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Identification and Prioritization of Major Agricultural Production and Productivity Constraints in the Case of Basketo Special District of Southern Ethiopia

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Abstract
Community level problem identification (CLIP) survey were undertaken in Basketo special district in 2016/17 by the objective of identifying, generating and prioritizing different crop, natural resource management, livestock, marketing and technology related problems for further study. Groups were selected purposively from three representative agro ecology of highland, midland and lowland and contains youth, men headed and women headed farmers. Focus group discussion, transact walk, structured observation and key informant interview were undertaken to collect data. Agricultural production constraint data were collected and prioritized by farmers themselves. Lack of access to improved seed, disease and pests, loss of soil fertility, lack of improved breeds, animal diseases, low or limited feed supply in quality and quantity, knowledge and skill gap on forage production, poor market linkage and poor management, soil erosion, land degradation, deforestation, and lack of access to credit are some bottlenecks of agricultural production in the district.
keywords: Agricultural production constraints, CLIP, Focus group discussion

1. Introduction

Agriculture is one of the most important sectors of the economy of Ethiopia [4]. The sector is vital for food security at the national level and accounts for the livelihoods of nearly 85% of the population. Although the transformation towards a more manufacturing and industry oriented economy is in progress, the sector still accounts for 46% of the GDP, 73% of overall employment, and close to 80% of foreign export earnings [3]. The major part of the sector consists of smallholder farmers operating on less than 2 hectares of land [3]. On the other hand, the productivity of the sector was and is almost stagnating over the last decades, e.g. for cereal crops it is approximately 1.2 tons/ha [5]. Realizing the sector´s low productivity problems, research findings by Dadi et al. [4], Wossen et al. [9], or Teklewold et al. [7,8] suggested that the adoption of agricultural technologies by smallholder farmers is a promising alternative to get out of the poverty trap. However, the level of technology adoption in the country is not going as fast as expected. For example, Wossen et al. [9] found an adoption rate of 4.7% for land management practices (bunds), and Teklewold et al. [8] reported less than 10% for the adoption of productivity enhancing technologies such as fertilizers.

It is the most important determinant of Southern Nation Nationality and peoples' Regional state of Ethiopia economy and it will continue to play important role in the overall economy development of the region. The livelihood of over 93% of the people of the region dependent on it, however, agricultural systems in the region is at subsistence level and food insecurity problem is increasing at shocking rate. Moreover, rapid natural resource degradation is prevalent [1]. Also Agricultural activities in the country as whole have been taking place under widely varying dynamic contexts such as agro-ecology, climate and soil conditions. The success in the sector is then strongly influenced by topographic settings, degree of human interferences and underlying biophysical features [3] [6].

Five major cereals (tef, wheat, maize, sorghum and barley) contributing the major part of crop production in Southern Ethiopia in general and Basketo Special District in particular. Other important crops growing in the districts like root and tubers and also fruits playing their great part in food security of the area. Oils and pulses like Sesame and common bean are important source of cash income for the household. Crop agriculture has been facing serious of challenges such as lack of improved crops varieties, poor agronomic management, low soil fertility, diseases and pests, uncertain rainfall, recurrent drought, low input access and very limited irrigation. Due to aforementioned problems the crop production and productivity in the area is below the optimum and needs the intervention of improved agricultural system.

The livestock sector has been an immediate source of income for livelihood of small scale farmers. Except efforts being made very recently less attention has been given for the improvement of the sector. Livestock production has been threatened by insufficient feed supply with poor quality followed by poor livestock health management which contribute to low productivity of the sector.

Natural resource management regard, the soil of crop land is currently affected by multiple issue relating to soil health and soil system. The soil system facing problems of organic matter depletion, nutrient depletion, soil erosion, water logging and limited biomass coverage. Deforestation, limited awareness, poor farming practice,

soil acidity and land degradation highly affecting the productivity of mid land and high land soils of the district.

This assessment conducted in the community level and aimed to collect base line data regarding crop production, livestock production, natural resource management and socioeconomic and livelihood system of Basketo special district. Arba Minch Agriculture Research Center, Socio economic research, research transfer and multiplication work process in coordination with Southern Agricultural Research Institute (SARI), AGP-II, conducting an assessment through community level problem identification, finding researchable issues to intervene in the problems of agricultural activities and social and economic welfare of the community.

Objective

To identify and prioritize major agricultural production constraints in the area of crop, natural resource management and livestock production in the mandate area of AGP II District for further study.

2. Methodology

2.1 Description of the Study Area

Basketo special district is one of the four special districts of SNNPR which is in 310, 367, and 626km from Arba Minch, Hawassa and Addis Ababa, respectively; having a total household of 27092 (2,506 female headed and 2,4586 male headed) and total population of 74,050 (37,221 male and 36,729female) with an altitude ranging from 780-2200m.a.s.l.The average annual rain fall of the district is 1200 mm (minimum 1000 mm and maximum 1400 mm) with minimum and maximum temperature of 15^0C and 27^0C, respectively. The total land coverage of the district is 105750.75ha of which19250hais covered by annual and perennial crops, 2250ha grazing land,491.75ha forest land, 103 ha water body, 566 ha bare land and 83090 ha others. The soils of the district classified as 18% clay, 52% loam and 30% sandy in all agro ecologies.

2.2 Site Selection and Sampling

The survey were conducted in three major agro-ecologies of Basketo special Woreda. Three kebele from district representing the highland, midland and low land agro-ecologies selected in collaboration with respective districts administrative council and steering committee. Purposive sampling were used based on agro ecologies, population, crop and livestock diversity and other cross cutting issues for selection of Kebeles. Awurasasita (highland), Motikesa (midland), Buna basa wolaita (lowland) were selected from the District.

Table 1:- Respondents profile in the district

Kebeles	**Agro ecology**	**Youth group respondents**	**Men headed respondents**	**Women headed respondents**
Awurasasita	Highland	40	40	40
Motikessa	Midland	40	40	40
Buna basa wolaita	Lowland	40	40	40
Total		**120**	**120**	**120**

2.3 Data collection method

Primary data was collected through Focus Group Discussion (FGD) by organizing the farmers in to three focus groups inclusive of different social groups such as youths, women and men. Each social group separately organized, interviewed and discussed based on checklists prepared in advance to identify constraints, opportunities and priorities of agricultural production and productivity, marketing system and other related issues. Secondary data was collected from written documents of bureau of agriculture of Basketo special district.

3. Results

3.1. Cropping and Farming System of Basketo Special District

Crop Production System

Food crops such as cereals, pulses and oils, root and tubers, vegetables, spices and fruits have been growing in the lowland, mid lands and highlands of Basketo Special district. Agricultural production is a result of mixed crop-livestock production system in the district.

Cropping systems predominantly practiced in the lowland of Basketo special Districts are mono cropping, inter cropping, crop rotation and relay intercropping. Limited access of irrigation made to depend on rain fed agriculture. Belg and meher are the major cropping seasons following the upcoming rain. Fallowing is also the other system that have been practicing in the lowlands to restore the land when it ceases to give yield.

Due to limited access for irrigation, crop production in the midland areas of Basketo special district in Belg and Meher cropping season depend on the upcoming rain. Maize is the most important Belg season crop under rain fed conditions . Some farmers have been growing, in their farm land and aside, agro forestry trees and forest trees like Eucalyptus species which are not friendly for crop production due their high resource competition and allelephatic effect. Other cropping systems practicing in the area identified as mono-cropping, relay intercropping, crop rotation, and fallowing.

Soil fertility management

Farmers in low land of Basketo district have no enough awareness on type, amount, time and method of applying fertilizers(organic and inorganic) to their soils to improve fertility and boost crop production. Farmers in the lowland managing their soil fertility by fallowing the land after the productivity ceased for some imperative crops like maize.

In midland of Basketo, organic fertilizer like farm yard manure and compost and inorganic fertilizers commonly applied for crop production. However, very few farmers have been using fertilizer for crop production and improving soil fertility. The soils of midland slightly exposed to acidity but the access for lime is very limited. So that productivity of main crops like maize and tef has been declining year to year.

Soil acidity is becoming a serious challenge to crop production in the highlands of Basketo Special district. For improving crop production in highlands of the district, lime application to acidic soils is one of the solutions to address soil acidity problem. In all agro ecologies Basketo farmers using inorganic fertilizers (DAP and Urea) for maize, common bean, sorghum and tef.

Seed and Seed systems

Source of quality seed in lowlands, midlands and highlands of Basketo special district for cropping seasons identified to be local market, peer farmers and government offices. Seed quality is the most important factor that affect crop production across the agro-ecologies. Most farmers using local seeds with poor quality which end up with low productivity. Private seed supplying sector not promoted in all agro ecologies of Basketo district so that the sole source of improved seed for maize is office of agriculture with limited extension service.

Method of Plowing and Frequency of Tillage

The most common method of land preparation for crop production in lowlands and midlands of Basketo is oxen draft and in highlands hand hoeing and oxen power. Lacking oxen becoming determining factor for crop production in lowland, midlands and high land of Basketo Special District. Tillage frequency for major crops like Maize, Haricot bean, Sorghum and Teff in lowlands and midlands of Basketo district identified as 3-4, 1-2, 3, and 1-2 times where as in highlands main crops such as wheat, faba bean, chick pea and barely need 2-3, 1-2, 0-1 and 1-2 times of tilling before sowing, respectively.

Table 2: Tillage frequency for major crops in Basketo special district

Major Crops	Tillage frequency		
	Lowland	Midland	Highland
Maize	3 times	3-4 times	
Haricot bean	1-2 times	1-2 times	
Sorghum	3 times	3 times	
Teff	1-2 times	1-2 times	
Wheat			2-3 times
Faba bean			1-2 times
Chick pea			0-1 times
Barley			1-2 times

Seed rate and method of planting

Row planting is an improved approach for ease management of crop field than conventional (broadcasting) method of planting. However, broadcasting method is predominantly applied method in lowland, midland and highlands of Basketo district for most crops. Only 50% of farmers have been practicing row planting for maize crop and 30% for wheat planting across the agro ecologies. But most of farmers still uses broadcasting/conventional method of sowing.

Pest management practices

Diseases and insect pests are the main yield reducing factors in crop production system. Diseases like bacterial wilt ,rust, and maize stalk borer determines crop production in Basketo lowlands and midlands. Insect pests such as weevil which can affect crop yield in the field and in the store as well, have been significantly affecting crop production in the lowlands of Basketo. Poor crop field management could be the main cause of yield loss due to insect pests and diseases in the survey area(highland, midland and lowlands) of Basketo special district. The most susceptible crops for disease and insect pests destruction in Basketo Special district identified as field pea, sorghum, enset, coffee, haricot bean, avocado and mango in lowland and midland. Farmers are losing their crop due to pest destruction in the field. Common pests devastating the crop production in the highlands of Basketo special district could be bacterial wilt, rust, leaf borer, fruit fly and parasitic weeds, which play great role in crop production system of the area.

Table 3:- Major crop pests and their management practices in the Basketo special district

Major Crops	Constraints	name of the pest	Existing management
Enset	Disease	bacterial wilt	removing infected enset
	Vertebrate	mole rat	digging the soil and killing
Coffee	Disease	CBD and CSD	no management method
Mango	Disease	Anthracnose	no management method
	Insect	Fruit fly	no management method
Avocado	Disease	Flower and fruit dropping	no management
Maize	Insect	maize stock borer, weevil/storage insect pest	no management method
	Lack of improved varieties		
Wheat	Lack of improved varieties	Disease resistant and quality seed not distributed	Disease resistant and quality seed not distributed
	Weed	broad leaved and grass weed species	Hand weeding one time
	Disease	Rust	spraying tilt chemical 1 time
Field pea	Weed	broad leaved, grass weed species	weeding not practiced
	Insect	Aphids	no management method
Faba bean	Weed	broad leaved, grass weed species	One time hand weeding
	Insect	Aphids	no management method
Teff	Weed	broad leaved and grass species	Hand weeding one time
Potato	Disease	Blight	no management method

Harvesting and post-harvest handling techniques

According to key informants, all crops have been harvesting manually using sickles. Farmers using locally available materials and man power to transport harvested crops from the field. Appropriate storage material protects the crop from pest attack and loss. However, farmers in all agro ecologies not caring about storage materials so that the storage life of the seed and grain mostly distorting. According to the assessment, harvesting crops in all agro ecologies could be by cutting the stalk for cereals, uprooting pulses, careless digging roots and tubers that may affect seed quality and storage ability of crops.

3.2 Livestock production system

Types of livestock

Livestock production is the main component of agricultural system in Basketo special district. Major animals playing a great role in the livelihood of the lowland parts of Basketo are cattle(oxen, cows, heifers and calves), equine, goats, poultry and honey bee. Midland and highland areas producing sheep and horses in addition to animals in lowlands.

Livestock feed source

Crop residues and grains found to be the major feed sources in dry season and natural pasture in wet season at Basketo special district. Free grazing of natural pasture becoming the wet season feed and maize stalk, common bean straw and sugar cane products used as the feed source especially for maintenance feeding system in dry season.

Livestock production and productivity Constraints

Major factors affecting production and productivity of livestock in Basketo across agro-ecological zones identified as access to improved breed, animal diseases, low or limited feed supply in quality and quantity, knowledge and skill gap on forage production, poor market linkage and poor management.

Table 4:- Identified Animal Production Problems by respondents of Basketo special districts.

Problem Concerns	Problem Descriptions	Agro ecology		
		Lowland Respondents	Midland Respondents	Highland Respondents
Dairy	Limited access to improved breed (cattle, poultry)	✓	✓	✓
	Disease	✓	✓	✓
	Poor Institutional support	✓	✓	✓
	Poor Management	✓	✓	✓
	Poor Adaptability	✓	✓	✓
Poultry	Poor management	✓	✓	✓
	Predator	✓	✓	✓
	Disease	✓	✓	✓
Forages	Access to improved forage seeds	✓	✓	✓
	Poor management and resistance to plant forage	✓	✓	✓
	Knowledge gap	✓	✓	✓
	Adaptability	✓	✓	✓
Feed	Shrinkage of grazing land	✓	✓	✓
	Poor productivity	✓	✓	✓
	Poor supplementation	✓	✓	✓
	Poor information on feed quality	✓	✓	✓
Animal health	Less institutional support in health delivery and inputs supply	✓	✓	✓
	Access	✓	✓	✓
	Knowledge gap (packaging, training)	✓	✓	✓
Technology	Technology (processing) materials /equipment delivery & maintenance	✓	✓	✓
	Lack of feed processing plants	✓	✓	✓
	Lack of milk processing plant and equipment	✓	✓	✓
	Lack of transporting equipment for animal products and by products	✓	✓	✓

3.3. Natural Resource Management

Soil and water conservation

The soil system facing problems of organic matter depletion, nutrient depletion, soil erosion, water logging, limited biomass coverage and soil microorganisms ceasing. Limited awareness becoming the most important defining factor of soil and water conservation in the lowlands of Basketo special district. Soil erosion, poor farming practice, low input use, low awareness and limited extension service contributing to low soil fertility. Soil acidity and land degradation especially due to erosion and unwise farming practices highly affecting the productivity of mid land and high land soils.

Agro forestry, natural forest and plantation forestry

Cordia africana, ficussur (shola), acacia abyssinica, ficusvasta(warka), Eucleara cemosa, eucalyptus, Moringa stenopetella, acacia busseai (girar) and other types of tree have been dominating in the lowlands of Basketo district. Deforestation of natural forest for expansion of agricultural land, house construction, timber, woods and wood products, charcoal, firewood and household equipment are listing by the community. Establishment of nursery site in public and private lands could be ideal for reforestation.

Agroforestry trees dominating in the highlands and midlands of Basketo special districts are Cordia africana (wanza),croton marcostachyus (bisana), prunusafricana (tikurinchet), avocado, podocarpus falcatus(zigba), juniperusprocera, grevillea Robusta, strychnosspinosa (dokuma), ficusvasta (warka). However, these existing indigenous and introduced economically and environmentally important trees destroyed due to knowledge gap of farmers, less extension service, deforestation, land expansion for crop production and other management related problems.

Small scale irrigation program

The irrigation access is very limited in all agro ecologies of Basketo special district. Sanka and husu are the two rivers in the low land area. Knowledge gap, commitment of extension sector and undulating topography determining use of available rivers for irrigation in the lowlands, midlands and highlands of Basketo special

district.

3.4. Livelihood System and Household Economy of Basketo Special District

Major income sources

The primary source of income to the farmers in Basketo Special district were agricultural production like crop and livestock. Non-agricultural activities like trade, wage and remittance are other sources of income. But the income they earn from different sources were too small to cover the cost of different agricultural inputs.

Table 5: Major sources of household income in Basketo special district

S.N	Main sources	Sub sources	Choices	Rank
1	Agricultural	Crops	✓	1st
		Livestock	✓	2nd
		Multipurpose trees	✓	3rd
2	Non agricultural	Trade	✓	4th
		Remittance	✓	5th
		Wage	✓	6th

Input and credit supply

Farmers acquire agricultural inputs such as fertilizer and improved seeds from office of agriculture. The Some farmers access credit from private lenders and these lenders collect money with unreasonable high interest and exploits the farmers. This in turn will affect agricultural productivity and production.

Market and road infrastructures

Laska, main market center for the district, is 27 kilo meters away from boarder lowland community of Basketo. The lowland boarder and highlands have been facing the problem of transport access and also the cost of transportation by carts and Isuzu cars is not affordable to the community.

Gender Role and Decision Making

Most agricultural activities among farmers of all agro ecologies managed by both genders. Some activities such as cultivation of vegetables, processing and selling of milk and milk products are considered as women's activities while planting of perennial trees and crops like coffee and enset, land preparation with spade, cutting trees, selling animals and beekeeping considered as men's career. However, decision making on resource use is made through discussion and mutual understanding of men and women. But it is not fully habituated through the Kebele.

Table 6: Gender role in different agricultural activities in Basketo special district

No.	Activities done	Men	Women
1	Land preparation for crop	✓	✓
2	Sowing/planting	✓	✓
3	Weeding	✓	✓
4	Harvesting	✓	✓
5	Cattle rearing/herd keeping	✓	✓
6	Collecting feed & fodder for cattle		✓
7	Honey bee production	✓	
8	Soil &water conservation practice	✓	✓
9	Vegetable cultivation		✓
10	Selling milk & milk products		✓
11	Poultry production	✓	✓

Nutrition

Most dominantly preferring nutritional food crops in all agro ecologies are maize, sorghum, wheat, barley, avocado, sesame, teff and banana; and livestock products like milk, meat, egg, butter, cheese, yoghurt and honey. They most commonly consume kitta (which is prepared from flour of maize, sorghum, barley and teff) with cabbage; kitta, bread or enjera with horticultural crops; kitta, bread or enjera with animal products (milk, meat, egg, yoghurts, cheese, honey); kolo (prepared from maize, barley, chick pea, field pea, faba bean, etc) and enset products (kocho and bulla) with cabbage. Most of respondents said that they consume those kinds of food without considering their nutritional value.

Climate Smart Agriculture

Large trees that are found in their farms play a role in keeping the soil from erosion and refreshing the air in the compound. They do several practices to enhance productivity such as shifting cultivation, organic manure application and crop rotation; those can be regarded as climate change mitigation strategies. Farmers found in the highlands and mid altitude areas often grow woody trees inside enset and coffee fields as agro forestry practice. The trees provide shade for the crops and mulch to the soil. The coffee and enset cultivation is purely organic and the farmers use farmyard manure, twigs and leaves of shade trees and compost. This enables the practice of

climate smart agriculture. In addition to this, the massive campaign of farmers that is being carried out in February and March is facilitating the construction of different soil and water conservation structures that stabilize the soil and reduces soil erosion.

4. Conclusion and Recommendation

Agriculture is one of the most important sector for Ethiopia. The sector is vital for food security at the national level and accounts for the livelihoods of nearly 85% of the population. Although the transformation towards a more manufacturing and industry oriented economy is in progress, the sector still accounts for 46% of the GDP, 73% of overall employment, and close to 80% of foreign export earnings. Community level problem identification were undertaken at three kebele representing those three Agro ecology(highland, midland, and lowland) and agricultural production constraints were identified and prioritized for further study. Lack of access to improved seed, disease and pests, loss of soil fertility, lack of improved breeds, animal diseases, low or limited feed supply in quality and quantity, knowledge and skill gap on forage production, poor market linkage and poor management, soil erosion, land degradation, deforestation, and lack of access to credit are some identified constraints. So, for above mentioned problems:-

- Development of disease resistant, high yielding and drought resistant variety
- Development of disease resistant and productive breeds.
- Participatory Demonstration and popularizing recommended/different improved agricultural technologies(Crop, livestock and Natural resource) with its full package on farm land to enhance farmers awareness.
- Distinguish and map the various business services providers and chain supporters
- Giving great attentions for harvesting, post harvesting handling and storage in order to reduce loss of products.
- Constructing irrigation canals are the best options for rain fall shortage area.
- Creating awareness on different soil and water conservation methods are the main thematic areas in which intervention should needed.

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