic status
2. Land classification – nature, topography, utilisation and problems- if any farming system, farming situation and irrigation coverage
3. Prevailing production systems and enterprises
4. Communication and infrastructure available – types of link road, distance of village from nearest post office, telephone, grain market. Milk collection centre, health centre, village office, regional agricultural research station, university, availability of radio, TV
5. Social and economic institutions and organisations , school, cooperative society, Youth clubs, self-help groups
6. Area, production and productivity levels of field crops, cropping intensity and cropping system
7. Area, production and productivity levels of horticultural and vegetable crops
8. Livestock production in various categories, number, production and productivity levels
9. Other available agricultural related enterprises such as poultry, goatry, etc, size production and productivity levels

1. PARTICIPATORY METHODOLOGY TOOLS INSIDE THE PRODUCTION SYSTEM-

a. **Checklist for Participatory Rural Appraisal-**
Contextual analysis

1. Problem identification technique	Both men and women together	
2. Social Map	Both men and women together	
3. Transect	Separate for Men and Women	
4. Resource Map	Separate for Men and Women	
5. Trend lines	Separate for Men and women	
6. Venn diagram	Separate for men and women	
7. GIS	For both men and women	
8. Institutional profile	Separate for men and women	
Livelihood Analysis		
1. Seasonal analysis	**Separate for Men and Women**	
2. Systems Diagram	Separate for Men and Women	
3. Four Square analysis	Separate for Men and women	
4. Crop preference	Separate for men and women	
5. Fodder crop preference	Separate for Men and Women	
6. Spider diagram for crop activities	Separate for Men and Women	
7. Spider diagram for livestock activities	Separate for Men and women	
8. Daily activity clock	Separate for Men and Women	
9. Feed processing technology preference	Separate for Men and Women	
10. Breed preference for animals	Separate for Men and Women	

11. Livelihood analysis	Separate for Men and Women	
Stakeholders Priorities		
1. Flow diagram	Separate for men and women	
2. Venn diagram	Separate for Men and Women	

2.1 CONTEXTUAL ANALYSIS

2.1.1 PROBLEM IDENTIFICATION TECHNIQUE

Step1: Identify key informants in the village

Select 10% of villages which fall under the research by random sampling technique. In each village, identify the key informants. The key informants are those persons who know the ins and the outs of various aspects of village, village people and various occupations in the village. It's better that the key informants are practicing farmers who stay in the village.

	Farmer 1	Farmer 1
		Farmer 2
	Farmer 2	Farmer 1

Key Informant 1		Farmer 2
	Farmer 3	Farmer 1
		Farmer 2
Key Informant 2	Farmer 1	Farmer 1
		Farmer 2
	Farmer 2	Farmer 1
		Farmer 2
	Farmer 3	Farmer 1
		Farmer 2
Key Informant 3	Farmer 1	Farmer 1
		Farmer 2
	Farmer 2	Farmer 1
		Farmer 2

	Farmer 3	Farmer 1
		Farmer 2

Contacting the required numbers of farmers and key informants snowball technique to contact required number of farmers from each key informant, get the names of three farmers who actually face the problems listed by them. In this way you go on contacting farmers and put the three questions regarding 1 listing the problems, 2 ranking the problems, 3 asking them to indicate the loss or the extent of damage in term of %. Do this until you get the data at least from 30 farmers? These 30 includes the key informants also.

3. Make a list of key informants and farmers chosen for problem identification

Table 1 : Problems identified by the Farmer

S.N.	Name of the farmer	Age	Land owned in hectares
1 2 . . 10 .			

20 . . 30			

Step 2, 3 and 4: listing and ranking of the problems, estimating economic importance and contacting the required number of key informants and farmers

Table list of problems identified by the farmers

Problem	**Description of the problems**
1	High labor charge
2	Non availability of labour
3 4 5 6	Water scarcity Pests and diseases

Problems identified by individual farmers, rank and % of loss.

S.N	Problems	Rank	% of loss
1			

2			
3			
4			
5			
6			
7			

2.1.2 Social Map

- Developing a comprehensive understanding of the physical and social aspects of village life.
- Collecting demographic and other required information household wise
- Providing a forum of discussion in which to unravel the various aspects of social life
- Serving as a guiding instrument during the process of planning interventions

Steps

- The process of social mapping should including the following steps:
- Fix the location and for the exercise in consultation with the local people. Invite for it.
- Explain the purpose of the exercise to the participants. Request them to start off which drawing the prominent physical features of their locality. Leave it to them to use whatever materials they choose- local as well as other materials- as creatively as possible.
- Watch the process alertly. Listen to the discussions carefully. Take notes in as much detail as possible.
- Do not rush things. Avoid chipping in. try to hand over the stick to them, that is, involve them deeply and actively. Let them have total control and initiative. Have faith in them and show it too.

- Keep track of two is actively involved, which sections of the society they belong to, and who is being left out. Take proactive steps to involve those left out in the process.
- Your role going through a rough patch.
- If you have something to add or clarify, wait for just the right moment. Do not disrupt the process. Ask them ''what about …', ''what does this symbol represent?'', ''what does this symbol represent?'', etc.
- Once the mapping is over, ask some people to identify their houses in the map.
- Number the households. It will be useful for gathering data later.
- Ask them to depict the household wise details you are particularly interested in, like ethnicity, composition, school age children, etc. this will, of course, depend on the purpose of the exercise.
- Interview the map: ask probing questions on the aspects you are not clear about, ask for more information on them, if necessary
- Copy the map on to a large sheet of paper. Do not miss any details or mess them up.
- Triangulate the information generated with others in the locality.
- Selections of site for mapping
- Location of the site for mapping is quite crucial. Hense you would do well to keep the following points in mind while selecting the site:
- Capacity to hold people
- Does the site have enough capacity to hold the required number of participants?
- Does the site get cluttered up in the case of a gathering?

Location

- Is it a central place?
- Will it be convenient for everyone?

Exclusion

- Will it be comfortable for all sections of society to come there?

2.1.3 TRANSECT

Purpose

The transect is a tool that directly builds upon the Village Resources Map to help us learn more details about the environmental, economic and social resources in a community. A transect is a sort of one-dimensional map of a line cut through a village. It depicts a cross-section of an area along which a number of issues are recorded. The purpose of a transect is to organise and refine spatial information and to summarise local conditions in the area. The information is gathered from direct observation while walking a straight line through the community.

Process

Organise 2 or 4 groups with a participants such as women and men, young and old. Either the different participants can be asked to take different team members for separate transect walks, showing the areas of most importance to them, or, each group can have responsibility for a different topic while they all walk together. For example, one group may focus on soils, land use and cultivation, a second on trees, vegetation and water resources, and a third, on infrastructure, housing and services. Afterwards the groups share the information from their walks to construct the transect diagram(s) together.

Using the Village Resources Map, and the advice of the participants, choose a moreor-less straight line through the area. The line chosen should take in as many of the different physical zones, types of vegetation, land-use areas and sections of the community as possible. It is often a good idea to start from the highest point in the area. Depending on the size of the area to be covered and the nature of the terrain, a transect can be done on foot, animal, cart or motor vehicle. But the slower modes are preferable because they allow for greater observation.

Materials

Notebooks, pens, flip chart paper and markers.

Notes to the RA team

While on the transect, ask questions about each zone. Everything noted is written down as the transect proceeds. During the transect walk (or ride or drive) take time for brief and informal interviews with women and men met along the way. During these interviews, discuss the critical issues already identified by the RA team and ask whether there are other issues as well. One of the advantages of doing a transect is that often people are more willing to discuss sensitive issues such as land ownership patterns when they are away from the village. Allow sufficient time for the transect. It may take several hours.

2.1.4 Resource Map

Purpose

The Village Resources Map is a tool that helps us to learn about a community and its resource-base. The primary concern is not with cartographic precision, but with getting useful information about local perceptions of resources. Participants should determine the contents of the map focusing on what is important to them. Maps may include:

- infrastructure (roads, houses, buildings)
- water sites and sources
- agricultural lands (crop varieties and location)
- agro-ecological zones (soils, slopes, elevations)
- forest lands
- grazing areas
- shops, markets
- health clinics, schools and religious facilities
- special use places (bus stops, cemeteries, shrines)
- animal types

Process

- Plan and organise a meeting for the entire community. Make sure that it is scheduled for a time when both women and men can attend and that all socio-economic groups have been invited.
- The Village Resources Map is a good tool to begin with because it is an easy exercise that initiates dialogue among the community members and Research team members.
- A large open space should be found and the ground cleared. It is easiest to start by placing a rock or leaf to represent a central and important landmark. Participants are then asked to draw other things on the map that are important in the village. Participants should not be interrupted unless they stop drawing, in which case questions can be asked such as whether there is anything else of importance that should be added.
- When the map is completed, facilitators should ask the participants to describe it and to discuss the features represented. Ask questions about anything that is unclear.
- Finally, the facilitator may want to ask participants to indicate some things they would like to see in their village that are not currently on the map -- in other words to draw a picture of what they would like the future to look like. This allows for some preliminary planning ideas and encourages people to begin contributing their thoughts at an early stage in the participatory process.

Materials

Sticks, pebbles, leaves, sawdust, flour, dung or any other local material. Flip chart paper and markers also may be used.

Notes to the Research team

All RA team members need to observe the mapping exercise because, it provides an overall orientation to the spatial features of the community and its key resources .

Be sure that the final map includes direction indicators (North, South, East, West) and an outline of the village borders. Thank the participants for they active participation.

2.1.5 TREND LINES

Applications - Trend analysis is useful to

- Learn from the community as to how they perceive changes over time in various areas/aspects of their lives.
- Integrate significant changes in the village profile.
- Discuss village problems and any increase or decrease in the severity of the problems over the years rather than asking direct questions.
- Discuss intervention and measures which had worked out or failed in the past and the reasons thereof.
- Understand people's perception of not only the past and present but also of the shape of things to come in near or distant future with or without intervention.
- Produce a conductive environment, after discussions on reasons for the present state of affairs, to plan the possible interventions.

Process

Steps

- The suggested steps in the process of trend analysis are as follows:
- Select a group of local people who are interested in the exercise. Explain to them the purpose of the exercise to understand the situation of land, water, farming, forest and livestock in last forty years.
- Initiate a discussion on the present situation and then move on to the aspects you are interested in pursuing. This sets the climate for trend analysis.
- In the spirit of a participatory approach, however, ensure that the participants themselves arrive at the aspects to be studied.
- Facilitate the discussion further to arrive at the aspects of trend analysis. Explain the objective and make the group of participants brainstorm and come out with a list of aspects related to the land, water, crop, forest and livestock they would like to study and select the most important ones.

- Also facilitate the selection of time landmarks across which the trends could be studied. Encourage the participants to depict the selected landmark years on cards preferably by symbols or visuals. Similarly also have them represent various aspects in the same way.
- Ask participants to make the matrix on the ground, using chalk. Ask them to represent from top to bottom the landmark years and from left to right various aspects like density of trees, grass,animals, crops, etc.

Village name: Sadore, Niamey, Date:….. June 2015

Natural Resource / Period	Land	Forest	Water	Livestock	Agriculture
1975					
1985					
1995					
2005					
2015					

- Take up one of the aspects, .ask the participants to depict the situation today in the relevant cell using symbols, stones etc., as the case may be. Leave the choice to the participants.
- Move to the next time landmark and so on. After the completion of one aspect, move to the next one and follow the same process till the time all the cells are filled in.
- Once the diagram is ready, ask them whether they are satisfied with it or whether they would like to make any changes.

- Also find out whether they would like to add new aspects coming up during the process. This is the time to ask them to depict certain aspect which did not figure in their list findings and reflect on them. Some key questions for the discussion could include:
    - Major trends and findings
    - Causes of the trends
    - What can be done?
    - Who can play a role in it?
    - What can the participants and local people do themselves?
    - What can they do with a little assistance from outside?
- Interview the diagram. Ask questions to clarify your doubts and gain an-depth understanding of the trend.
- Copy the diagram onto a sheet of paper with details of the legend, the scoring system, the participants and facilitators, and the location and date.
- Thank the participants for their active involvement and for their time.
- Triangulate the diagram and other findings generated during the discussion with others having knowledge about the topic.

Time required

Around 2-2 $\frac{1}{2}$ hours should suffice for trend analysis. But the time requirement may vary with details aimed at and the topics for discussion.

2.1.6 VENN DIAGRAM

Applications

- Various institutions and individuals and their influence on the local people.
- Various groups and individuals in the locality and their influence.

- The main actors in the community and their conspicuous and inconspicuous influence.

Steps

The suggested in the process of doing a Venn diagram are as follows:

Explain the purpose of the exercise to the participants.

- Ask them to; list the various institutions, individuals, etc.; as per the objectives of the exercise.
- Ask them to write and/or depict them on small cards. Visual depiction becomes necessary if there are non-literate participants.
- Ask the participants to place cards on one of the variable of study, e.g., perceived importance of institution, in a descending order. Once the cards are arranged in an order, ask them whether they agree or would like to make modifications. Encourage them to make changes, if they are interested.
- Ask them to assign paper circles of different sizes (cut and kept ready) to the instructions or individuals in such a way that the bigger the circle, the higher that instruction or individual ranks on that variable. Paste on the circles the cards with names of instructions or individuals. If you want, you can simply note down or depict the instructions or individuals on the circles.
- Draw a circle on the ground representing the community. Ask them to place the circles in such a way that those high on the second variable, accessibility, are kept close together, while those low on the variable are kept away from the circle representing the community.
- Once all the cards are placed, ask them if they agree with the placement. In case they want to, encourage them to make changes.
- In case, there are certain institutions/individuals who interact or work closely, they could be placed with an overlap. The degree of overlap indicates the cards in such a manner. Note down the points of discussion and explanation.
- Copy the output onto a sheet of paper. Record the name of the village, participants, date, legends, what the size of the circle represents and what the distance represents.
- Thank the participants for their active involvement and time.

- Triangulate the diagram and the major finding with others knowledgeable about the situation to ensure that your information is correct.

2.1.7 Geographical Information System

Aim: To derive land use anal cover maps showing distributions of different land units:

- Crop fields
- Settlement areas
- Villagers
- Urban centres
- Water Bodies
- Natural vegetation including- shrubs, herbs and other crops

- As a pre-requisite for the above exercise, field connaissance and collection of ground data point representing each vegetation and non-vegetation community were collected using GPS, in what is known as ground trothing
- As a planning tool, one envision crop production if compared with religion with similar of toil types and environments. Essentially, secondary socio-economic data can easily interpreted using a pre-configured function in the GIS software package arc, or even using other open-source interfaces with similar functionalities

2.1.8. Institutional Profiles

Purpose

Institutional Profiles are tools that help us to learn more about the nature of the institutions identified in the Venn Diagrams. An analytical chart is created for each institution in the community to examine what they have accomplished and what they need to foster development work. If local communities are to implement development activities which they can sustain, explicit attention must be paid to their capacities.

Process

- Work with the same groups of participants that produced the Venn Diagrams.
- For each local group or institution identified in the Venn Diagrams, discuss at least four kinds of information: founding and goals, management, achievements and needs.
- Pre-prepare a chart on flip chart paper for each institution. Be sure to ask about leadership, membership, activities, decision-making processes, and interactions or conflicts with other groups or institutions.

Materials

Venn Diagrams, flip chart paper and markers.

2.2 Livelihood analysis tools

2.2.1 . Seasonal Calendars

Purpose

Seasonal Calendars are tools that help us to explore changes in livelihood systems taking place over the period of a year. They can be useful in counteracting time biases because they are used to find out what happens in different seasons. Calendars can be used to study many things such as how much work

people have at different times of year or how their incomes change in different periods. It can also be used to show the seasonality of other important aspects of livelihoods such as food , feed, crops, livestock marketing and water availability.

Process

- Work with the same focus groups of women and men that produced the Daily Activity Clocks. Explain that this time you want to learn about what people do in a year.
- Find a large open space for each group. Calendars can be drawn on a large paper or can be traced in the sand or on a dirt floor using stones or leaves for quantification.
- Draw a line all the way across the top of the cleared space (or paper). Explain that the line represents a year -- and ask how people divide up the year, i.e. months, seasons, etc. The scale to use is the one that makes the most sense to the participants. Ask the participants to mark the seasonal divisions along the top of the line.
- It is usually easiest to start the calendar by asking about rainfall patterns. Ask the participants to put stones under each month (or other division) of the calendar to represent relative amounts of rainfall (where more stones equal more rain).
- Once the rainfall calendar is finished, you can draw another line under it and ask them to make another calendar, this time showing their labour for agriculture (putting more stones over the time periods of high labour intensity). Make sure the labour calendar, and all subsequent calendars, is perfectly aligned with the rainfall calendar.
- This process is repeated, one calendar under another, until all the seasonal issues of interest are covered. Be sure that calendars include those for food availability, water availability, income sources and expenditures. Ask the participants to put a symbol or sign next to each calendar to indicate the topic. As much as possible ask the participants also to describe the sources of food and income, etc.

2.2.2 Resources Picture Cards

Purpose

The Resources Picture Cards help us to learn about the gender-based use and control of resources within the household. Variation among the different socioeconomic groups is included.

Gender roles are a key aspect of how resources are managed and decisions made. Who in a household has access to resources such as land, livestock and food? Who makes decisions about the use of resources? Understanding the answers to these questions helps us to understand who is likely to lose and who is likely to gain because of a particular development activity.

The Resources Picture Cards tool is particularly useful for facilitating frank discussions about a sensitive issue in a fun and non-threatening way. In a visually clear manner the resource base of both women and men is shown, fostering discussions about priorities and resource needs for development action plans.

Process

Work with the same focus groups of women and men that produced the Daily Activity Clocks and Seasonal Calendars. Explain that this time you want to learn about resource use and control.

Place the three large drawings, one of a man, one of a woman, and one of a man and woman together, on the ground in a row with adequate room between them. (Alternatively they can be taped up on a wall.) Underneath these drawings scatter the 20 or so smaller cards, each picturing a different resource, at random. Include some blank cards so that participants can add resources.

Ask the participants to sort the cards by placing them under the three large drawings, depending on who uses the resource, whether women, men or both.

Facilitate the discussion among the participants about why they made the choices they did.

Then put the second set of drawings and cards on the ground, close by to the first set. Repeat the exercise but this time focus on who has control, ownership or decision-making power concerning each resource.

Again, facilitate the discussion among the participants about why they made the choices they did.

Ask the participants to compare the way they have arranged the two sets of Resources Picture Cards.

Repeat with other groups, as necessary, and compare.

Materials

Two sets of Resources Picture Cards, small stones to hold them in place if the exercise is carried out outdoors, or masking tape if using a wall.

2.2.3 Income & Expenditures Matrices

Purpose

Income & Expenditure Matrices are produced to help us understand a very important aspect of people's livelihoods -- sources of income and sources of expenditures. This tool can also reveal changes in expenditures in times of crisis. By quantifying the relative importance of different sources of income for different people, including both women and men from each social group, we can understand the security or vulnerability of different people's livelihoods.

By quantifying the relative importance of different sources of expenditures for different people, we can understand their priorities and limitations. In the Expenditures Matrix it is important to see if all, most or only some of their total income is spent to meet basic needs -- food, water, clothing, shelter, health care and education. After meeting their basic needs, do people have any money left for savings or to invest in their livelihoods, such as animal vaccines or fertiliser?

Process

Organise two or three new focus groups, this time mixing up socio-economic groups, men and women, young and old, etc. Work with each group separately. Explain that you want to learn about from where they make money and on what they spend it.

Begin by asking the group to list their sources of income. Start drawing the matrix on the ground, or on a large piece of paper, by indicating each source of income across the horizontal axis. The group may want to select pictures or symbols to represent each category.

Collect 50 stones (ask the children for help). Explain that these stones represent the total income for the whole community for the year. Ask the participants to divide the stones according to their wealth/income, with one person representing each socioeconomic group having a proportion of the 50 stones, as discussed and agreed upon by the group as a whole.

The representative for each socio-economic group is asked to stand along the vertical axis with his or her proportion of stones. In other words, the vertical axis may include a representative for rich women, poor women, rich men, poor men, etc. Each in turn is asked to distribute their stones in the matrix to indicate their sources of income -- putting a lot of stones under major sources of income, few stones under minor sources of income, and no stones at all if they make no money from that particular source. This is carried out, in discussion with their fellow participants, until all the stones are distributed.

Record the matrix - counting all the stones for each source of income for each socioeconomic group.

Now ask the participants to list all their expenditures, including savings. Change the horizontal axis of the matrix to represent each category of expense. Again pictures or symbols may be desirable.

Ask the representatives for each socio-economic group to collect back all their stones (the same number each used for the income matrix) and to distribute them to show how they spend their money.

Record the matrix - counting all the stones for each expenditure for each socioeconomic group.

Finally, create a relevant crisis (army worm, drought) and ask each representative to remove several stones from the matrix to show where they would find the money to cope. Discuss the impact of crisis and the coping strategies of the different participants.

Record from where the stones were taken to cope with crisis. From school fees?

clothing? food?

Materials

Local materials including 50 stones (or leaves or sticks), or paper and pens.

2.2.4 Farming Systems Diagram

Purpose

The Farming Systems Diagram helps us to understand how rural household livelihoods are assembled. It is a diagram designed to highlight the farming system, including on-farm activities such as crop production, off-farm activities such as fuel collection, and non-farm activities such as marketing. The diagram also shows the flow of resources to and from the household and who is involved, by gender.

- Having household members make a diagram of their farming system helps to capture the full range of household activities showing the complexity of the livelihood system.
- They also often show how livelihoods may depend on many different types of agro ecosystems many of which may be common property resources such as forests, grazing lands, rivers and streams.
- Farming systems diagrams can also illustrate that women and men each have specialised knowledge about particular crops, animals or tree products - knowledge that can be built upon for development.

Process

- Select two households from each of the socio-economic groups identified in the Social Map. Visit each household individually.
- After courteous introductions tell the family that you want to learn about their farming activities (no need to mention mapping at this point). Ask the women and men in the household to walk with you through their farm. This helps people feel at ease as it allows household members to show their knowledge. Do not forget to cover the housing area and common property areas. As you walk along ask questions about the activities and resources you see. Do not forget to ask about what happens in other seasons and in places too far to visit.
- After about 30 to 40 minutes walking, gather together as many household members as possible - men, women, children - for discussions about what you have seen and talked about. Then stop and suggest to the family that the information they are providing is too much to keep in your

head and is better recorded by drawing the information on a piece of paper. Continue the discussion but ask those present to help you make the drawing. As soon as you can let the family take over the drawing. Soon you will just be asking questions and listening.

Materials

Paper, coloured pencils or pens.

2.2.5 Benefits Analysis Flow Chart

Purpose

The Benefits Analysis Flow Chart is a tool that helps us to understand what the "fruits" of people's livelihood activities are, and who enjoys them. It is a tool that builds upon the information learned in the Farming Systems Maps.

Livelihood activities and resources generally result in products and by-products -- what we call benefits. For example, the benefits of growing a tree may include fruit, fodder, fuelwood, lumber, bark and poles. The benefits resulting from growing pearl millet may include food, oil, fuel, fencing and animal feed. The Benefits Analysis Flow Chart shows who uses each of these products, who decides how it is used and who controls the money if sold.

Process

Make a return visit to each of the families that produced the Farming Systems Diagram (scheduled at a convenient time discussed at the end of your first visit). Arrive with a set of index cards (a different set for each family) already prepared based on the information about resources revealed during discussions of the Farming Systems Diagram.

Each card should represent a resource or a product or by-product (benefit) of the family's various livelihood activities. For example, poultry production may result not only in eggs and meat for consumption, but also eggs for sale, meat for sale, feathers, fertiliser and gifts for special occasions. Each of these would be shown on a separate card. Bring along a number of blank cards as well as the Farming Systems Diagram.

Deal out a few of the prepared cards at a time to the adult family members. They pass the cards around taking turns looking at them. Ask them to describe who in the family uses the products, how it is used, who decides how it should be used and who controls the money if sold. If a family member does not know much about a particular product, he or she passes the card to the person who does. Additional information is sought from other household members.

Use the blank cards for adding additional products and by-products as they come up in the discussion. Make reference back to the Farming Systems Diagram as needed.

Materials

Blank index cards, coloured pencils or pens, notepaper with several blank Benefits Analysis Flow Charts for recording the discussions, and the Farming Systems Map produced by each family.

2.2.6 Daily Activity Clocks

Purpose

Daily Activity Clocks illustrate all the different kinds of activities carried out in one day. They are particularly useful for looking at relative work-loads between different groups of people in the community, e.g. women, men, rich, poor, young and old. Comparisons between Daily Activity Clocks show who works the longest hours, who concentrates on a small number of activities and who must divide their time for a multitude of activities, and who has the most leisure time and sleep. They can also illustrate seasonal variations.

Process

Organise separate focus groups of women and men. Be sure that each group includes people from the different socio-economic groups. Explain that you would like to learn about what they do in a typical day. Ask the groups of women and men each to produce their own clocks. They should first focus on the activities of the previous day, building up a picture of all the activities carried out at different times of day and how long they took. Plot each activity on a circular pie chart (to look like a clock). Activities that are carried out simultaneously, such as child care and gardening, can be noted within the same spaces.

When the clocks are completed ask questions about the activities shown. Ask whether or not yesterday was typical for the time of year. Note the present season, e.g. wet, and then ask the same participants to produce new clocks to represent a typical day in the other season, e.g. dry. Compare.

Materials

Flip chart paper, coloured markers and a ruler

2.2.7 Four Square analysis-

Four square analysis a tool for assessing crops at local level

Four square analysis can be done on the ground with the real samples of the crops and varieties, or on larger paper sheets based on variety names.

A large cross needs to be drawn on the ground or paper to distinguish four categories or squares

Large area, many households	Small area many households
Large area few households	Small area, few households

The squares or categories can be visualized by drawing different numbers of huts or people and small and large fields

Upon invitation, participant are asked to bring along samples of the crops and varieties they grow

During this exercise, they discuss among themselves and decide to which of the square a particular crop and variety belongs

For example, if the majority of households grew a variety on large fields, it is placed in the first square, or if a few households grew it on a small plots only it is assigned to square four number

This goes on until all different samples are placed. The name of each variety mat be written on stones or cards and placed next to the samples

Notes and photographs may help for the documentation

2.2.8 Spider diagram for crop activities

Aim: to under the gender roles in crop and livestock activities.

Steps:

Call for the meeting of the representatives and active members of group. Explain to them purpose of the on exercise. Initiate a discussion with them on how the groups are performing.

Ask them to identify the indicators on which the role of men and women can be identified. You may get a number of indicators first on crop activities . Encourage the participants to arrive at most 5-6 useful indicators by a process of discussion and prioritization

Once you have arrived at a set indicators, the next step is to draw a centre point on a large paper or ground. Draw as many arms/spokes from the hub as indicators identified. Allocate an indicator to each

of the arms by using the name or depicting the indicators with visuals. If you are dealing with participant with low literacy skills, depicting each of the indicators by visual or symbols becomes essential. Encourage the participant to select and depict the symbols themselves.

Now ask them to give a score to each group on different indicators. A score of 0-5 is best, where zero indicates lowed score and 5 is the highest score. The scores of each group can be plotted on arms for each group, using a line pattern

Ask the participant to explain the diagram in detail and also to draw them findings

Ask probing questions to clarify your doubts or get a further understanding

Copy the diagram with details of the participants, facilitators, location, date and legends on piece of paper

Thank the participation for their time and active participation

Triangulate the diagram and details generated during the exercise

Time required: $1^{1/2}$ and $2^{1/2}$ hours

Material required: flip chart (red, blue, green, black, marchers)

2.2.9 SPIDER DIAGRAM FOR LIVESTOCK ACTIVITIES

Aim: to under the gender roles in crop and livestock activities.

Steps:

Call for the meeting of the representatives and active members of groups. Explain to them purpose of the on exercise. Initiate a discussion with them on how the groups are performing.

Ask them to identify the indicators on which the role of men and women can be identified. You may get a number of indicators first on crop activities and similarly ask for livestock activities. Encourage the participants to arrive at most 5-6 useful indicators by a process of discussion and prioritization

Once you have arrived at a set indicators, the next step is to draw a centre point on a large paper or ground. Draw as many arms/spokes from the hub as indicators identified. Allocate an indicator to each of the arms by using the name or depicting the indicators with visuals. If you are dealing with participant with low literacy skills, depicting each of the indicators by visual or symbols becomes essential. Encourage the participant to select and depict the symbols themselves.

Now ask them to give a score to each group on different indicators. A score of 0-5 is best, where zero indicates lowed score and 5 is the highest score. The scores of each group can be plotted on arms for each group, using a line pattern

Ask the participant to explain the diagram in detail and also to draw them findings

Ask probing questions to clarify your doubts or get a further understanding

Copy the diagram with details of the participants, facilitators, location, date and legends on piece of paper

Thank the participation for their time and active participation

Triangulate the diagram and details generated during the exercise

Time required: $1^{1/2}$ and $2^{1/2}$ hours

Material required: flip chart (red, blue, green, black, markers)

2.2.10 Breed preference for animals -Matrix Pairing tool

- Choose an individual or a group

- Choose, or ask people to choose, a class of objects (breed) that is important to them and about which they know something
    - Ask them to name most important ones. This list could consist of anything from two to seven objects or more. So far, four, five or six have proved best
- Elicit criteria: for each item in turn ask: what is good about it? And them what is bad about it?
- List all the criteria. Turn negative criteria (eg vulnerable to pest) into positive ones (eg not vulnerable to fests) so that all are positive
- Draw up a matrix with the objects across the top and the criteria down the side
- Ask which object is best each criterion. With six objects. I have found that following sequence work quite well:
- Which is best?
- Which is next best?
- Which is worst
- Of the remaining which is better?
    - Record the ranking directly into the matrix. Force a final choice with a questions on the lines of if you could only have one of these. Which would you use? Which next? Which next?

2.2.11 Crop preference -Matrix Pairing tool

1. Choose an individual or a group
2. Choose, or ask people to choose, a class of objects (variety), (breed) that is important to them and about which they know something
3. Ask them to name most important ones. This list could consist of anything from two to seven objects or more. So far, four, five or six have proved best
4. Elicit criteria: for each item in turn ask: what is good about it? And them what is bad about it?
5. List all the criteria. Turn negative criteria (eg vulnerable to pest) into positive ones (eg not vulnerable to fests) so that all are positive
6. Draw up a matrix with the objects across the top and the criteria down the side

7. Ask which object is best each criterion. With six objects. I have found that following sequence work quite well:

- Which is best?
- Which is next best?
- Which is worst
- Of the remaining which is better?
    - Record the ranking directly into the matrix. Force a final choice with a questions on the lines of if you could only have one of these. Which would you use? Which next? Which next?

2.2.12 Fodder Crop preference -Matrix Pairing tool

1. Choose an individual or a group
2. Choose, or ask people to choose, a class of objects (variety) that is important to them and about which they know something
3. Ask them to name most important ones. This list could consist of anything from two to seven objects or more. So far, four, five or six have proved best
4. Elicit criteria: for each item in turn ask: what is good about it? And them what is bad about it?
5. List all the criteria. Turn negative criteria (eg vulnerable to pest) into positive ones (eg not vulnerable to fests) so that all are positive
6. Draw up a matrix with the objects across the top and the criteria down the side
7. Ask which object is best each criterion. With six objects. I have found that following sequence work quite well:

- Which is best?
- Which is next best?
- Which is worst
- Of the remaining which is better?

- Record the ranking directly into the matrix. Force a final choice with a questions on the lines of if you could only have one of these. Which would you use? Which next? Which next?

2.2.13 Feed Processing TECHNOLOGY PREFERENCE -Matrix Pairing tool

1. Choose an individual or a group

2. Choose, or ask people to choose, a class of objects (feed processing technologies) that is important to them and about which they know something

3. Ask them to name most important ones. This list could consist of anything from two to seven objects or more. So far, four, five or six have proved best
4. Elicit criteria: for each item in turn ask: what is good about it? And them what is bad about it?
5. List all the criteria. Turn negative criteria (eg vulnerable to pest) into positive ones (eg not vulnerable to fests) so that all are positive
6. Draw up a matrix with the objects across the top and the criteria down the side
7. Ask which object is best each criterion. With six objects. I have found that following sequence work quite well:

- Which is best?
- Which is next best?
- Which is worst
- Of the remaining which is better?
    - Record the ranking directly into the matrix. Force a final choice with a questions on the lines of if you could only have one of these. Which would you use? Which next? Which next?

2. Stakeholders Analysis

3.1 Flow Diagram

Purpose

- The Flow Diagram is a tool that builds upon the learning from the Pairwise Ranking Matrix. It helps us to learn about people's understanding of the causes of their problems as well as the effects resulting from their problems. It can also be used to identify possible solutions.
- The Flow Diagram deepens analysis of the main problems in the community by revealing how problems, cause, effect and solutions are linked. It can also show which problems have solutions that can be implemented by the community, which problems require external assistance to resolve, and which seem to have no solution at all, such as natural disasters.
- **Process**
- Work with the same focus groups that participated for the Pairwise Ranking Matrix.
- Take only one priority problem (as identified in the Pairwise Ranking Matrix) at a time.
- Put the name (or symbol) of the problem in the centre of the flip chart paper and draw a circle around it.
- First, ask about the causes of the problem. As each cause is named write it on a separate card. Discuss and probe until there are no more causes identified.
- Ask the participants which causes are related to one another. Ask assistance from participants in placing the causes cards on the flip chart in correct relationship to the problem. When everyone agrees on their placement draw arrows from the causes to the problem.
- Second, ask about the effects that result from the problem. As each effect is named write it on a separate card. Discuss and probe until there are no more effects identified.
- Ask assistance from participants in placing the effects cards on the flip chart in the correct places. When everyone agrees on their placement draw arrows to and from the effects and problem.
- Third, ask about solutions. As each solution is named write it on a separate card. Discuss and probe until there are no more solutions identified.

- Ask assistance from participants in placing the solutions cards on the flip chart in the correct places. When everyone agrees on their placement draw double lines between the solutions and the problem.
- Repeat for each priority problem for each group.

Materials

- Flip chart paper, an easel or wall, masking tape, markers, and A3 cards (in 3 colours).

3.2 Attach accompanying Activity Sheets for each tool.

Rapid Appraisal activity sheet

Activity Sheet #_____ Date:

Village:

Place:

Time:

Facilitator: *(responsible for leading the discussion with the participants, asking questions, introducing the tools, etc.)*

Recorder: *(responsible for taking notes about what is said and drawing pictures of what is designed, mapped, or modelled)*

Translator: *(if needed)*

Step: *(development context, livelihood analysis, stakeholder's priorities)*

Tool: *(trend lines, village map, seasonal calendar, etc.)*

Participants: *(by gender, age, wealth, ethnicity, etc.)*

Triangulation with:

activity #__ activity

#__ participants:

Process: *(a step-by-step description of what will happen)*

Materials: *(materials needed to be prepared, taken with you or found when you get there)*

4 TOOLS OUTSIDE THE PRODUCTION SYSTEM

4.1 MARKET

1.Markets where animals are sold , Names of the market.

2. People who supply feed, animals , veterinary services and inputs

Focus in the outputs from these systems -

a. Animal consumed
b. Animal sold
c. egg consumed
d. egg sold
e. check where the animals are sold
f. check if any feed and health input purchased

Collect additional information on :

1. Investment in housing
2. Markets where animal and feed are purchased and who supply them
3. Markets where animals, meat, feed are sold or the people who buy them?
4. Check on the ownership of the flocks
5. Do people own their animals?
6. Are people contracted to raise the animals
7. What responsibilities do they have?
8. Are there rules for raising animals?
9. How are they rewarded?
10. What are the various feed prices
11. What are the various labour charges?

4.2 STRUCTURED INTERVIEW- FODDER VALUE CHAIN SURVEY: CASE TRADERS FORAGE AND ANIMAL FEED

Focus group discussion with men and women trader separately:
Minimum 15 women and 15 men

1. History of the Merchant fodder and feed livestock activities (overview of his/her professional career)
   ?.....

2. What are the other sources of income of the shopping fodder and feed cattle?

3. What is the market name ?

4. How many men and women feed trader?

5. How many days in the year , the trader he dedicated to the marketing of livestock feed and fodder ? .....

6. What are the difficulties faced by the trader in his activity: .....

7. What quantities (kg , boot, bag, etc.) fodder and animal feed that the trader sells a week?
   .....
8. .....
9. What percentage of forage and livestock sold to major food (wholesale) traders?

   .....

10. What percentage of forage and livestock feed sold to end users (farmers?
    .....
11. What are the different types of food marketed cattle?
    .....
    .....
12. What are the different types of livestock feeds preferred by wholesalers?
    .....
    .....
13. Where does the trader buys animal feed (zones, villages, etc.)
    .....

14. What are the various types of feed sold?…
15. In terms of how many producers buys cattle food?
    ……
16. At what price per kg, boot, bag, etc.) (Depending on the type of feed) the trader buys the animal feed? ……..
    ……
17. What determines the price forage and cattle feed (type, quality, time of year, etc.)?
    ……
    ……
18. What are seasonal factors determining the purchase of forage and feed for livestock traders ?……
    ……
19. What are the areas or regions for acquisition forage and livestock foods by season?
    ……
    ……
20. What are the different types of transport in transportation of livestock fodder and other feeds?
    ……
    ……
21. What are the different additional costs between purchase and sale of livestock fodder and other foods?
    ……
    ……
22. What are the selling prices of different food and livestock fodder?
23. ……
    ……
24. How the trader sets the selling prices of different food and livestock fodder?
    ……
    ……
25. What are the preferences of farmers in terms forage and cattle feed?

26. ……
……
27. What percentage of sales of forage and cattle feed to breeders?
28. ……

29. What is the approximate number of traders of food and livestock fodder ?
30. ……

4.3 Fodder value chain survey: Case of producers of forage and crop residues

Please conduct separate focus group discussion between men and women farmers
Minimum 15 women and 15 men

1. What is the total area of the fields of the producer and forage crop residues?
……
……
2. What are the crops or crop residues as fodder sold?
……
……
3. History of the producer in the production forage or crop residues and feeding of domestic animals?
……
……
……
4. What is the daily schedule of the producer for agricultural activities particularly in feeding its animals?
……
……
…
5. What costs related to production and animal feed
……
……
……

6. What are the difficulties faced by the producer in the production of fodder and animal feed?
……
……

7. What causes the difficulties encountered by the producer in the production of feed and animal nutrition?
……
……
8. How the producer sells its production of fodder and crop residues?
……
……
9. What percentage of forage fodder sold to traders?
……
…… ……
10. What percentage of fodder used to feed the animals on the farm?
……
……
11. What are the reasons for the sale of fodder?
……
……
12. What are the rental and sale of fodder crop residues?
……
……
13. What are the reasons for choosing these places of sale?
……
14. What is the seasonality of demand for forage and crop residues?
……
15. What amounts of fodder sold and those distributed to the exploitation of animals?
……
16. What are the frequency distribution of fodder (supply of farm animals?
……
……

17. At what price per kg, boot, bag, etc.) (Depending on the type of feed) the producer he sells fodder and crop residues? …….
…….
18. What determines the price of fodder and crop residues (type, quality, time of year, etc.)?
……
……
19. What are the different types of services that provide fodder traders fodder producers?
……
……..
20. Does the producer intends to increase its production area of forage or crop residues?
…….
……

5. To test the performance for grain and fodder yield of farmer preferred varieties under farmer conditions through laboratory analysis.

Objective of the study:

1. The objective of the experiment is to test the performance for grain and fodder yield of farmer preferred varieties under farmer conditions through laboratory analysis.

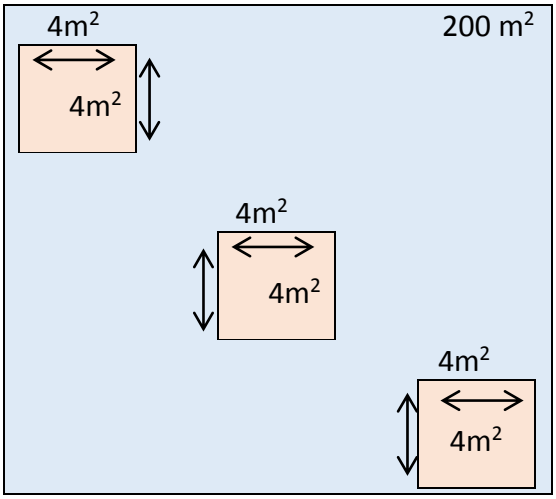
2. Collection of seeds of gender preferred dual purpose crops

By random sampling a total of 20 farmers will be selected from two village. Each village will have 5 women and 5 men farmers. The samples and data will be collected from these farmers.

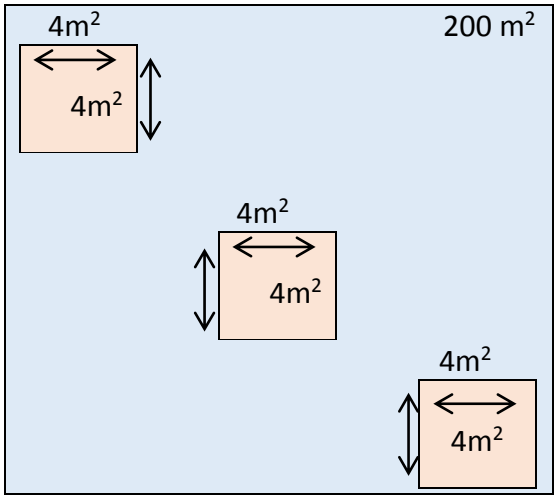
Procedures for data collection for Pearl Millet, Sorghum-

Sampling

Step1: Consider the sizes of each of the three sub-plots, 4m*4m for the performance squares in each 200 m2.



Example of sampling in treatment T2



Example of sampling in treatment T4

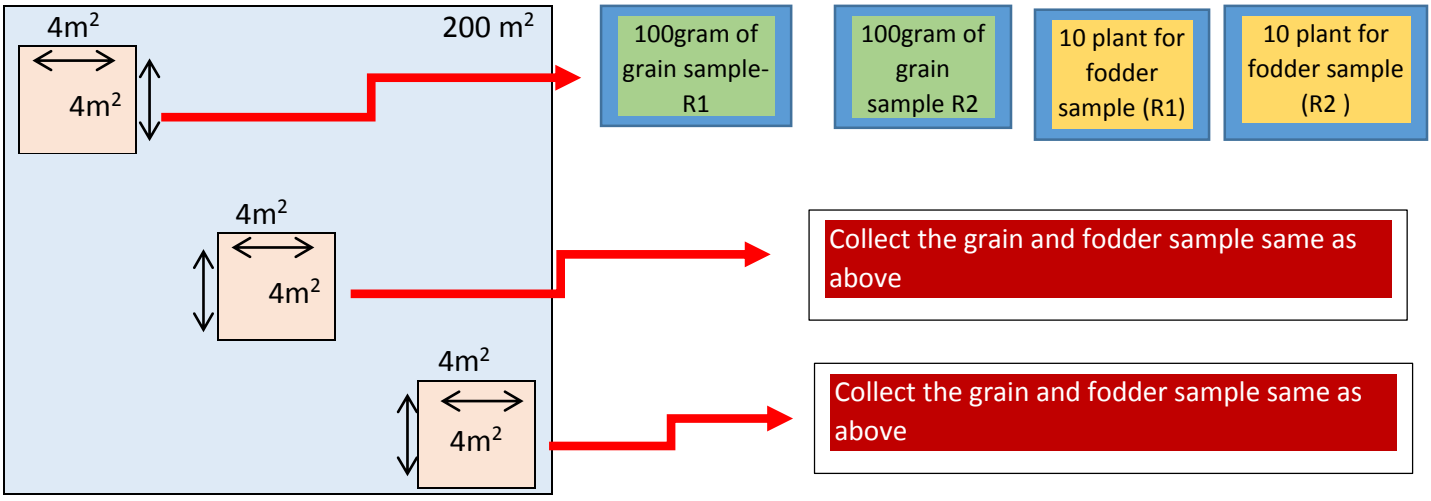
Figure 1: Sampling design

Step2: Eliminate border lines for the sampling in the performance square.

Step3: Determine the number of the plants to consider for the sample for all of the operations.

Step4: Consider first, 10 plants for stems and leaves yield assessment.

Step5: Consider 10 plants in each sub-plot of each experimental unit for the grain assessment.



Farmer 1: Treatment 1 replication 1

Figure2: Collection of sample for grain and fodder

Therefore from every farmer field, samples will be taken for grains and stovers in case of Pearl Millet, Sorghum (or available crops in production system) The sample quantity for grain will be 100 gram. The samples will be labelled properly.

- Name of the farmer
- Date of sample collection:
- Description of the variety:
- Replication:

The samples will be analyzed for grain and fodder quality for wet lab analysis on proximate principles to ILRI where the samples will also be processed for further for NIRS analysis with parameters of DM, CP ADF NDF etc.

<u>Observations to be collected for Millet , Sorghum, Ground nut and Cowpea</u>

1. **Plant stand count per plot**: this will be taken at maturity by counting the number of plants in 4m2*4m2 each plot.

2. Number of hills per plot: the number of emerged hills in each plot will be counted after field establishment.

3. Days to 50% flowers: days will be counted from date of planting to the time when at least half of plants produce flowers in each plot.

4. Plant height (cm): this will be measured at maturity by sampling five plants from each plot. The height will be obtained by measuring the length of stem from base (ground level) to the tips using meter rule and the average will be computed.

5. Days to maturity: the days taken from sowing to when the plants reach physiological maturity stage will counted from each plot.

6. Total dry matter/plant (TDM) (g): to obtain the crops each from the component crops will be sampled from each net plot and oven dried

Pearl Millet, Sorghum data

7. **Lodging:** this will take into account the number of Pearl Millet stands that collapse or bend in each per plot.

8. **Striga count**: the number of emerged striga will be counted in each plot.

9. **Panicle number**: this will be obtained by counting the panicles or head of Pearl Millet produced in each plot.

10. **Panicle weight (g)/plot**: this will be determined after harvest by weighing the panicles of each net plot using weighing balance.

11. **Panicle length**: five panicles from each net plot will be measured using meter rule and their average (in cm) will computed.

12. **Stalk weight (g):** after cutting the panicles, five stalks from each net plot will be cut from ground level and weighed.

13. **1000 seed weight (g**): 1000 seeds from net plots will be counted by seed counter after drying to obtain 1000 seed weight per plot.

14**. Disease**: infected plants will be noticed and counted in each plot. Disease score (1-No symptom, 2-Slight infection, 3-Moderate infection, 4-Severe infection, 5-Very severe infection)

Cowpea, Ground nut data

15**. Grain weight (g)**: after shelling, the grains will be dried and weighed using scale balance to measure the weight of grains (in g) in net each plot.

16**. 100 seed weight (g):** this will be obtained by counting 100 seeds from each net plot and measure their weight in grams.

17. **Pod weight (g)**: the harvested pods from each net plot will be weighed to obtain pod weight per plot.

18. **Fodder weight (g):** fodder weight will be obtained after the pods are separated. The weight of five plants (in g) will be measured using balance.

19. **Disease**: infected plants will be noticed and counted in each plot. Disease score (1-No symptom, 2-Slight infection, 3-Moderate infection, 4-Severe infection, 5-Very severe infection)

Observation to be recorded Sheet 1: Field information

Village		
Farmer name		
Varieties		
Animals		

Sheet2: Cropping observations

Serial Number	**Activities**	**Date**	**Type/Quantity / Season of work**	**Comments**
1	Labour		Type of labour :	
			Price per day	
2	Seed		Distance between the lines :	What are the problems during sowing? What was the specification used?
			Row spacing:	
3	Fertiliser		Type :	
			Quantity:	
			Price/kg	
4	Fertiliser		Type :	Was it together with the weeding?
			Quantity :	
			Price/kg	
5	Fertiliser		Type :	When applied?
			Quantity :	
6	Insecticide – Pesticide Treatment		Type :	What kind of insect pest attack? When?
			Type :	

			Price/kg	
7	1st Weeding			
8	2nd Weeding			
9	Evaluation visit			
10	Harvest			Bird attack? Diseases when?
11	Threshing			
12	Grain produced		Quantity:	
			Type:	
			Type	
13	Fodder produced		Quantity :	
			Type:	
			Type:	
14	Home consumption		Quantity:	
			Type	
			Type	
15	Kept as Seed		Quantity	
			Sold as seed:	Price per kg
16	Marketing		Quantity	Price per kg
			Type	

Observations for Pearl Millet

Date	Name of the farmers	Varieties	Pearl Millet Data													
			1	2	3	4	5	6	7.	8	9	10	11	12	13	14
			Plant stand count per plot	Number of hills per plot:	Days to 50% flowers	. Plant height (cm)	Days to maturity:	Total dry matter/plant (TDM) (g):	Lodging: count:	Striga	Panicle number:	Panicle weight (g)/plot:	Panicle length:	Stalk weight (g):	1000 seed weight (g):	Disease

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Observations for Sorghum

Date	Name of the farmers	Varieties	Sorghum Data													
			1	2	3	4	5	6	7.	8	9	10	11	12	13	14
			Plant stand count per plot	Number of hills per plot:	Days to 50% flowers	. Plant height (cm)	Days to maturity:	Total dry matter/plant (TDM) (g):	Lodging: count:	Striga	Panicle number:	Panicle weight (g)/plot:	Panicle length:	Stalk weight (g):	1000 seed weight (g):	Disease

Observations for Cowpea

Date	Name of the farmers	Varieties	Cowpea Data										
			1	2	3	4	5	6	7.	8	9	10	11
			Plant stand count per plot	Number of hills per plot:	Days to 50% flowers	. Plant height (cm)	Days to maturity:	Total dry matter/plant (TDM) (g):	Grain weight (g):	100 seed weight (g):	Pod weight (g):	Fodder weight (g):	Disease:

Observations for Groundnut

Date	Name of the farmers	Varieties	Ground nut Data										
			1	**2**	**3**	**4**	**5**	**6**	**7.**	**8**	**9**	**10**	**11**
			Plant stand count per plot	**Number of hills per plot:**	**Days to 50% flowers**	**. Plant height (cm)**	**Days to maturity:**	**Total dry matter/plant (TDM) (g)**:	**Grain weight (g)**:	**100 seed weight (g):**	**Pod weight (g)**:	**Fodder weight (g):**	**Disease**:

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The CGIAR Research Program on Dryland Systems aims to improve the lives of 1.6 billion people and mitigate land and resource degradation in 3 billion hectares covering the world's dry areas.

Dryland Systems engages in integrated agricultural systems research to address key socioeconomic and biophysical constraints that affect food security, equitable and sustainable land and natural resource management, and the livelihoods of poor and marginalized dryland communities. The program unifies eight CGIAR Centers and uses unique partnership platforms to bind together scientific research results with the skills and capacities of national agricultural research systems (NARS), advanced research institutes (ARIs), non-governmental and civil society organizations, the private sector, and other actors to test and develop practical innovative solutions for rural dryland communities.

The program is led by the International Center for Agricultural Research in the Dry Areas (ICARDA), a member of the CGIAR Consortium. CGIAR is a global agriculture research partnership for a food secure future.

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