

2013 개도국 식량안보를 위한 농정성과 확산(KAPEX) 사업
에티오피아 공동조사 결과보고서

Fisseha Zegeye	조사팀장
Fisseha Teshome	조사팀원
Derese Teshome	조사팀원
Daniel Gulti	조사팀원
이 무 하	한국전문가
목 일 진	한국전문가

연구 담당

Fisseha Zegeye	조사팀장	연구 총괄, Part I · II
Fisseha Teshome	조사팀원	Part I · II
Derese Teshome	조사팀원	Part I · II
Daniel Gulti	조사팀원	Part I · II
이 무 하	한국전문가	Part III
목 일 진	한국전문가	Part III

차례

Part I. The Results of the First Joint Survey by Ethiopian Survey Team

Chapter 1. Introduction

1. Background and Context 3
2. Objectives of the study 5
3. Duration of the first survey 5
4. List of joint survey/research team 5
5. Main Activities (Schedule) 6

Chapter 2. Overview of Agricultural R&D and Extension System of Ethiopia

1. Policies and Strategies of Agricultural Technology Development
and Extension System 9
2. Assessment of the current situation (national, local, farmers level) 22

Chapter 3. Result of Survey/Research

1. Ministry of Agriculture (MoA) 25
2. Ethiopian Agricultural Research System 27
3. Hoetta Agricultural Research Center (HARC) 29
4. Oromia Agricultural Research Institute (OARI) 31
5. Sasakawa Global 2000 (SG 2000) 34
6. Oxfam America 35
7. Ethiopian Agricultural Transformation Agency (EATA) 36

Chapter 4. Summary and Recommendation

1. Summary 39
2. Recommendation 42

Part II. The Results of the Second Joint Survey by Ethiopian Survey Team

Chapter 1. Introduction

1. Background and Context 45
2. Objective of the study 47
3. Importance and limitation of the study 47
4. Methodology 48

Chapter 2. Result and Discussion

1. Socio-economic characteristics of the respondents 51
2. Agricultural production 52
3. Extension service 58
4. Credit and saving service 59
5. Cooperative membership and perceived level of satisfaction 60
6. Months of food shortage on the yearly 61
7. Information communication and extension 62
8. Self-evaluation of knowledge and skill of SMS and DAs 63
9. Perceived status of research-extension linkage 65

Chapter 3. Summary and Recommendation

Part III. The Results of the Joint Survey by Korean Experts

제1장. 개 요

- 1. 자문활동 일정 71
- 2. 현황 소개 72

제2장. 공동조사 내용

- 1. 공동조사 주제 77
- 2. 조사방법 78
- 3. 조사 내용 78

제3장. 주요 자문활동 내용 및 성과

- 1. 협의결과 89
- 2. 자문내용 90

제4장. 공동조사 추진 관련 제안 및 향후 일정

- 1. 자문결과 93
- 2. 시사점 및 제언 95
- 3. 향후 추진방향 97

- 참고 문헌 100

표 차 례

Part I

Table 1- 1. List of the team Korean and Ethiopian members	6
Table 1- 2. Main activities and key actors consulted during the survey	7
Table 1- 3. Summery of SWOT analysis of Agricultural research and extension system	39

Part II

Table 2- 1. Socio-economic characteristics of respondent farmers	51
Table 2- 2. Crop area and production (Meher and Belg season, 2011/12) of the sample respondent	53
Table 2- 3. Farmers' awareness and use of some improved crop varieties	54
Table 2- 4. Use of agricultural inputs by district	55
Table 2- 5. Access to irrigation, vegetable and fruit production practice	56
Table 2- 6. Cross/exotic breed and livestock ownership	57
Table 2- 7. Improved soil fertility management by district	57
Table 2- 8. Perceived level of satisfaction on extension service by district	58
Table 2- 9. Perceived level of satisfaction of farmers on FTCs by district	59
Table 2-10. Use of credit and saving service by district	60
Table 2-11. Cooperative membership and perceived level of satisfaction	61
Table 2-12. Food shortage and months by district	62
Table 2-13. Information communication and extension	63
Table 2-14. Self assessed knowledge and skill on extension content	64
Table 2-15. Self assessed ICT knowledge and skill of SMS and DAs	64
Table 2-16. Perceived status of research-extension linkage	65

그림 차례

Part I

Figure 1-1. The Staff Profile of EIAR by Academic Status	29
--	----

Part II

Figure 2-1. Map of Kalu District	48
Figure 2-2. Map of Arsi Negele	49

Part III

그림 3-1. Kalu 지역 지도	85
그림 3-2. Arsi Negele 지역 지도	87

Part I

The Results of the First Joint Survey

by Ethiopian Survey Team

Chapter 1

Introduction

1. Background and Context

Ethiopia is one of the ancient sites of human existence and societal development. It is located in the Horn of Africa bordered by Eritrea to the north, Djibouti and Somalia to the east, Sudan and South Sudan to the west, and Kenya to the south. The country is also the second most populous nation in Africa, with over 80 million inhabitants and tenth largest by area occupying more than 1.1 million km². The country is known for huge water resources such as rivers, lakes, and underground water. The existence of ethnic diversity with distinct socio-cultural features, and a wide range of flora, fauna, historical heritages make the country one of the preferred destinations for tourists. Over 80 languages are spoken in the country.

Agriculture is the mainstay of the Ethiopian economy and it is typically traditional, small scale and primarily depends on rain fall. It accounts for a little over 40 per cent of the GDP and 90 per cent of the total export revenue, employs 85 per cent of the country's labour force and satisfies 70 per cent of raw

material requirements of the country's industries. Agro-ecology zones of the country is traditionally classified in to six traditional agro-ecological zones such as "Bereha" (hot lowlands, <500 meters), "Kolla" (lowlands, 500-1,500), "WoinaDega" (midlands, 1,500-2,300), "Dega" (highlands, 2,300-3,200), "Wurch" (highlands, 3,200-3,700), and finally "Kur" (highland, >3,700); scientifically the country is divided into 18 major agro-ecological zones and 49 subagro-ecological zones.

Major crops grown in Ethiopia include cereals, roots and tubers, pulses, oilseeds, vegetables, fruits and cash crops such as coffee, cotton, tea, sugarcane, and tobacco. The country has immense potential for spice crop, medicinal, ornamental and other plants species though the potential is not yet fully utilized. The country is also much known in Africa for its livestock resources even though it is untapped potential to contribute to the country's economy. Cattle, sheep, goats, chickens, camels and honeybees are the major livestock species. The major agricultural export crop is coffee, and other traditional major agricultural exports are hides and skins, pulses, oilseeds, and the traditional "chat"

Despite its importance, the agricultural sector is constrained mainly by climate change and natural resource degradation, fragmented land size because of increasing rural population, imperfect agricultural markets, and limitation on generation, dissemination and adoption of agricultural technologies in value chain system, improper and inadequate use of agricultural inputs, weak extension system, inadequate research and extension capacity. Hence, the sector is characterized by low productivity unable to produce sufficient food for the growing population.

2. Objectives of the Study

General objective: The overall objective of the survey is to find out ways to initiate policy programs to create and strengthen agricultural research and extension organizations and related system.

Specific objective: The specific objective of the study is to

- Assess the current status of the development of Ethiopia's agricultural research and extension system:
- Identify challenges and potentials of Ethiopia's agricultural research and extension system: and
- Generate information and statistics for the future collaboration.

3. Duration of the First Survey

The joint survey was carried out by a survey team of experts and program coordinators from Korea and Ethiopia. The survey was scheduled in two phases. The first phase of the research was implemented from August 12 to 15, 2013.

4. List of Joint Survey/Research Team

For the project, a Joint Survey/research Team was formed of experts and program coordinators from Korea and Ethiopia. The main role of the survey team was to generate and compile information on the environment for and the cur-

rent status of the development of Ethiopia's agricultural research and extension system. The following table depicted a list of the survey team.

Table 1-1. List of the Ethiopian team members

No	Name	Organization	Position
1	Mr. Fisseha Zegeye	EIAR	Associate Researcher and Team leader of the Ethiopian team
2	Mr. Fisseha Teshome	MoA	Development Partners Linkage Senior Expert
3	Mr. Derese Teshome	EIAR	Associate Researcher
4	Mr. Daniel Gulti	ATA	Program Analyst

5. Main Activities (Schedule)

Key actors were purposefully chosen in order to generate information on the current status of the agricultural research and extension system. These actors include:

- Ministry of Agriculture (Agricultural Extension Directorate)
- Federal Agricultural Research Institute (Holetta Agricultural Research Center)
- Farmers, Farmers Training Centers, and farmers' cooperatives
- Regional Agricultural Bureau (Oromiya Agricultural Bureau)
- Regional Agricultural Research Institute (Oromiya Agricultural Research Institute)
- Oxfam America
- SG 2000

Table 1-2. Main activities and key actors consulted during the survey

Date	Time	Description	Location
August 12, 2013	Afternoon	Ministry of Agriculture (Agricultural Extension Directorate) Ethiopian Institute of Agricultural Research (HQ) Agricultural Transformation Agency (ATA)	Addis Ababa
August 13	Morning	Oromiya Agricultural Bureau Oromiya Agricultural Research Institute	Addis Ababa
	Afternoon	Oxfam America SG 2000	Addis Ababa
August 14	Morning	Holetta Agricultural Research Center	Holetta (42 Km from Addis Ababa)
	Afternoon	Farmers, Farmers Training centers And farmers' cooperatives	Holetta (42 Km from Addis Ababa)
August 15	Morning	Adama Science and Technology University (School of Agriculture)	Adama (98 Km from Addis Ababa)
	Afternoon	Small meeting with Ethiopian Team	

Chapter 2

Overview of Agricultural R&D and Extension System of Ethiopia

1. Policies and Strategies of Agricultural Technology Development and Extension System

1.1. Domestic Policies and Strategies

The economic development policy of Ethiopia predominantly depends on the development of the agricultural sector. For the past two decades, Agricultural Development-Led Industrialization Strategy (ADLI) was the economic road map and guiding principle to eradicate poverty and to achieve food security of the country. The country has designed and ratified National Development Policy Frameworks (NDPF) to fight and eradicate poverty through achieving broad-based and pro-poor growth. The frameworks such as Sustainable Development and Poverty Reduction Program (SDPRP), the Plan for Accelerated and Sustained Development to End Poverty (PASDEP), and the Growth and Transformation Plan (GTP) have been used as the development plans of the country to achieve Millennium Development Goals (MDGs).

Sustainable Development and Poverty Reduction Program (SDPRP) was launched in 2002 and implemented for three years from 2002/03 to 2004/05. This medium term plan was focused on development of agriculture and rural areas to achieve food security, decentralization of administrative power, empowerment of the regional state, building capacity in both the public and private sector, and initiate reforms in both the justice system and the civil service.

Next to SDPRP, the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) was initiated to be implemented for five years (2005/06-2009/10). PASDEP was strategically programmed based on the result of SDPRP and designed to pursue the direction under SDPRP and persistently to fortify the essentials of SDPRP. The main objective of the PASDEP is to lay out the directions of economic development of Ethiopia with the ultimate objective of eradicating poverty; and to outline the major programs and policies in each of the major sectors (MoFED, 2006).

The Growth and Transformation plan (GTP) is a growth Plan of the country implemented for five years from 2010 to 2015. The plan projected Gross Domestic Product (GDP) growth of 11-15% per year during the period. Like previous development frameworks, the GTP recognizes the pivotal role of agriculture in the economic development of the country. The main objective of the GTP is to enhance productivity and production of smallholder farmers and pastoralists, strengthen marketing systems, improve participation and engagement of the private sector, expand the amount of land under irrigation, and reduce the number of chronically food insecure households.

Currently, Participatory Demonstration and Training Extension System

(PADETES) is serving as an extension approach in which smallholders became the focus of interventions in agriculture in general and that of the extension system in particular. The pluralistic extension system is devised to serve smallholder farmers with different needs and priorities in different agro-climatic and bio-physical conditions. This is the system that likely allows the co-existence of different extension approaches and the institutional arrangement opens a way towards privatization of the extension service (Berhanu et al., 2006).

The package approach is a key element of the national extension system. The term “package” is defined as a group of separate items packed together as a single unit. For crop sub-sector, the major package consists of improved seeds and fertilizers (Dejene et al., 2000). The package extension delivery system was designed to be implemented by suiting different agro-ecology zones of the country. The package approach is prepared and delivered as a complete package, best practice scaling up and value adding farmers’ extension service. The extension package and best practice scaling up approach is practiced in response to the farmers' prioritized needs. The package based extension service is provided to the farmers, women and youths, and private investors working in the agricultural sector. The farmers targeted by the package approach are categorized as ‘A’, ‘B’, and ‘C’ according to their productivity and input utilization level. The central purpose of categorizing farmers is to promote farmers at level ‘B’ and ‘C’ to level ‘A’ through intensive and effective work.

1.2. Collaborative Project with Other Partner Countries

The Ministry of Agriculture (MoA) has worked with different partner countries and donor agencies for rural economic development and food security of the country. The Rural Economic Development and Food Security (RED&FS) Sector Working Group is a government and donor platform designed for smooth facilitation of aid modalities (Farnworth, and Gutema 2010).

The same source noted that the platform has an Executive Committee chaired by the Minister for Agriculture. Eight senior MoA experts and seven donor agencies are represented. The RED&FS Secretariat coordinates the 22 donors working with the MoA. The RED&FS Working Group has three technical pillars/committees: (i) Sustainable Land Management (SLM): 11 donors; (ii) Agricultural Growth Programme (AGP): 14 donors; and (iii) Disaster Risk Management and Food Security (DRM): 12 donors. Each sub-committee is co-chaired by a representative of MoA and the donor agencies.

- The Productive Safety Net Programme (PSNP), the main programme component within the Disaster Risk Management and Food Security Pillar, has an expected budget of USD 2.25 billion.
- The Sustainable Land Management has an estimated budget of USD 6 billion over 15 years. The programme secured USD 30 million from the World Bank, 13 million Euros from Germany, and 16 million Euro from Finland.
- The Agricultural Growth Programme (AGP) is mainly provided through programmes of support that are loosely-tied and opportunistic of nature (no unifying/organizing principle as yet). It has an expected budget of about USD 300 million. This is considerably lower than the PSNP which essentially focuses on food aid and does not appear to be directed at

long-term sustainability in the agricultural sector.

- The Agricultural Investment Policy Framework provides an overarching framework within which aid agencies should align themselves with government policy and strategies (PASDEP) and harmonize their aid modalities and instruments in the agriculture and rural development sectors.

The preferred financial modality of the Government of Ethiopia is basket funding. Currently other aid modalities exist:

- Parallel funding by USAID, JICA
- Multi-donor Trust fund by DFID
- Mixed modality e.g., Norway, CIDA, EU
- East Africa Agricultural Productivity project (EAAP), World Bank
- Others

1.3. Historical Background

1.3.1. Agricultural Extension in Ethiopia

Agricultural extension work in Ethiopia began in 1931 with the establishment of the Ambo Agricultural School which is one of the oldest agricultural institutions in Ethiopia and the first agricultural high school offering general education with a major emphasis on agriculture. Real extension activities on different areas, however, were started in 1943 when the Ministry of Agriculture (MoA) was established. It was to provide advice on soil conservation through the grow-more-trees campaign; better varieties of seeds and seedlings; cleaning and seed selection; the protection of game fish; the preservation of hides and skins and so on (Kassa, 2003).

The same source indicated that formal agricultural extension work began in the early 1950s following the establishment of the Imperial Ethiopian College of Agriculture and Mechanical Arts (IECAMA, now Haramaya University). The college is mainly responsible to train high level manpower and to promote agricultural research and dissemination of appropriate technologies. In 1963, the government transferred the mandate for agricultural extension from the College to the Ministry of Agriculture (MoA).

Agricultural extension service under compressive package programs (CPPs) including CADU, AEDU and WADU was also initiated in the late 1960s. According to Berhanu et al. (2006), the approach aimed at modernizing the Ethiopian agriculture through a comprehensive package approach initially implemented in selected pilot areas and eventually scaled up to cover about 90% of the farming community within 15–20 years of time. The comprehensive package programs were mainly financed by donor funding. The basic components of the program were agricultural extension service, agricultural research, seed multiplication and distribution, marketing and credit services, improved farm implements production and distribution, rural infrastructure such as rural road, water supply, health centers, etc., and organizing multipurpose cooperatives. The success of the Comprehensive Package Program, however, was limited because of its high requirements in terms of modern agricultural inputs and skilled human power, unfavorable land tenure regime, and poor infrastructural and market development (Kassahun, 2012, cited in EEA, 2004/05).

Comprehensive Package Projects (CPPs) were too expensive to realize the targets. Therefore, the first minimum package (MPP-I) was initiated in 1971, which target 220 Woredas throughout the country. The objective was related to improve crop and livestock production through mobilization of the human resource, farm input supply and credit service, marketing service, crop and live-

stock production demonstrations, and training of host farmers and extension agents. The goal of the program was to improve the livelihood of the farming community. After the land reform, MPP II was established in 1980 with an additional objective of increasing crop and livestock production, such as, food self-sufficiency, raw material for local industries, foreign exchange from export of produces, soil and water conservation, cooperative organizations, and rural roads development. The Minimum Package Program too did not entail significant progress due to failure in introducing a more dynamic farming system drawing on the experiences of smallholders (Kassahun, 2012 cited in Dessalegn, 2004).

MPP-II was phased out in 1985 and was replaced by a new program called Peasant Agricultural Development Program (PADEP). The PADEP was resumed during the first four years of EPRDF rule (1991-1995) and during the same time a pilot extension system supported by Sasakawa Global 2000 (SG-2000) was introduced in 1993, involving 160 farmers in demonstration exercises focusing on maize and wheat production. The success of the SG-2000 scheme, resulting in a boom harvest in 1995, prompted the government to adopt agricultural extension as a national intervention strategy and a major component of ADLI. Based on this, a new extension programme, the Participatory Demonstration and Training Extension System (PADETES), was introduced (Berhanu et al., 2006; and Kassahun, 2012).

1.3.2. Agricultural Research in Ethiopia

The Ethiopian Institute of Agricultural Research is one of the oldest and the largest agricultural research institutes in Africa. The Ethiopian Agricultural Research System (EARS) has evolved through several stages since its initiation during the late 1940s, following the establishment of agricultural and technical school of Ambo and Jimma. Until the mid-1960s the Imperial College of Agricultural and Mechanical Arts(now Haramaya University) with its Agricultural Experiment Station at Debre Zeit(now Debre Zeit Research Center) was the major research entity.

However, a formal and harmonized Agricultural Research System in Ethiopia dates back to 1966 when the Institute of Agricultural Research (IAR) was established with the broad intention of coordinating the National Agricultural Research System (NARS). The IAR was established with a mission to formulate national agricultural research guidelines, coordinate the National Agricultural Research System, and undertake research in its centers and sub centers located in various agro-ecological zones of Ethiopia.

Since the establishment of IAR, Ethiopia has a national agricultural research system with autonomous management and with major and minor stations covering the major ecological zones, and the major commodity and discipline groups. Until its replacement by the Ethiopian Agricultural Research Organization in 1997, the IAR had been the only organization in the country with a clear mandate solely for agricultural research.

Subsequently, after the declaration of a decentralized political system of the Government of the Federal Democratic Republic of Ethiopia, the National Agricultural Research System has included the Federal Research Institute, the

Regional Agricultural Research Institutes (RARIs) and research undertakings by Higher Learning Institutions (HLIs). During this time, the Ethiopian Agricultural Research Organization (EARO) was established with a new set up in 1997 by Proclamation no 79/1997 and later was renamed the Ethiopian Institute of Agricultural Research (EIAR). The objective of the institute is to generate, demonstrate, adapt, promote and transfer market and client oriented improved agricultural technologies, knowledge, information and innovative approaches to the farming communities responding to different agro-ecological zones and thereby to bring about healthy and quality life.

In 1993, some IAR centers were decentralized to create independent research centers run by the respective regional governments, and became the Regional Agricultural Research Centers (RARCs) generally under their respective regional bureaus of agriculture. However, over the past ten years, seven of the nine regional states of the country, namely the Afar, the Amhara, the Gambella, the Oromia, the Somali, the Southern and the Tigray regions have established their respective Regional Agricultural Research Institutes (RARIs), which have agricultural research as their central mandate and coordinate research activities of agricultural research centers within their respective regions.

With regard to the performance of the national agricultural research system, in its fifty years of existence, it has developed and released over 800 improved varieties of crops. In addition to these improved crop varieties, 49 improved technologies for livestock management, 45 for natural resources management, nine for agricultural engineering (farm implements), and five for forestry had been identified, evaluated and recommended.

1.4. Organizational Structure

1.4.1. Agricultural Extension System

Since 1943 there have been several structural, managerial and financial reforms from federal level to regional level in order to improve the agricultural service delivery in response to agro-ecologies of the country and needs of farmers and pastoralists in particular. The extension delivery system is under the Ministry of Agriculture (MoA) with four sub-sectors (Natural resource, Agricultural Development Disaster risk management and food security and Livestock Development Sectors) which are headed by state ministers. Agricultural extension Directorate is organized under agricultural development sub-sector. Under each subsector there are Directorates and centers etc. The Directorate has one Director and two Deputy Directors with a staff of different subject matter specialist. The 9 regional states and 2 city administrative councils have their own Agricultural Bureau and each has extension departments with department heads and SMSs. About 715 Woreda administrations have their own agricultural offices and each has extension process with a team leader and SMSs. There are about 15,826 kebeles (the lowest administration level). Even if all of them are not fulfilled by the necessary DAs, Most of them have 3 Development Agents.

In most kebeles Farm households living in their respective kebeles are organized in Development groups (20-30 members) and under each group there are sub-groups (5 members). Each group has its own group leader.

1.4.2. Agricultural Research System

Like the extension system, the agricultural research system of Ethiopia has

evolved through several stages since its initiation during the late 1940s. The current National Agricultural Research System (NARS) is made up of three types of institutions:

- The Ethiopian Institute of Agricultural Research (EIAR) (consisting of the different research institutions/centers which were merged within EARO during its establishment).
- The Regional Agricultural Research Centers/Institutions (RARCs/RARIs). Currently, there are 63 Regional Agricultural Research Centers.
- Institutions of Higher Education (IHE) – Addis Ababa University’s Faculty of Veterinary Medicine and Department of Biology, Haramaya University’s College of Agriculture, Hawassa University’s and Wondo Genet College of Forestry and Natural Resources, and Mekele University’s.

1.5. Security of Budget

Realizing the importance of the agricultural sector for the whole economy, the Government of Ethiopia has been allotting huge amount of public investment in the sector including public investment for research and extension services.

For example as Kassahun (2012) quoted Spielman et al. (2010), between 2004 and 2009, these farmers training programs received a significant annual public investment amounting to over US \$ 50 million or almost 2% of agricultural GDP.

1.6. Cooperation between Stakeholders (high-low level institutes or centers)

Agriculture Development Partners Linkage Advisory Council (ADPLAC) is a linkage forum for the actors in the technology system. Council members include representatives from extension, research, input supply civil society, the private sector, cooperatives and marketing services, as well as women's associations and women's affairs offices. They come together to improve the efficiency and effectiveness of the technology generation and dissemination process. Besides the federal level, ADPLAC offices are set up in 55 zones of the country and 302 woredas as of mid-2012. Since ADPLAC has the potential to bring all the agricultural development actors together and enhance agricultural output, it has to be established in the woredas where it is missing and has to be functional in the woredas where it has already been established.

1.7. Main Crops

Ethiopia is the center of origin and diversity for many important crops and livestock. Major crops include cereals, roots and tubers, pulses, oilseeds, vegetables, fruits and cash crops such as coffee, cotton, tea, sugarcane, tobacco etc. Ethiopia has high value crops such as black pepper, ginger, and fenugreek, but this potential has not been fully utilized. This country ranks among the highest in Africa in its livestock resources. Cattle, sheep, goats, chickens, camels and honeybees are the major livestock species.

The country is endowed with huge water resources of rivers, lakes, and underground water. Most of its soils are highly fertile and productive. Because of

its wide altitude ranges (-110 m to +4600 m above sea level), the country possesses all types of climate from hot tropical to cold temperate and hence all kinds of flora and fauna are found in the country. In spite of these resources, many challenges confront policy-makers and other agents of change. Total production of agricultural crops reached more than 25 million MT though it remained below the required level for food self-sufficiency. The challenges include the following.

- Low productivity of major food crops
- The growing demand for food and products to feed nearly 90 million people
- The growing income gap between urban and rural areas
- Declining natural resource base of agriculture
- A few grain crops, dominance in food production
- Frequent drought and climate variability
- Poverty and food insecurity

2. Assessment of the Current Situation (national, local, farmers level)

The extension system ultimately aimed at improving the living standard of the people and contributing to the national economy through improving production and productivity of the agricultural sector. By the end of the terminal year (2015) of the Growth and Transformation Plan (GTP), it is planned to increase the number of extension service users from 5.09 million to 14.64 million (MoA, 2010). This target is realized through a participatory agricultural extension system of introducing modern and improved agricultural technologies, knowledge, and information to the farmers. The system also promotes and extends the use of prominently result oriented best practices which are tested and proved by real farming conditions.

The extension system is focusing on different directives, such as, agro-ecology of the country, diversification and area based specialization, market based extension service, best practice, building the capacity of the farmers, family centered extension service, watershed based development, and participatory extension system.

Greater attention has been given for human capacity development of the rural sector in order to expand the extension system of the country. In 2000 the government launched the establishment of Agricultural Technical and Vocational Education and Training colleges (ATVETs) to train new extension workers. Three extension workers have trained at diploma level in plant science, animal science and natural science and they are assigned at each 'kebele' to provide the extension service to farmers. So far more than 73,000 DAs graduated and currently 47,682 DAs are serving the rural community at Farmers Training

Centers (FTCs).

The government has also established Farmers Training Centers (FTCs) to deliver the extension service to farmers in every 'kebele' in the country. These centers are serving as a focal and entry point to deliver any extension service to the farmers. 10,418 FTCs have been built with a plan of a total of 18,000 FTCs throughout the country. However, only 30% of the established FTCs are actually functional.

Chapter 3

Result of Survey/Research

1. Ministry of Agriculture (MoA)

1.1. Current Status

The Ministry of Agriculture (MoA) is the Ethiopian government ministry which watches over the agricultural policies of Ethiopia on a federal level. The powers and duties of the MoA include:

- conservation and use of forest and wildlife resources,
- food security,
- water use and small-scale irrigation,
- monitoring events affecting agricultural development and early warning system,
- promoting agricultural development, and
- establishing and providing agriculture and rural technology training.

1.2. Challenges

- Limited consistency and quality of implementation
- Weak coordination between research and extension and other actors
- Inadequate coordination for withdrawal and replacement of outdated technologies
- Slow-paced reforms in diversifying extension financing and delivery system
- One-off campaigns divert attention from overall extension system responsibilities
- Limited emphasis on pastoral and agro-pastoral regions/areas and crop biased extension approach
- Weak monitoring, evaluation, and learning systems
- Shortage of transportation facilities at all level
- Significant financial requirements to build and maintain FTCs
- High turnover of DAs and SMSs
- Climate change

1.3. Potentials

- Emerging private sector development in the agriculture sector
- Development of strong farmer cooperatives and unions that play key role in private-led extension services
- Existence of ATVETs to teach extension agents, and regional research centers to generate appropriate technologies
- Market-oriented agricultural development policy and strategy
- Emergence of value chains and pluralistic extension actors
- Existence of farmer development groups/social networks and women's groups
- Special initiatives such as Agricultural Growth Program (AGP), Household Asset-Building Program (HABP) and East Africa Agricultural Productivity Project (EAAPP) which innovate with extension approaches

2. Ethiopian Agricultural Research System

2.1. Current Status

After of the declaration of a decentralized political system of the Government of the Federal Democratic Republic of Ethiopia, the National Agricultural Research System as included the Federal Research Institute, the Regional Agricultural Research Institutes (RARIs) and research undertakings by Higher Learning Institutions (HLIs). During this time, the Ethiopian Agricultural Research Organization (EARO) was established with a new set up in 1997 by Proclamation no 79/1997 and later was renamed the Ethiopian Institute of Agricultural Research (EIAR). The objective of the institute is to generate, demonstrate, adapt, promote and transfer market and client oriented improved agricultural technologies, knowledge, information and innovative approaches to the farming communities responding to different agro-ecological zones and thereby to bring about healthy and quality life.

EIAR has the following core mandates:

- Improvement of agricultural technologies
- Multiplication of agricultural technologies
- Popularization of improved technologies
- Coordination of the NARS

EIAR works to improve the livelihood of all Ethiopians engaged in agriculture, agro-pastoralism, and pastoralism through competitive agricultural technologies.

2.2. Challenges

- Limited experimentation and field work
- Lack of technical capacity for laboratory equipment and operation facilities maintenance
- Frequent restructuring and change of strategic direction/approach
- Limited capacity to multiply breeders seeds and other technologies
- Weak linkages with extension
- Lack of regularly updated clear research strategy
- Inadequate consideration for local innovation
- Limited focus on farmers, participation
- Weak coordination of research
- Weak monitoring and evaluation system
- Inadequate planning and implementation capacity of researchers to design research projects and to develop appropriate technologies
- Generating inadequate appropriate technology (Post harvest and value addition)
- Weak use of IT
- Research staff are quite often overloaded with work.

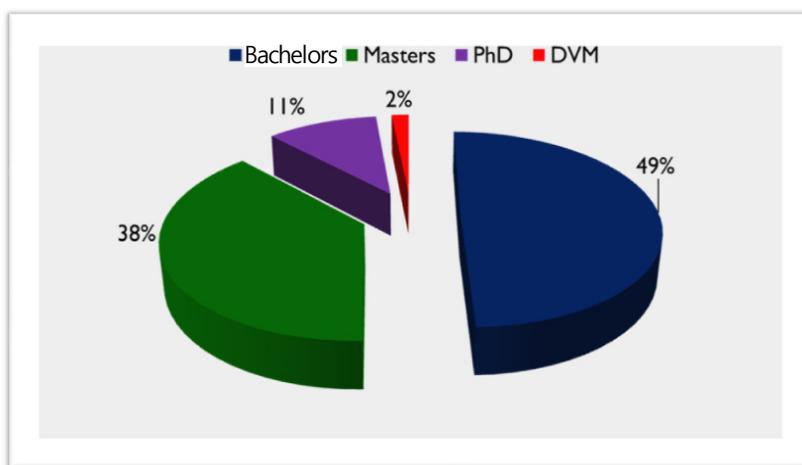
2.3. Organization and Staff Profile of EIAR

The governing body of the institute included

- Director general (1)
- Deputy director general (1)
- Core research directors (5)
- Research coordinators (5)

- Support processes (9)
- Research centers (15)

Figure 1-1. The staff profile of EIAR by academic status



3. Holetta Agricultural Research Center (HARC)

Holetta Agricultural Research Center (HARC) is one of the oldest and biggest Agricultural Research Centers in Ethiopia. It has some case-teams, research and projects coordinated nationally.

Major goals of the research programmes in the center are to:

- Enhance the national efforts for food self-sufficiency; development of market oriented products; adequate supply of raw materials for agro-industries; production and substitutes for the country's import materials and

sound utilization and conversion of the natural resources as well as environmental protection; and

- Enhance the efficiency of projects for research in crops, livestock, and natural resources.

Priority research programmes:

- Oil crops research programme,
- Pulses research programme,
- Root crops research programme,
- Dairy and animal traction research programme,
- Forage, animal nutrition and apiculture research programme,
- Soil fertility and resource characterization research program, and
- Agriculture biotechnology research programme.

Other services provided by the center:

- Seed multiplication (pre-seed and basic seeds),
- Laboratory analysis services (seed for quarantine, soil, nutrition and plant samples),
- Counseling and extension work,
- Education and training.

Human resources: in Holetta Agricultural Research Center, there is a total of 420 staff.

4. Oromia Agricultural Research Institute (OARI)

4.1. Current Status

Oromia Agricultural Research Institute (hereinafter OARI) is one of the seven Regional Agricultural Research Institutes (RARIs) that are established after the declaration of a decentralized political system of the Government of the Federal Democratic Republic of Ethiopia. OARI is mandated to generate, demonstrate, adapt, and promote improved agricultural technologies, knowledge, information and innovative approaches focusing on gaps of the overall national agricultural development in general and gaps of the regional needs and priorities in particular. OARI is accountable to Oromia Agricultural Bureau of the region and gets its budget from Oromia Regional Government.

Operationally OARI conducts agricultural research throughout the Oromia Regional State with the objective to improve production and productivity of the agricultural sector through demonstration and promotion of improved agricultural technologies. All research and pre-extension activities are carried out in 17 agricultural research centers located in different agro-ecologies of the region. The research and technology development endeavors are structurally organized into four thematic research processes such as crop, natural resource, livestock and agricultural mechanization with one executive unit working on research-extension and gender issue in the research system. The Research, Extension and Gender directorate is responsible for establishing two-way linkage between research and extension system on which agricultural technologies are introduced to the farming communities; needs, problems and feedback are communicated back to the research system.

The entire research priorities are outlined based on the result of a farming system survey. The survey is designed in such a fashion to come up with information on problems and needs of the farming communities. Identified problems and needs are then prioritized. Sometimes feedback from the extension system through ARDPLAC and researchers, field observation are used to identify research gaps in selecting a research subject and developing a proposal. Some innovative farmers have also come to the research centers informally to convey their needs and problems.

Agricultural technologies are selected and verified based on the result obtained at the research center and farmer's field adoptability trials to specific environment before technology popularization. Farmer's field level adoptability trials are used to show technology application and relative advantages of the technology over the traditional cultivar/breeds for better diffusion and adoption. Verified technologies along with a recommended extensions package are then disseminated to greater farming communities through pre-extension scaling out efforts in collaboration with regional agricultural offices.

The feedback mechanism for the technologies disseminated to the farmers is ensured by continuous technology monitoring and evaluations, and adoption and impact studies.

4.2. Challenges

- Limited capacity building for the research and extension system both in human resource (research methodology, data analysis) and research facilities (field vehicle, laboratory and field demonstration equipment, logistics)

as some research centers are newly established.

- New research centers, limited experiences on the research activities
- Sustainability, climate change (erratic rainfall, frequent drought), eco-system and natural resource management etc.
- Irrigation facilities
- Weak linear research-extension-farmers linkage because of limited political influence and commitment, weak linkage and undefined accountability of the research and extension system
- Limited social skill to work with farmers among professionals other than social sciences in the research and extension system
- Lack of proper plan/schedule for short and long term training
- Limited access to and use of agricultural technologies by farmers because of ineffectiveness of the extension system. Some technologies were proved to be appropriate in improving agricultural technologies but the technologies are not yet reaching farmers due to long-standing reasons.
- Crop biased research and livestock system and the need of huge investment on livestock
- Limitation of consideration of gender issues

4.3. Opportunities

- Good policies supporting the research extension system
- Diversified agro-ecologies (34) in the region
- Diversified resources potential for agricultural development in the region
- Young researchers to be trained in different areas of research activities
- Non-government organizations interested in assisting and collaborating on Ethiopia's research and extension system

- National policy which supports the development of new technology improving production and productivity of the sector
- Human resource: A total of 452 researchers are working in OARI.

5. Sasakawa Global 2000 (SG 2000)

Sasakawa Global 2000 (SG 2000) agricultural programs were implemented in 14 sub-Saharan countries but the programs are actively employed in countries such as Ethiopia, Nigeria, Mali and Uganda. The Ethiopian Country program was established in 1993 as an “implant” into the Ethiopian national extension system. The program is designed to introduce new approaches to the extension system by increasing farm-level productivity, especially of smallholder farmers. The main objective of the program is to transfer improved food production technologies appropriate to local farm-level circumstances effectively. The goal was to increase production and productivity and help achieve food security and increase farmer incomes. As Ethiopian agriculture has changed over time, SG 2000 emphasized more on an integrated approach to extension, one in which improving crop productivity goes hand in hand with increasing the effectiveness of post-production handling and marketing. SG 2000-Ethiopia is implementing various projects funded by Nippon Foundation, BMGF, JICA and WFP.

6. Oxfam America

Oxfam America Ethiopian program was established in 1970 to address the underlying causes of poverty and marginalization. The program focuses on sustainable livelihood, public service, disaster risk reduction and support for women. Sustainable livelihood is to improve food and income security through better access to production technology and sustainable markets, especially for women, and by facilitating private and public sector engagement to enable access to markets. The country program works to ensure people have access to improved public services as well as support women to lead decision making in service development and management. The disaster risk reduction is designed to improve community preparedness for disasters, focusing on gender in emergencies. Furthermore, the country program focuses on change attitudes and beliefs on sex based violence, empowering women to act as leaders and supporting their access to economic opportunities.

Oxfam America supplies emergency aid to communities when needed and helps people improve their means of making a living, thereby fostering their self-sufficiency. To deliver on this objective Oxfam America works on a range of activities including providing micro insurance, insuring crop production in drought prone areas, and strengthening the Ethiopian extension system.

In 2010, a tri-partite partnership with the Ministry of Agriculture (MoA), Oxfam America (OA) and SAA was entered into, in order to implement a project known as “Strengthening Extension Service Delivery in Ethiopia” funded by the Bill and Melinda Gates Foundation (BMGF). The objective is to improve extension service delivery to smallholder farmers for increased food security and income at household level. Oxfam America strengthens the infra-

structure of FTCs and supports the mobility and communication skills of the development agents (DAs) being placed at each FTC to educate farmers on improved agricultural technology.

7. Ethiopian Agricultural Transformation Agency (EATA)

The other institution the taskforce discussed to understand the overall research and extension system of Ethiopia is the Ethiopian agricultural transformation agency (ATA).

ATA is a high level agency established by the Ethiopian government, with the help of international donor organizations, to address the high level systemic and operational bottlenecks of the agricultural sector and thereby increase farm level productivity and farmer income to improve their livelihood and transform the Ethiopian economy. The agency has three main program areas, namely: Systems, Value chains and Cross-cutting initiatives. The System programs are Research and Extension, Input and Output, Markets, etc. The main mandate of these programs is to address the systemic bottlenecks that hinder the respective systems from operating efficiently and effectively. For instance the Research and Extension team addresses the systemic bottlenecks affecting the agricultural sector in generating and disseminating appropriate technologies.

The value chains are organized around the high priority crops (like teff, maize, wheat, barley, sesame, etc) prioritized by the Ethiopian agricultural sector. These value chain teams address the bottlenecks that hinder the increase in the productivity of the specific crops. For instance the maize team addresses the

bottlenecks in maize productivity from cropping until marketing. Here, the interconnection between the systems and the value chain programs has to be evident. The other programs within ATA are the cross cutting initiatives. These programs (like gender and climate initiatives) have to be streamlined across the value chain and system programs to ensure that the interventions planned are climate and gender sensitive.

All these ATA programs were not mandated to do actual implementation; rather they give high level implementation support to the government counterparts like the Ministry of Agriculture and regional bureaus of agriculture.

Chapter 4

Summary and Recommendation

1. Summary

Table 1-3. Summary of SWOT analysis of the agricultural research and extension system

Level	Strength	Weakness	Opportunity	Threat
Ministry of Agriculture (MoA)	<ul style="list-style-type: none"> · Policy and strategy of agricultural and rural development · Existence of different guidelines · Extension guidelines · ARDPLAC framework · Capacity building of 25 agricultural colleges and establishment of 10418 Farmer Training centers · More than 73 trained extension workers · Five year plan · Primary cooperatives and unions · Government high fund for agriculture (more than 16% of the GDP) · Scaling up of best practices and model farmers 	<ul style="list-style-type: none"> · Weak follow up of the implementation · Weak link with regional agricultural bureaus · Poor linkage among different stakeholders · Ineffective decentralization of the agricultural management system · Lack of adequate qualified staff at the federal level · Weak monitoring and support system · Frequent structural changes · High staff turnover · Low payment and lack of incentive for staff · Logistics shortage for field work · Lack of enabling environment for the pluralistic extension system · Lack of appropriate extension methods for livestock, mechanization, forestry. · Limited effort in communicating to stakeholders · Lack of adequate agricultural inputs 	<ul style="list-style-type: none"> · Existence of huge projects like AGP, SLM, EAAP, HAAP · Existence of more than 67 agricultural research centers · Universities with agriculture departments · Ethiopian Commodity exchange market system · Existence of AGO in developed world · ATA establishment for policy issues · Evolving agro processing industries 	<ul style="list-style-type: none"> · Climate variability · High attrition rate of extension personnel

(continue)

Level	Strength	Weakness	Opportunity	Threat
Ministry of Agriculture (MoA)	<ul style="list-style-type: none"> · National Reward system for farmers, organizations and individuals · Empowered to make regional decisions · Staff availability · Prepare annual plan · Mobilization · Irrigation facility · Watershed management approaches 	<ul style="list-style-type: none"> · Inefficient resource utilization · Lack of coordination with research and universities · Lack of updated research information · Some nonfunctional FTCs · In adequate budget · Staff turnover and mobility within the system · Frequent restructuring of the extension system · Lack of monitoring and evaluation and support for districts · Administrative staffs interference · Lack of trust in capacity of SMS 	<ul style="list-style-type: none"> · Empowered to make region specific planning · Existence of different development organizations (NGOs, Credit, Research, Universities) 	<ul style="list-style-type: none"> · Budget limitation · Staff turn over · Climate change · High inflation rate
Regional Agricultural Bureau	<ul style="list-style-type: none"> · Empowered to make local extension planning · Established farmers, local development network · Availability of FTCs in each rural village of districts · Availability of logistics · Involve in natural resource management with a community · Capacity building for frontline extension workers and farmers 	<ul style="list-style-type: none"> · Use of the networks for non-agricultural activities · FTC follow up and use is weak · No operational budget for FTCs · Lack of crop calendar based planning · Top down extension approach · Lack of commitment by staffs to support farmers · Lack of adequate logistics like transport · Lack of updated research information · Limited technology availability · Lack of linkage with relevant stakeholders · Lack of effort to use available opportunities in the vicinity · lack of balanced budget for agriculture 	<ul style="list-style-type: none"> · Presence of farmers, network · Empowered to make local planning · Existence of different development organizations (NGOs, Credit, Research, Universities) 	<ul style="list-style-type: none"> · Climate change · Outbreak of pests and diseases · Extension workers, change of profession
District	<ul style="list-style-type: none"> · Empowered to make local extension planning · Established farmers, local development network · Availability of FTCs in each rural village of districts · Availability of logistics · Involve in natural resource management with a community · Capacity building for frontline extension workers and farmers 	<ul style="list-style-type: none"> · Use of the networks for non-agricultural activities · FTC follow up and use is weak · No operational budget for FTCs · Lack of crop calendar based planning · Top down extension approach · Lack of commitment by staffs to support farmers · Lack of adequate logistics like transport · Lack of updated research information · Limited technology availability · Lack of linkage with relevant stakeholders · Lack of effort to use available opportunities in the vicinity · lack of balanced budget for agriculture 	<ul style="list-style-type: none"> · Presence of farmers, network · Empowered to make local planning · Existence of different development organizations (NGOs, Credit, Research, Universities) 	<ul style="list-style-type: none"> · Climate change · Outbreak of pests and diseases · Extension workers, change of profession

(continue)

Level	Strength	Weakness	Opportunity	Threat
Farmers	<ul style="list-style-type: none"> · High agricultural technology demand · Availability of farm labor · Availability of social networks and farmers groups · High awareness for conservation 	<ul style="list-style-type: none"> · Doubts about new technologies · Limited off farm incomes · Dependency syndrome on government actions · Lack of saving culture · Poor working culture · Limited commercial crop production · Limited use of mechanization · Land fragmentation · Low input use · Lack of ownership of local institutions e.g. FTCs · Lack of irrigation facilities 	<ul style="list-style-type: none"> · Availability of FTCs · Market availability for agricultural outputs · Social network for information dissemination · Availability of credit 	<ul style="list-style-type: none"> · Disease and pest outbreak · Recurrent drought · Market price fluctuation
National Agricultural Research System	<ul style="list-style-type: none"> · Established centers at different agro-ecology · Released more than 800 varieties of different crops · effort made to reach all agricultural commodities · large number of higher learning institutions which also conduct agricultural research 	<ul style="list-style-type: none"> · Limited experimentation and field work · Lack of technical capacity for laboratory equipment, operation facilities maintenance · Frequent restructuring and change of strategic direction/approach · Limited capacity to multiply breeder seeds and other technologies · Weak linkages with extension · Lack of regularly updated clear research strategy · Inadequate consideration for local innovation · Limited focus on farmers, participation · Weak coordination of research · Weak M&E system · inadequate planning and implementation capacity of researchers to design research projects and to develop appropriate technologies · Inadequate appropriate technology (Post harvest and value addition) · weak use of IT · Research staff often overloaded with work 	<ul style="list-style-type: none"> · Clear agricultural development policy · High government commitment to support agricultural research · Availability of international organizations interested in partnership like KREI/Korean government · High demand for improved agricultural technologies by farmers · Availability of genetic diversity 	<ul style="list-style-type: none"> · Senior research staffs turn over · Climate change and natural resources degradation · Lack of vehicles and research (tractors, seed cleaning machines) · Low staff motivation

2. Recommendation

Although recently there are encouraging initiatives, it was acknowledged that still a lot has to be done to ensure a vibrant research and extension system in Ethiopia. Among the initiatives to improve the system, the following can be mentioned:

- Improve the research and extension system,
- Design strategy to create pluralistic systems and approaches for better public and private partnership,
- Build capacity of researchers, agricultural experts, development agents through repetitive short and long term training and experience sharing,
- Motivate research and extension staff through conducive working environment and benefit and incentive packages,
- Ensure quality research and swift transfer of technology through improving research laboratories, facilities and required logistics,
- Enhance access and use of improved technologies through resourcing and functioning of FTCs,
- Allocate enough budgets to strengthen research and extension institutes.

Part II

The Results of the Second Joint Survey

by Ethiopian Survey Team

Chapter 1

Introduction

1. Background and Context

The mainstay of the Ethiopian economy is agriculture that is traditional, rain fed and has low productivity. The sector is constrained by degradation of natural resources, environmental problems, diminishing farm sizes, and imperfect agricultural markets. The sector also lacks adequate agricultural technology and has weak institutional support mainly extension and credit services. According to Solomon et al. (2011), it has long been recognized that the continuous use of traditional, low yielding crop varieties is a major cause of low crop productivity and ultimate food insecurity and poverty.

Achieving agricultural growth and development and thereby improving rural household welfare will require increased efforts to provide yield enhancing and natural resources conserving technologies. Agricultural research and technological improvements are therefore crucial to increase agricultural productivity to meet demand for food and thereby reduce poverty (Solomon and Bekele, 2010). To this end, the government of Ethiopia designed an economic development strategy that places high priority on accelerating agricultural growth to achieve food security and poverty alleviation since 1991 through introduction

and dissemination of improved technological packages that combined credit, fertilizers, improved seeds, and better management practices (Yu et al., 2011).

Over the past two decades the Ethiopian government has spent huge investment on the research and extension system to improve the delivery of agricultural technologies, chemical fertilizer and other inputs for smallholder farmers for better productivity and food security. Because of the efforts to date, the agricultural sector has been able to grow annually at over 8% for the past seven years, the number of model farmers has been rising, and commercial farms have expanded in some pocket areas of the country.

The level of agricultural input utilization and improved technologies adoption is 15% that is by far lower as compared to some developing countries in Africa. Inorganic fertilizer such as UREA and DAP is increasingly supplied and applied but the recommendation is not based on the result of soil test and crop response. At the same time, the sector has to produce sufficient food crops for the country's growing population at a rate of 2.5 per year. This become more challenging for the country along with global and internal factors such as climate change, natural resource degradation (soil fertility, fragmentation of farm size, deforestation etc.), and low level of institutional capacity and poor linkage mechanism.

Additionally, though the research-extension linkage strategy was approved in 1999 (ADPLAC), this feedback forum could not function. As a result, available researches outcomes have not been effectively disseminated to farmers to address needs and problems identified by the extension system. Likewise, the extension system is not as efficient as its full potential to deliver those improved technologies generated from the research system. With the highlights, this study presents the overview of the current situation of Ethiopia's agricultural technology development and extension system as the result of the KAPEX program.

2. Objective of the Study

General objective: The overall objective of this study is to generate information useful for the Korean Government's official development assistance thereby to contribute to technology development and dissemination efforts in Ethiopia.

Specific objectives: the specific objective of the study is:

- To assess the current status and challenges of Ethiopia's agricultural technology development and extension system;
- To find out ways to initiate research and development programs/projects to improve and strengthen agricultural research and extension organizations and related system; and
- To accumulate and document relevant information and statistics for successful implementation of the programs.

3. Importance and Limitation of the study

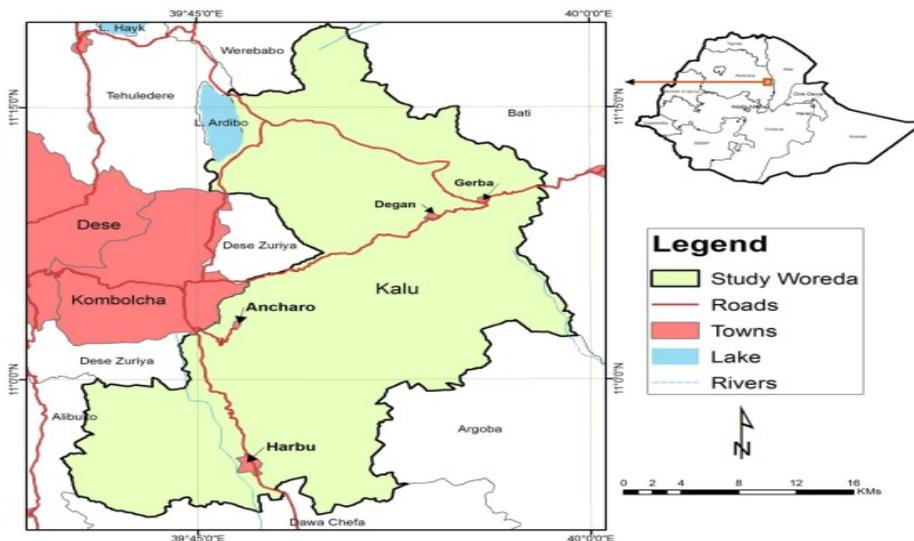
The information generated by this study helps to develop further official development assistance (ODA). The study provides information on research and extension useful for policy makers, planners, extension organizations etc. A limit of the study is shortage of time to collect, analyze and interpret primary data and compile secondary information.

4. Methodology

4.1. Study Area

Two districts, namely Kalu district of the Amhara region from the north eastern part of the country and Arsi Negele district of the Oromia region from south eastern part of the country were selected purposively considering resource potential for agriculture, level of droughts, relative access of agricultural technology, and availability of nearby ATVET colleges. These two districts were served to identify future pilot project areas having similar socio-economic and biophysical conditions as well.

Figure 2-1. Map of Kalu district

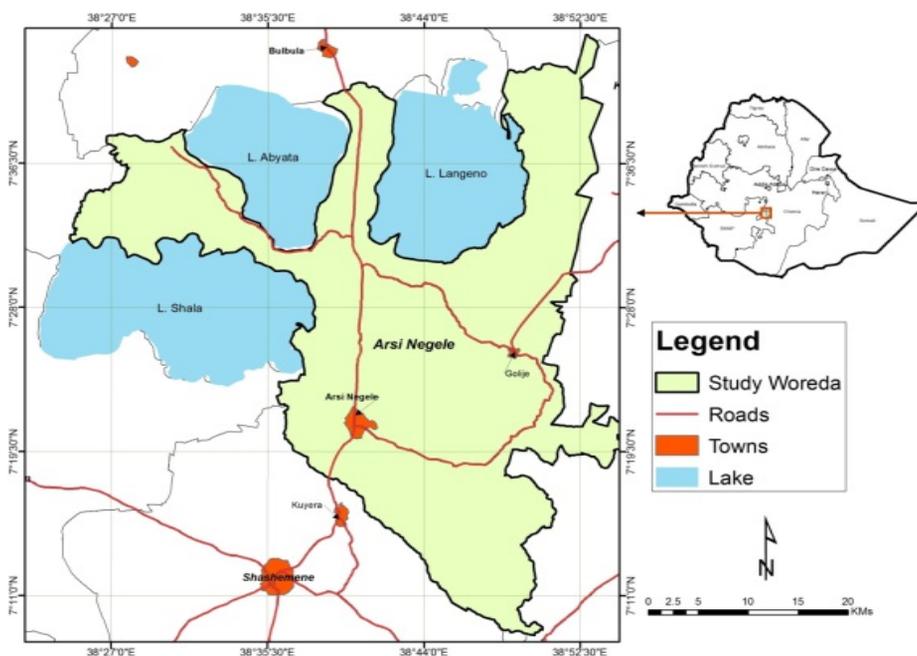


Kalu district: the district is located at a distance of 370 Km from Addis Ababa in the north east direction. Of the total area of the district, 89% is mid-high land and the annual average rainfall is 750 to 900 mm. The average maximum

and minimum temperature is 35°C and 25°C, respectively. The altitude ranges from 1450 to 2680 m.a.s.l. The district consists of 30 rural and 4 urban kebeles (lowest administrative unit). According to the 2007 census, 228,142 inhabitants live in the district.

Arsi Negele district: The district is located 203km from Addis Ababa in the south east direction. The district consists of high land (32%), mid high land (42%) and low land (26%). 90.5% of the total land surface is arable land. The annual average rainfall ranges from 500 to 1150mm and the average max and minimum temperature is 25°C and 10°C, respectively. The altitude of the district ranges from 1500 to 2800 m.a.s.l. The district has 260,129 inhabitants according to the 2007 census.

Figure 2-2. Map of Arsi Negele



4.2. Source of Data and Method of Data Collection

This study employed primary and secondary information. Data were collected from 120 farmers randomly drawn from two districts namely Kalu district and Arsi Negele district. From each district, three Kebeles (lowest administrative unit) were purposively selected based on traditional agro-ecologies such as high land, mid-land and low land. Moreover, from 24 SMS and 15 DAs, information was generated using structured questionnaires. This study also makes use of desk review in order to obtain secondary information.

4.3. Method of Data Analysis

Both qualitative and quantitative data on socio-economic, agricultural production, social services, food shortage months, knowledge and skill of SMS and DAs were collected and analyzed using descriptive data analysis techniques using SPSS. The descriptive statistics made use of tools such as a mean, percentage, standard deviation and frequency distribution. Information was summarized into tables and the results were supported using secondary information.

Chapter 2

Result and Discussion

1. Socio-economic Characteristics of the Respondents

Table 2-1 summarizes the socio-economic characteristics of the respondent farmers. Mean differences were observed in variables between the two districts with different significant level. Access to potable water, education, total family size, landholding, cultivated land, market access and grazing land were found to be statistically significant at less than 1% probability level.

Table 2-1. Socio-economic characteristics of respondent farmers

Discrete variables			
Description	Kalu (%)	Arsi Negele (%)	Total (%)
Sex (Female)	15.0	35.0	25.0
Access to potable water (Yes)	70.0	33.3	52.5
Access to electricity (Yes)	36.7	21.7	29.2

Table 2-1. Socio-economic characteristics of respondent farmers (CONTINUE)

Continuous variable				
Description	Kalu district		Arsi Negele district	
	Mean	S.D	Mean	S.D
Age	40.520	10.736	37.150	9.205
Educational	2.380	2.731	3.820	3.721
Total family size	5.270	1.812	8.640	3.894
Total land owned by the household (ha)	0.819	0.640	1.854	1.280
Total land cultivated in 2004/05 (ha)	0.640	0.461	1.529	1.038
Market distance (hour)	1.411	1.144	4.333	6.717
Total grazing land (ha)	0.186	0.156	0.603	0.473

Source: Own survey 2013

2. Agricultural Production

2.1. Types of Crop Grown

Ethiopia's crop agriculture is complex, involving substantial variation in crops grown across the country's different regions and ecologies and five major cereals such as teff, wheat, maize, sorghum and barley are the core of Ethiopia's agriculture and food economy (Alemayehu et al., 2011). Though a number of crops are produced in the country the production and productivity remains very low compared to the research and best farmers' practices. In general productivity of major crops is less than 30% of average potential. Teff is by far lower than its research potential of about 5 tons per hectare. The other challenge is a few crops dominate the production system; grains only occupy about

80%. Based on the main season production in 2012/13, a total of 12.28 million hectares are cultivated and a total of 23.1 million tons is from grains. Productivity also fluctuates over years as the production is mostly rainfall dependent. As Table 2-2 shows, teff, barley, wheat, maize and sorghum, pulses, vegetables and potato are the crops grown in the study areas. In Kalu district teff and sorghum are the main crops that most farmers are growing; in Arsi Negele district wheat, maize, and barely are main crops that most farmers grew during 2011/12 production season.

Table 2-2. Crop area and production (Meher and Belg season, 2011/12) of the sample respondents

Crop	Kalu district			Arsi Negele district		
	N	Average area allocated (ha)	Average production (Qnt)	N	Average area allocated (ha)	Average production (Qnt)
Teff	44	0.41	2.74	27	0.34	2.56
Barley	15	0.21	2.40	34	0.60	13.40
Wheat	18	0.25	2.97	53	0.75	17.24
Maize	10	0.13	1.90	36	0.53	11.19
Sorghum	33	0.37	4.03	12	0.16	1.88
Pulses	19	0.91	7.05	5	0.78	4.75
Vegetables	8	0.19	8.75	5	0.18	8.00
Potato	7	0.07	1.79	26	0.42	37.96

Source: Own survey, 2013

2.2. Use of Different Type of Improved Varieties

Table 2-3 depicted the total sample respondents; more than 80% of the respondents were aware of improved crop varieties and at the same time more

than 77% of them reported they are using improved crop varieties of wheat, maize, and tef cultivars. The respondents also reported inadequate local supply of seed, size of farm land, limited capital for purchasing agricultural inputs, doubt of adaptability to the locality, perception of cultivars as low performer for not using continuously seed of improved varieties. Study in Ethiopia similarly identified knowledge of existing varieties, perception about the attributes of improved varieties, household wealth (livestock and land) and availability of active labor force as the major determinants for adoption of improved technologies (Solomon et al., 2011). Another source also indicated variables that could affect adoption of improved cereal varieties such as plot characteristics, access to agricultural services, holder and household characteristics, resources available to the farmer, local adoption patterns, and reliance on the crop (Yu, 2011).

Table 2-3. Farmers' awareness and use of some improved crop varieties

Options	Kalu (%)	Arsi Negele (%)	Total (%)
Aware of improved varieties (yes)	61.7	100.0	80.8
Use of improved crop varieties (yes)	58.3	96.7	77.5

Source: Own survey 2013

2.3. Use of Agricultural Inputs

The national level evidence shows increases in total fertilizer imports as well as in the applied volume of fertilizer. The effect of fertilizer use on the value of agricultural production and yield is also found positive. However, the high price of fertilizer, supply shortage, and late arrival of fertilizer are the major constraint for the use of fertilizer (Endale, 2010). Similarly, the present study

also identified lack of capital to purchase fertilizer and timely arrival of fertilizer as a challenge for the use of fertilizer. The data also shows that of the total sample respondents more than 80% reported they are using inorganic fertilizer though there is heterogeneity between the two districts. The use of other agricultural inputs such as herbicides, pesticides and the use of compost were found to be 62.5%, 55.3%, and 69.2%, respectively (Table 2-4).

Table 2-4. Use of agricultural inputs by district

Use of agricultural inputs		Kalu (%)	Arsi Negele (%)	Total (%)	Reasons for discontinuing
Inorganic fertilizer	Yes, I am still using	65.0	100.0	82.5	<ul style="list-style-type: none"> · Lack of money to purchase · I could not get timely
	Yes, but I have stopped	16.7	-	8.3	
	No, I never used so far	18.3	-	9.2	
Herbicides	Yes, I am still using	25.0	100.0	62.5	<ul style="list-style-type: none"> · Lack of money to purchase · I could not get timely · lack of skill and knowledge on how to use
	Yes, but I have stopped	11.7	-	5.8	
	No, I never used so far	63.3	-	31.7	
Pesticides	Yes, I am still using	51.7	60.0	55.8	<ul style="list-style-type: none"> · Lack of money to purchase · I could not get timely · lack of skill and knowledge on how to use
	Yes, but I have stopped	20.0	6.7	13.3	
	No, I never used so far	28.3	33.3	30.8	
Compost	Yes, I am still using	68.3	70.0	69.2	<ul style="list-style-type: none"> · Lack of money to purchase · I could not get timely · lack of skill and knowledge on how to use · My land is very fertile
	Yes, but I have stopped	8.3	3.3	5.8	
	No, I never used so far	23.3	26.7	25.0	

Source: Own survey, 2013

2.4. Access to Irrigation, Vegetable and Fruit Production Practice

Producing vegetables and fruit using irrigation water is an important source of household income for food security. According to the survey, of the total sample respondents, only 17.5% of the farmers reported that they have access to irrigation water. At the same time, 53.3% and 26.7% of the sample respondents indicated they grow vegetable and root crops, and fruits, respectively (Table 2-5).

Table 2-5. Access to irrigation, vegetable and fruit production practice

Options		Kalu district (%)	Arsi Negele district (%)	Total (%)
Access to Irrigation	Yes	33.3	1.7	17.5
	No	66.7	98.3	82.5
Growing vegetable and root crops	Yes	28.3	78.3	53.3
	No	71.7	21.7	46.7
Growing fruit	Yes	38.3	15.0	26.7
	No	61.7	85.0	73.3

Source: Own survey, 2013

2.5. Livestock Production Practice

Ethiopia is much known in Africa for its livestock resources even though it is untapped potential to contribute the country's economy. Cattle, sheep, goats, chickens, camels and honeybees are the major livestock species. According to CSA (2009) there were 52.0 million cattle, 63.1 million small ruminants, 42.1 million poultry, and 2.5 million camels. As Table 2-6 shows, average livestock ownership in TLU was found to be 5.806 and 3.252 for Arsi Negele and Kalu district, respectively with significant difference between the two districts. Besides, of the total sample respondents, only 11.7% reported that they own cross breeds/exotic breeds.

Table 2-6. Cross/exotic breeds and livestock ownership

Do you own cross breeds/exotic breeds?	Kalu district (%)	Arsi Negele district (%)	Total (%)
Yes	8.33	15.0	11.67
No	91.67	85.0	88.33

Source: Own survey, 2013

2.6. Improved Soil Fertility Management

Soil fertility and its management is one of important variables for crop production and productivity. Table 2-7 shows that the average infertile farm size was found to be 0.294 ha and 3.599 ha for Kalu district and Arsi Negele district, respectively; at the same time 81.7% and 96.7% reported that they have participated in training on improved soil and water conservation and management, respectively.

Table 2-7. Improved soil fertility management by district

Soil fertility status	Kalu district		Arsi Negele district	
	Mean (ha)	SD	Mean (ha)	SD
Very fertile	0.386	0.228	1.080	0.999
Fertile	0.366	0.204	0.674	0.401
Infertile	0.294	0.212	3.599	15.210
Improved practice	Yes (%)	No (%)	Yes (%)	No (%)
Preparation and use of compost	76.7	23.3	65.0	35.0
Training on improved soil and water conservation	81.7	18.3	96.7	3.3

Source: Own survey, 2013

3. Extension Service

The present Five Year Growth and Transformation Plan (FYGTP) recognizes the pivotal role of agriculture in the economic development of the country. By the end of the terminal year (2015) of the GTP, it is planned to increase the number of extension service users from 5.09 million to 14.64 million. Table 2-8 indicates that 34.2%, 53.3% and 12.5% of the sample respondents responded they are very satisfied, satisfied and unsatisfied with the service they obtained from an extension agency, respectively.

Table 2-8. Perceived level of satisfaction on extension service by district

Level of satisfaction on extension service	Kalu district (%)	Arsi Negele district (%)	Total (%)
Very satisfied	46.7	60.0	34.2
Satisfied	38.3	30.0	53.3
Unsatisfied	15.0	10.0	12.5

Source: Own survey, 2013

Since 2002, roughly 8,500 FTCs have been built at the kebele (the lowest administrative division) level. The centers are staffed by DAs and are responsible for providing extension activities in rural areas. Core activities are around livestock, crop production, and NRM (Davis, 2009). The following table indicated that the perceived level of satisfaction of farmers on FTCs. As the result of the survey shows, 34.2% of the respondents reported that they are unsatisfied with the service they obtained because of poor infrastructure and inadequate training facilities, limited participation of farmers in FTCs, lack of operational cost for training and demonstration, and unavailability of technologies at FTCs (Table 2-9).

Table 2-9. Perceived level of satisfaction of farmers on FTCs by district

Level of satisfaction on FTCs	Kalu district (%)	Arsi Negele district (%)	Total (%)	Perceived reasons
Very satisfied	20.0	50.0	35.0	<ul style="list-style-type: none"> · Poor infrastructure and inadequate training facilities · Limited participation of farmers in FTCs · Lack of operational cost for training and demonstration · Unavailability of technologies at FTCs
Satisfied	38.3	23.3	30.8	
Unsatisfied	41.7	26.7	34.2	

Source: Own survey, 2013

4. Credit and Saving Service

Most of the time farmers in Ethiopia face shortage of capital for their agricultural activity and to start commercial agriculture. One of important institutional support for farmers hence, is credit service especially for purchasing agricultural inputs and further investment. The joint survey result showed more than half of the respondents were not using credit and saving service during past years. The test statistic value also confirmed there is no significant statistical difference between the two districts (Table 2-10).

Table 2-10. Use of credit and saving service by district

Use of credit and saving service	Kalu district (%)	Arsi Negele district (%)	Total (%)
Yes	45	53.33	49.17
No	55	46.67	50.83

Source: Own survey, 2013

5. Cooperative Membership and Perceived Level of Satisfaction

Cooperatives can play an important role in any country including Ethiopia. Of 43,256 primary cooperatives registered in Ethiopia in 2012, 26.5 percent were agricultural cooperatives (Bernard et al., 2013). As the table below indicated, 80% of the sample respondents informed they are member of primary cooperatives at local level. Agricultural cooperatives are providing agricultural input supply service (seed of improved crop varieties, inorganic fertilizer such as UREA and DAP and chemicals for weed, pests, and diseases), selling agricultural output, providing marketing information and credit service for members. Of the total sample respondents, 60% informed that they are satisfied with the level of their participation in cooperatives and more than 14% indicated that they are unsatisfied with the service they obtained (Table 2-11). Bernard et al. (2013) identified a lack of local access to such organizations, membership fees and low trust in the cooperative's effectiveness as reasons for non-membership of cooperatives in Ethiopia. The study at the same time found non-participation in the cooperative is also related to having access to benefits without joining the cooperative. These reasons are significantly heterogeneous across regions.

Table 2-11. Cooperative membership and perceived level of satisfaction

Are you a member of any type of cooperative?	Kalu district (%)	Arsi Negele district (%)	Total (%)
Yes	90.0	70.0	80.0
No	10.0	30.0	20.0
Level of satisfaction with participating in cooperatives	Kalu district (%)	Arsi Negele district (%)	Total (%)
Very satisfied	11.1	42.7	25.0
Satisfied	70.4	47.6	60.4
Unsatisfied	18.5	9.5	14.6

Source: Own survey, 2013

6. Months of Food Shortage in a Yearly

Table 2-12 shows many farmers face critical food shortage. According to the survey, of the total respondents, 20.8% and 50.8% reported that they face food shortage in most of the cases and sometimes, respectively. The mean value of month that the farmers face food shortage was also found to be 3-4 months with minimum of one month and maximum of seven months. The statistical test is found to be not significant between the two districts.

Table 2-12. Food shortage and months by district

Did your family ever face critical food shortage?		Kalu district (%)	Arsi Negele district (%)	Total (%)
Yes, in most of the cases		28.3	13.3	20.8
Yes, but sometimes		43.3	58.3	50.8
No, I never faced food shortages so far		28.3	28.3	28.3
Months in a year that I face food shortage	Mean (n)	3 ~ 4	3	3 ~ 4
	Minimum (n)	1	1	1
	Maximum (n)	7	6	7

Source: Own survey, 2013

7. Information Communication and Extension

In order to capture the information communication and extension service, information was generated on a manual/guideline to deliver extension services, last update of the manual, language of the manual/guideline, use of the manual for extension service, and reference book, journal, proceeding. The survey result indicated that 82.1% of the respondents said that they have a manual/guideline for their extension service delivery work. However, of the total of the respondents having the manual/guideline, 51.3% and 28.2% reported they use the manual/guideline often and rarely, respectively. Close to 60% of the respondents reported they have no reference materials for extension service (Table 2-13).

Table 2-13. Information communication and extension

Options	Number	Percentage	
Manual/guideline to deliver extension service	Yes	32	82.1
	No	7	17.9
Last update of the manual	1980 - 2002	11	28.2
	2003 - 2005	21	53.8
Language of the manual/guideline	English	9	23.1
	Amharic	14	35.9
	Afan Oromo	9	23.1
Use of the manual for extension service	Most often	1	2.6
	Often	20	51.3
	Rarely	11	28.2
	Never	-	-
Reference book, journal, proceeding	Yes	16	41.0
	No	23	59.0

Source: own survey, 2013

8. Self-evaluation of Knowledge and Skill of SMS and DAs

Table 2-14 showed SMS' self-assessed knowledge and skill on extension content of improved pre-harvest and post-harvest agronomic practices. According to their perceived self-assessment result, the mean score was less than 4 points and greater than 3 points. This shows that the respondents' level of knowledge and skill on improved agronomic practice rated as high. However the respondents, level of ICT knowledge and skill was low: less than 3.0 and greater than 2.0 points (Table 2-14 and Table 2-15).

Table 2-14. Self assessed knowledge and skill on extension content

Knowledge and skill on improved agronomic practice	Mean score
Identification of improved crop varieties of major food crops	3.46
Improved seed production and handling	3.33
Improved land preparation for major food crops	3.85
Recommended seed rate and sowing for major food crops	3.71
Improved soil fertility management and fertilizer application	3.79
Identification of weeds of major food crops	3.79
Use of herbicides against the weeds	3.46
Identification of pests and diseases of major food crops	3.33
Use of chemicals against the pests and diseases	3.13
Proper date for harvesting	3.59
Improved post-harvest management	3.38

Source: Own survey, 2013

Key for the values: ≥ 4.5 very high; < 4.5 but > 3.0 high; $= 3$ moderate;
 < 3 but ≥ 2 low; < 2 very low

Table 2-15. Self assessed ICT knowledge and skill of SMS and DAs

Knowledge and skill	Mean score
Word processing	2.62
Spread sheet/excel	2.23
Data base /Ms access	2.03
E-mail communication	2.21
Chatting on social media (eg. Facebook, tweeter, etc)	2.26
Attaching files	2.36
Searching the Internet on web pages	2.21
Web pages	2.03
Powerpoint presentations	2.23
Use of mMobile text message in extension	3.05

Source: Own survey, 2013

Key for the values: ≥ 4.5 very high; < 4.5 but > 3.0 high; $= 3$ moderate;
 < 3 but ≥ 2 low; < 2 very low

9. Perceived Status of Research-extension Linkage

In Ethiopia the research-extension linkage was often considered too weak to respond to farmers' needs and problems. The following table indicated that 43.6% and 38.5% of the respondents reported that the linkage is medium and weak, respectively.

Table 2-16. Perceived status of research-extension linkage

How do you rate the linkage between research and extension?	Kalu (%)	Arsi Negele (%)	Total (%)
Very strong	-	5.0	2.6
Strong	-	15.0	7.7
Medium	42.1	45.0	43.6
Weak	47.4	30.0	38.5
Very weak	10.5	5.0	7.7

Source: Own survey, 2013

Chapter 3

Summary and Recommendation

The farmers have limited access and utilization of improved technology in both crop and livestock sub-sectors. Therefore, we have to ensure increased availability of technologies through

- Establishment of effective model research-extension linkage centers at national and regional level.
- Upgrading of FTCs into agricultural technology centers in terms of technology availability, and link with ATVET colleges.
- Continuous effort to build the capacity of researchers and extension staff using long and short term training, and experience sharing focusing on improved agricultural practices, planning, monitoring and evaluation, leadership, ICT and small scale mechanized technologies.
- Fulfilling proper research facilities and required logistics such as field vehicles, laboratory facilities, and on-farm level implements.

Part III

The Results of the Joint Survey
by Korean Experts

제 1 장

개 요

1. 자문활동 일정

1.1. 1차 공동조사

No	일자	출발지	도착지	방문 기관	수행 업무
1	8.12 (월)	체	재	<ul style="list-style-type: none"> - 농업부(농업지도국) - 농업연구원(EIAR), 농업전환청(ATA) 	<ul style="list-style-type: none"> - 에티오피아 농업기술 연구개발 및 보급체계 현황 파악 - KAPEX 사업 향후 추진일정 협의 - EIAR과 ATA의 기능과 역할 파악 - 현지 공동조사단과 현지조사 일정 공유 및 관련 협의
2	8.13 (화)	체	재	<ul style="list-style-type: none"> - 오로미아주 농업부 - 오로미아주 농업연구원 Oxfarm America - SG 2000 	오로미아주 농업발전 현황, 농업기술 연구개발 및 보급체계 현황 파악 비정부기구의 농업기술 연구개발 및 보급 분야 지원 현황 파악
3	8.14 (수)	체	재	Holetta 농업연구센터 농민 교육훈련센터 농가, 농민생산자조직	지역 차원에서의 농업기술 보급 실태 파악 농가의 농업기술 보급서비스 이용 실태 파악
4	8.15 (목)	체	재	아다마 과학기술대학 공동조사단 회의	대학의 농업기술 연구개발 및 보급 현황 및 향후 협력 가능성 모색 공동조사 결과 공유 및 향후 계획 협의

1.2. 2차 공동조사

No	일 자	출발지	도착지	방문 기관	수행 업무
1	9.21 (토)	체	재	- Amhara주 Kalu 지역 (이무하 교수)	- 이 동
2	9.22 (일)	체	재	- Oromiya주 Arsi Negele 지역 (목일진 박사)	Woerda(district)정부 관계자 면담 농업기술 지도사 및 농가 대상 면담 및 설문조사
				- Amhara주 Kalu 지역 (이무하 교수)	Woerda(district)정부 관계자 면담 농업기술 지도사 및 농업 TVET college 면담 및 설문조사
3	9.23 (월)	체	재	- Oromiya주 Arsi Negele 지역 (목일진 박사)	농업기술 지도사 및 농가 대상 면담 및 설문조사
				- Amhara주 Kalu 지역 (이무하 교수)	농업기술 지도사 및 농가 대상 면담 및 설문조사
4	9.24 (화)	체	재	- Amhara주 Kalu 지역 (이무하 교수)	아디스 아바바로 이동 공동조사 결과 공유 및 향후 계 획 협의

※ 목일진 박사는 건강상의 이유로 2차 공동조사에 합류하지 못하였음.

2. 현황 소개

1.1. 일반현황

에티오피아 연방 민주공화국(Federal Democratic Republic of Ethiopia)은 9개 주(regional state)와 2개의 시 주(city-state)로 구성되어 있고, 아프리카의 동

쪽 들출부, 아프리카의 뿔(Horn of Africa)에 위치하고 동쪽은 소말리아, 서쪽은 수단, 남쪽은 케냐, 북쪽은 지부티와 에리트리아로 둘러싸여 항구가 없는 내륙 국가이다. 면적은 한반도의 약 11배에 달하며 총인구는 2012년 기준 약 9천 4백만이며, 강수량은 연 1,000~1,500mm이지만 대우기에 집중되는 특징을 가진다. 수도는 아디스 아바바(Addis Ababa)로 인구 625만명('12년 7.1현재)으로 에티오피아에서 가장 큰 도시이다. 에티오피아는 농업국가로서 농업이 총 GDP에 차지하는 비율은 46%(WB, 2011), 총수출의 60%를 차지하며 총 인구의 83%가 농촌인구이다. 그러나 농업 생산성이 매우 낮고 대부분이 생존농업 수준이며 전체 농지의 0.5%만이 관개를 통하여 유지된다. 총 토지의 35.7%가 농지이고, 14.6%가 경작지이며 1.1%가 영구 작물재배지이다. 일인당 경작지는 0.16 ha이며 농가당 평균 인구는 5.2명으로 농가구성 인구는 오로미아 주와 소말리 주 저지대가 가장 많다. 이는 넓은 초원지대에 적합한 목축민이 많기 때문이며 농가형태의 유형은 3가지로 볼 수 있다.

- 지방정부로부터 인정받은 개인소유의 경지를 가진 농가
- 개인농가로부터 임대한 농지보유 농가
- 임대조건도 없이 농지를 무상으로 이용하고 있는 농가

소농이 전체 농지의 10%를 차지하고 있다. 더욱이 농촌 인구의 약 80%가 축산을 하고 있어 아프리카에서 가장 많은 수의 가축을 보유한 나라이다.

농업인구의 교육수준은 낮아서 최소한 3년 이상의 교육을 받은 15~30세의 인구가 50% 이상인 woreda(행정구역)가 매우 적다. 에티오피아는 기후 조건에 따라 5 개의 지역으로 구분한다. 각 지역은 독특한 강우형태와 농업생산 시스템을 가진다. 고산지대(Dega와 Weina Dega 지역)가 대부분의 농업지역이고 준건조 및 건조 저지대(Kolla와 Behera 지역)는 농목축 및 목축 생산 시스템 속에서 가축사육을 주로 한다.

- 한냉 고산지대(Wurch): 고도 3,000 미터 이상의 지역이며 연간 강수량은 2,200 mm 이상이고 보리가 주산물이다.

- 냉습 고산지대(Dega): 고도 2,500~3,000 미터 지역으로 연간 강수량은 1,200~2,200 mm 이며 보리와 밀을 주로 재배한다.
- 온냉 아습지대(Weina Dega): 고도 1,500~2,500 미터 지역으로 연간 강수량은 800~1,200 mm이고 인구의 대부분이 이 지역에 거주하며 모든 종류의 곡물이 재배되지만 특히 떼프(teff)가 재배된다.
- 온난 반건조 저지대(Kolla): 고도 1,500 미터 이하 지역으로 연간 강수량은 200~800 mm이고 수수 및 옥수수가 재배된다. 기온은 연중 섭씨 27~50도를 유지한다.
- 열 고건조 지대(Bereha): 심한 Kolla 지역으로 연간 강수량은 200 mm 이하 지역이며 사막형 식생을 보유하고 목축이 주된 경제활동이다.

또한 이러한 지역적인 차이는 일 년이 건기와 우기로 나누어짐으로 인해 더욱 다양한 농업환경을 제공하게 된다. 9월부터 2월까지의 건기(Dry season)이고 3월부터 5월까지는 Belg라고 불리는 짧은 우기(Rainy season) 그리고 6월부터 8월까지의 Kremt라고 불리는 긴 우기이다.

개량종자의 사용비율은 전체 농민의 약 10%에 불과하고 종자수요에 비해 공급량이 부족하기 때문에 정부는 공급량 증대를 위해 국내 종자생산기업과 외국계기업의 협력지원에 힘쓰고 있다. 화학비료는 대부분 수입에 의존하고 있으며 곡류작물 재배에 90% 이상이 공급되고 있다.

1.2. 농업 연구

현재의 National Agricultural Research System (NARS)은 세 종류의 기관들로 구성되어 있다.

- 에티오피아 농업연구원(Ethiopian Institute of Agricultural Research,

EIAR)

- 지역 농업연구소(Regional Agricultural Research Centers/Institutions, RARC/RACI). 현재 전국적으로 63개소가 있다.
- 고등교육기관(Institutions of Higher Education). 아디스아바바 대학교의 수의과 대학 및 생물학과, 하라마야 대학교의 농과대학, 하와싸 대학교의 완도 산림자연자원대학, 메켈레 대학

국가 농업 연구조직 50년 역사에서 800 종류 이상의 작물 개량품종을 개발하여 발표하였고, 개량된 가축사양관리 기술 49건, 자연자원 관리 기술 45건, 농촌에 적용할 농공기술 9건 및 산림자원을 위한 기술 5건 등을 규명하고 평가하여 권장하였다.

1.3. 농업기술 지도

지도보급 시스템은 농업부 산하에 4개의 부서로 구성되어 있다(자연자원, 농업 개발, 재해위험관리 및 식량안보, 그리고 축산발전). 농업지도국(Agricultural Extension Directorate)은 농업개발부 산하에 속해 있다. 각 부서 산하에는 여러 개의 국과 센터가 있다. 각 국에는 한 명의 국장과 두 명의 부국장이 있고 그 밑에는 각 분야별 전문가들로 구성되어 있다. 아홉 개의 주와 2 개의 시주 행정 위원회에는 독자적인 농업부가 있고 각 부에는 과장과 분야전문가(subject matter specialist, SMS)들로 구성된 여러 개의 지도과가 있다. 약 715개의 Woreda 행정조직은 자신들의 농업부와 팀 리더와 SMS로 구성된 지도 조직을 가지고 있다. 15,826 개의 까벨레(kebele)(최하부 행정조직)는 모든 까벨레가 필요한 연구개발 인력을 보유하고 있지는 않지만 대부분 3명씩은 보유하고 있다. 대부분의 까벨레에서는 농가 20-30호로 구성된 개발그룹을 형성하고 있고 각 그룹에는 리더가 있으며 다시 5호씩의 소그룹으로 나누어진다.

에티오피아 정부는 1995년부터 참여시범훈련 지도 시스템(Participatory Demonstration and Training Extension System, PADETES)을 도입하여 농촌지역의 농가 35-40%에게 제공하고 있다. 2002년부터는 8,489 개소의 농민훈련센터를 까벨레에 설치하고 개발인력(Development Agents, DA)을 배치하여 농촌지역에 기술지도 보급활동을 책임지게 하고 있다. 주된 활동은 축산, 작물생산 및 자연자원관리 분야이다. 2000년부터 정부는 개발인력(DA)을 훈련시키기 위해 농업 기술직업 교육훈련원(Agricultural technical and vocational education and training, ATVET)을 설치하여 농가에 지도활동을 수행하도록 하고 있다.

제 2 장

공동조사 내용

1. 공동조사 주제

ODA 프로그램을 통해 에티오피아 농업 연구와 지도체제를 발전시키는 데에 필요한 정보를 확보하는 데에 주안점을 두고 관련 이해당사자들과의 인터뷰와 설문조사를 통해 현재 상황과 문제점들을 도출하는 데 그 목적이 있다.

- 에티오피아 공무원들과 전문가들의 농업기술의 연구와 개발 및 지도 시스템에 대한 지식과 이해를 향상시킨다.
- 공무원과 전문가들이 한국의 농업연구 및 지도 시스템에 대한 발전 경험으로부터 교훈을 배우도록 돕는다.
- 최종적으로 농업연구와 지도 시스템을 배양하고 강화하여 관련 연구지도 조직과 이들의 하부 조직이 농업 생산성 향상을 위해 노력할 수 있도록 하고, 그것을 통해 농민들의 경제적 및 사회적 입지를 상승시킨다.

2. 조사방법

공동 조사/연구 팀을 에티오피아 및 한국의 전문가와 프로그램 조정자로 구성하여 현재 에티오피아의 농업 연구 및 지도 시스템의 발전상황과 환경에 대한 연구를 수행한다. 연구는 농업 연구와 지도 간의 유기적인 연계의 성격에 초점을 맞춘다. 연구팀은 농업 연구 및 지도 조직들과 관련 시스템들을 만들고 강화하기 위한 정책 프로그램을 제안할 방법을 찾는다. 또한 장래 협력사업을 위해 타당한 정보와 통계자료를 축적한다.

3. 조사 내용

3.1. 1차 조사

3.1.1. 농업부 방문

- 기획국(Plan & Program Directorate)장 Zena Habtewolde 면담
- 정책담당자들의 생각:
 - 좋은 아이디어가 전문가들 수준에서 머물고 현장에 전달이 되지 않고 있음.
 - 밝혀내야 할 주요 장애요인으로는 작목별로 왜 농민들이 신기술을 받아들이지 않는지, 신기술을 접할 기회가 왜 제대로 제공되지 않는지, 그리고 농가 규모에 따른 수용정도의 차이를 해결할 방법 등.

- 참석자: Fisseha(팀 리더, EIAR), Sadanie(EIAR 대외홍보담당), Jamal(Agricultural Transformation Agency), Fassa(농업부 지도과장), Birhanu(농업부 지도과 기술지도담당)
- 조사팀 구성, 현황조사 일정, 연수 및 워크샵 계획 토의 및 보고서 관련 일정 확정
 - 한국에서의 연수: 9월 2일 - 13일
 - 에티오피아 현지 연수: 10월 7일 - 11일
 - 워크샵(한국에서 캄보디아, 라오스와 경험 공유): 11월 중
 - 현지 워크샵: 11월 중

3.1.2. 연방농업연구원(Ethiopian Institute of Agricultural Research, EIAR) 방문

- 부소장 Dr. Adugna Wakjira 면담
- 연구현황, 기술전파 및 농민 지도, 타기관 및 국제기구와의 협력 현황 청취
- CGIAR 센터 및 농진청과 협력관계를 잘 유지하고 있는 듯 보임.
- 한국의 농업분야 성공사례에 관심이 많음.
- 지금 에티오피아는 Group of 5(5호 소단위)* 조직에 폭 빠져 있음.
 - * 다섯 가구를 기본조직으로(또는 직장의 경우 5인) 하여 공동으로 생산 등의 업무를 수행하는 것으로 군대조직에서 유래되었다고 함.
- 그러나 연구인력의 대부분이 최근에 입사한 젊은 층으로 훈련이 부족하여 연구업무를 제대로 수행하지 못하고 있는 실정. 적은 보수로 이직이 심각한 수준

- 연구시설 및 장비도 턱없이 부족하며, 차량이 없어 농가현장에 접근이 제한되고 있음.

3.1.3. Sasakawa - Global 2000 방문

- 소장 Dr. Aberra Debelo 와 직원들 면담
- 1986년 Nippon Foundation에 의해 사하라 사막 주변국을 돕기 위해 설립된 Sasakawa Africa Association(SAA) NGO임. 2000년부터는 Carter Foundation도 참여함. 에티오피아에는 1993년 지부가 창설됨.
- 본부에는 소수가 근무하고 실질적인 업무는 국가조직을 이용하여 수행함. 1995년에 시범사업을 실시하였고 2002년에 scale-up을 하였음.
- 최근에는 Bill & Melinda Gates Foundation과도 연계하여 대농민 기술지도에 중점을 두고 농민훈련센터를 18,000 개소 설립, 운영하고 있음.
- 주요 활동을 열거하면,
 - 농촌지도사의 재훈련을 통한 능력배양
 - 연구인력 확충 및 시설, 장비 확보를 통한 연구능력 배양
 - 정보교류를 통하여 중복연구를 되도록 줄이려는 노력
 - 적재적소에 필요한 기술지도
 - 이러한 활동을 지원하기 위한 필요분석(모니터링, 평가, 교육, 보급)을 위해 기초, 기반조사 등을 실시함.
- SG-2000과 함께 회의에 참석한 Oxfarm America는 원래 작물관련 지도 기능을 수행하기 위한 농민 훈련센터를 운영하여 연구와 현장을 연계하고 역량강화 활동을 집행함으로써 농업부와 SG 2000의 교량역할이 설립 목적이

었으나 현재는 예산 사정으로 인해 주로

- 건물 및 시설의 확충, 정비
- 농업관련 정책에 중점을 두고 활동하고 있다고 함

두 기관 모두 구체적인 활동 결과물을 제시하지는 못하고 CYMMIT의 라이신 함량이 높은 옥수수품종 지역적응시험 등 직접적인 활동으로 보기 어려운 내용만 언급하고 있음.

3.1.4. 오로미아주 농업연구소(Oromia Agricultural Research Institute) 방문

- 부소장 Dr. Laspas 면담
- 오로미아 주정부에 속해 있는 이 연구소는 청사를 신축하여 곧 완공단계에 있음.
- 산하 17개의 연구센터를 가지고 있고, 1,000 여명의 연구원을 포함하여 2,500 여명이 일하고 있음.
- 작물, 원예, 축산, 자연자원, 농기계, 농업경제 등의 분야에 중점적으로 연구, 지도를 하고 있음.
- 국가 축산연구의 최우선 과제는 낙농과 비육우 사업임.
- 연구원의 능력 배양, 실험실 장비, 시약, 현장용 차량 등의 지원을 필요로 하고 있음. 특히 지리정보시스템 및 생물통계학 분야의 훈련을 강조하고 있음
- 이 연구소도 연구원의 연구 능력 부족이 가장 큰 문제이며, 연구원의 95%가 훈련이 부족한 젊은 층이며 농업 지도직 종사자도 더 많은 훈련이 필요하다

고 함

- 주정부의 농업연구기관에 대한 연방정부의 지원이 미약하다고 하며 식량 자급 및 빈곤구제에 아무런 지원도 없음을 강조
- 연구주제 개발은 현장조사를 통해 수행되지만 연구와 지도 조직이 별개로 되어 있어 기술개발과 기술 활용의 간격을 줄이는 것이 급선무임.

3.1.5. 홀레타 농업연구소(Holetta Agricultural Research Institute) 방문

- Ethiopian Institute of Agricultural Research(EIAR)의 산하기관임. EIAR은 Holetta를 포함하여 14개의 산하연구기관을 보유함.
- 소장 Dr. Aster Yohannes와 면담
- 농진청 KOPIA-Ethiopia의 호스트 기관
- 고산지 농업과 축산 기술지도에 중점을 두고 있음. 고산지(해발 2,200m 이상)의 밀, 보리, 테프(teff, *Eragrostis tef*)*에 중점을 두고 있고, 감자, 과수, 약용작물도 함께 연구·지도하고 있음.
 - * 테프 : Poaceae 과에 속하는 곡물로 종자는 1mm 이하로 작으며, 칼슘 함량이 높고 그 외 무기염류도 풍부함. 에티오피아에서는 ‘인제라’ 빵을 만든다. 에티오피아의 고산지대에서 잘 자라며, 건조, 과습 등의 불량환경에서 잘 자람.
- 연구와 지도의 연계성 강화 및 연방정부기관과 지방기관의 효율적 업무 협조를 위해 총리실 산하에 Agricultural Development Partners Linkage Advisory Committee(ADPLAC)를 설립하여 노력하였으나 책임자의 인사이동으로 지금은 활동이 중단되고 있다고 함.

- 이 연구소는 전체 재배면적의 20%를 차지하는 밀 품종 ‘콕사’를 개발하였고 그 외 옥수수, 보리 품종도 다수 개발하는 성과를 올림.
- 그러나 역시 전문 인력이 부족하고 수집한 데이터를 정리, 분석하는 능력도 모자라는 것이 현실이라고 함.
- 또한 육성한 품종도 종자생산체계가 확립되지 않아 품종 확대재배 및 보급에 문제가 있음.

3.1.6. 홀레타 지역 농민훈련센터 방문

- 시설은 5-6ha 규모의 포장과 함석으로 지은 간이 건물이 전부임.
- 두 명의 지도사가 있으며 예산은 없고 작물을 재배하여 종자 또는 생산물을 판매하여 비용 충당.
- 현재는 감자의 종서를 생산하여 보급하고 있으며 이 훈련센터는 홀레타 농업연구소의 적극적인 지원을 받고 있음. 감자는 역병 내병성 품종을 이용하고 있고 홀레타 농업연구소 조직배양에서 나온 종서를 사용한 결과 바이러스 병은 거의 관찰되지 않았음. 콩과 작물의 종자도 생산하고 있음.

3.1.7. 홀레타 인근 농민 협동포장 방문

- 인근에서 감자재배를 하는 여성 농민조합이며 종서는 농민훈련센터에서 분양 받음. 가난한 여성 가장들이 모여 조합을 만들고 감자재배로 자녀의 생계와 교육을 꾸려가고 있음.
- 홀레타 농업연구소의 인근이라는 이점이 작용한 듯. 그러나 우기에만 단작으

로 감자 재배가 가능하고 건기에는 작물 재배가 전혀 이루어지지 않고 있음.

- 감자재배로 소득향상이 이루어져 생활형편은 다른 농가에 비해 우월함. 생산량이 증가하여 자가소비 후 과잉되는 감자의 판로에 대해 걱정하고 있었음.

3.1.8. 아다마 과학기술대학교 농과대학 방문

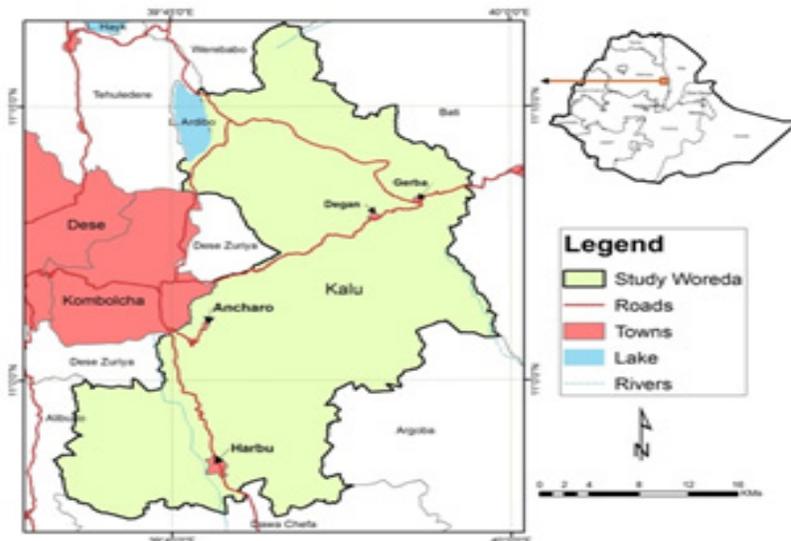
- 농과대학은 수도 아디스아바바 시에서 175km 정도, 아다마 과학기술대학이 위치한 아다마 시에서 75km 남쪽인 아셀라에 위치하고 있음. 현재 공동 외국인 학장은 이무하 박사가 맡고 있음.
- 아셀라는 해발 2,400m 정도이며 작은 호수와 평탄한 강이 여럿 있는 넓고 평평한 지역임. 인근에 KOICA, 연세대, NGO 등의 새마을 운동 및 농촌관련 프로젝트가 진행 중에 있음.
- 농과대학은 농업연구센터, 토양분석실험실 등과 밀접한 관계를 유지하며 협조체계를 구축하고 있음
- 현재 지도기능을 추가로 추진, 활성화 중에 있음. 인근 지역의 특정 분야에 대해 서비스를 하는 것으로 목표를 설정하고 미국식으로 대학에서 시범재배 및 농민의 고충을 직접 해결하는 방법을 모색하고 있음.
- 각급 연구기관에서 능력이 있는 연구 인력이 대학으로 이직하여 오는 실정이며, 현직 대학 교원들에 대하여는 연구과제 신청서 작성 훈련, 타 분야와의 공동연구 활성화 방안 등이 강구되어야 할 것이라고 함.
- 졸업생의 취업율은 낮은 편이나, 연구소, 농업계 회사 등에 일부 취직이 되고 있음.

3.2. 2차 조사

3.2.1. Kalu 지역

칼루 지역은 수도인 아디스아바바에서 동북부로 약 400 km 떨어진 암하라 주에 속한 곳이다. 농업국이 위치한 **Kombolcha** 시는 주 정부가 산업도시로 육성하는 곳으로서 다양한 공장들이 위치하고 있다. 해발은 1800 m 정도로 midland에 속한다. 칼루 지역은 lowland에서 midland 그리고 highland의 다양한 지역으로 구성되어 있어 농업의 구성이 다양하다. 몇 개의 도시가 위치하고 있어 농산물의 수요시장은 잘 구성되어 있다고 생각된다.

그림 3-1. Kalu 지역 지도



○ Kalu 지역 농업국 방문

- 개발국장(Agriculture Bureau of Development) Birhanu 면담

30 kebele를 담당하고 있으며 토지소유농민만을 대상으로 시범교육. 강수량 부족으로 비료나 농약 사용에 애로가 많은 지역이 많음. 가뭄 지역에서는 농작물 생산에 어려움을 겪으므로 물관리 문제를 해결하는 것이 급선무이다. 주 농

산물이 수수이다. 25개의 농민 훈련센터(FTC)가 있으며 그중에서 16개는 상태가 양호하다. 그러나 Rural capacity building(RCB)을 위한 양호한 시범농장이 없다. Kalu woreda 기준은 2.5 ha인데 현재 시범포 규모는 0.6~1.6 ha 수준이다. 대부분의 DA(지도사)의 능력은 부족하고 작업환경은 악화되어가고 있다. 9.6 ha의 과일채소 신규 사업을 추진하고 있다.

- 직원의 잦은 퇴직으로 사업의 지속성이 문제임.
- 농민들이 필요한 기술 개발을 누가 주도하는지에 대한 질문과 필요 기술을 개발한 후에 어떻게 보급하는지에 대한 논의
- 농민들의 요청으로 기술이 개발된 후 지도소 직원들에게 기술교육을 실시하여 신기술을 전수한다. 지도소 직원은 전수받은 기술을 기술 개발국 담당자와 농민들에게 시범을 보임으로써 제대로 전수받은 기술을 농민들에게 올바르게 보급하는지를 확인시킴.

○ 콤볼차(Kombolcha) ATVET college 방문

- 학장 Sewent 면담

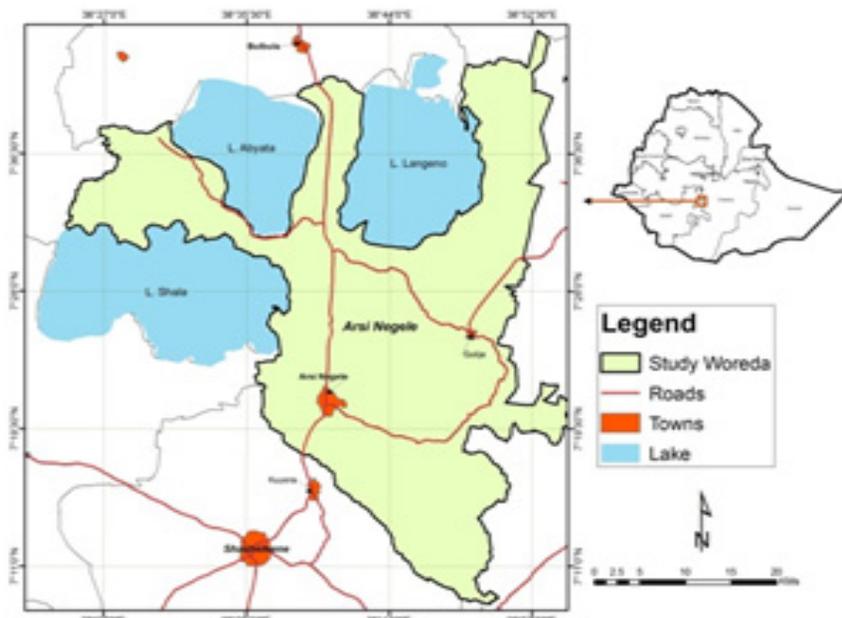
암하라 주에는 2개의 TVET(전국에 24개)이 있으며 농민 훈련이 목적이다. 현재 40명의 교원과 175명의 정규직 직원 그리고 40명의 계약직 직원을 보유하고 있다. 단기 훈련과정과 diploma 과정을 운영하고 있다. 2012년에는 1,000명의 농민을 3개월간 교육하였고 1077명의 학생들이 학력향상 프로그램을 수료하였다. 정부는 토지가 없는 농민들에게도 훈련을 우선 실시하기를 바라지만 현실적으로 그들에게 훈련이 실용적이지를 못하다. 또한 고교졸업자의 20%는 정규 대학으로 진학하고 나머지 80%는 TVET에 진학함으로써 실패자들이 가는 곳이라는 인식이 팽배해 있다. 따라서 장기적인 TVET의 존재 전략이 필요하다. 현재 축산 분야에 대한 수요가 높아 작목별 특화교육보다는 복합 영농을 겨냥한 농업전반에 대한 교육을 실시한다.

- 지역 농민 교육 담당 기관으로서 주로 여름 학기 위주로 1,000 명을 대상으로 전 분야, 농학, 원예, 축산에 관하여 교육을 실시함.

- 시설 부족으로 현장 교육을 하는 데에 애로사항이 있음.
 - 교육 시설은 상대적으로 잘 갖춰져 있어 일반 농과대학 수준임.
- 개발국(Supervisor, Development Agency) 방문
 - 소장 Ayalew 면담
 - 현지 농민의 실태와 문제점 파악을 위한 설문 협조 요청
 - 설문지 총 74개항에 걸친 방대한 설문지 검토
 - 농업 현장 방문 설문 조사 실시
 - 총 74개항에 걸친 농민들의 현실 조사를 위한 설문지 배포 및 현장 방문
 - 생존형 농업이 주로이며 상업성이 있는 종목들은 특수작물에 한 해 계절적으로 재배하고 있음.

3.2.2. Arsi Negele 지역

그림 3-2. Arsi Negele 지역 지도



이 지역은 아디스 아바바에서 남동쪽으로 203 km 거리에 위치한다. 고지대 (High land)가 32%, 중고지대(mid high land)가 42% 저지대(low land)가 26%를 차지한다. 총 토지의 90.5 %가 경작지이다. 연간 평균 강수량은 500~1150 mm 이고 평균 기온은 최고가 섭씨 25도, 최저가 10도이다. 이 지역의 고도는 1,500 ~2,800 미터이다. 인구수는 2007년 센서스에 의하면 260,129 명이다.

제 3 장

주요 자문활동 내용 및 성과

1. 협의결과

1차 공동조사에서는 에티오피아 연방 및 주 정부 연구기관의 연구개발 실상, NGO 협력 실태 및 농업 현장의 농민과 농민훈련 센터의 실태를 파악하는 것을 주 내용으로 설정하였다.

2차 공동조사에서는 실질적인 현장 여건을 파악하고 현장의 농민들을 대상으로 설문을 하여 책상과 현장의 차이를 실감하는 기회를 갖고자 북쪽 암하라 주 갈루 지역과 중부의 오로모 주 아르씨 네겔레 지역을 직접 현장 방문하여 면담과 설문조사를 실시하기로 하였다.

현지 연수에서는 한국의 농업 및 새마을 운동의 발전 역사와 에티오피아 농업 발전을 위한 대안 제시 등에 관한 세미나와 토론의 시간을 가졌다.

1, 2차 공동조사 결과를 바탕으로 한국의 과거 경험과 비교 검토하여 에티오피아 농업생산성 향상을 위한 연구와 지도 사업의 효과적인 협력 체제를 제시하는 것으로 이 사업을 마무리 짓는다.

2 자문내용

공동조사 시 에티오피아의 관점이 아닌 한국적 사고방식과 과거 경험에 근거하여 질문을 제시함으로써 이들이 경험하지 못하고 미처 깨닫지 못했던 부분을 지적해주는 것으로 자문의 역할을 담당하였다. 에티오피아의 농업기술개발 및 지도 시스템은 기술개발과 지도가 별개의 기관에 속하는 이원화된 제도이다. 따라서 과거의 한국처럼 농업기술개발보급이 일원화되어 일사분란하게 전국적으로 집행되지를 못하고 연구기관에서 개발한 결과를 다시 지도사들에게 교육하고, 이들이 다시 실습을 통해 현장적용 가능성을 연구사와 농민들에게 보여주어야 성과가 확산될 수 있는 체제이다. 한국측 공동조사위원이 자문하는 내용은 이들의 현실상황 하에서 최선이 무엇일까를 고민하여 그들이 원하는 사업에 의견을 반영시키는 수준이다.

공동조사시 구체적 자문내용을 열거하면 아래와 같다.

- 조사팀은 에티오피아의 농업연구 지도 체계에 상존하는 문제점을 적시하고 SWOT 분석으로 도출하였다. 그러나 도출된 문제점에 대한 우선순위가 없는 아쉬움이 있다. 문제점의 시급성 및 농업연구 지도 체계에서의 결과도출 가능성에 따라 순위를 정하는 것을 권하고 싶다. 우선순위는 연구 분야, 지도 분야 또는 농민교육 등을 모두 포함해야 할 것이다. 추가로 작물이나 축종, 대상지역, 농업생태환경 등을 고려하여 우선순위를 정하여야 할 것이다. 이 조사연구를 기초로 하여 새로운 ODA 과제를 발굴한다면 우선순위의 설정은 더욱 중요하다고 본다.
- 발표 및 미발표 문헌을 통한 2차 데이터의 수집 결과, 에티오피아는 농업연구 지도 체계의 개선에 풍부한 경험을 축적하고 있으며, 이를 위해 많은 해외 원조를 받았다는 사실을 알 수 있다. 과거의 축적된 경험을 잘 분석하여

새로운 과제를 발굴하는데 활용할 수 있을 것이다.

○ 농업연구개발 및 지도 체계를 개선하기 위해서 에티오피아는 지난 반세기 동안 많은 프로젝트를 수행하였다.

- 에티오피아의 농업연구 지도에 관련된 프로젝트가 상당수 언급되었으나 상호관계가 명확하지 않다. 표를 통해 정리할 필요성이 있다.
- 위에 언급된 관련 정책과 프로젝트에 대하여 단순 서술로 표현되어 있어 농업에 있어서의 성과 및 영향에 대한 평가가 아쉽다.
- 현재 2010~2015(5개년) 계획으로 시행되고 있는 GTP에 대해서는 농업 분야의 설정 목표 등 자세한 내용이 포함되어야, 추후 ODA 사업과제를 작성할 때 지표가 될 것이다.
- PADETES에 대한 상세한 내용도 같은 이유로 포함되어야 할 것이다.
- 에티오피아 농업의 민간부문에 대한 언급이 자주 되고 있다. 민간부문이 관여하는 작물(축종), 지역, 자본의 규모 등을 알아야 에티오피아의 전반적인 농산업을 이해할 수 있을 것이다.
- 에티오피아 농업연구기관(EIAR)의 연구원들의 교육수준은 아주 높은 것으로 나타나고 있다. 반 이상이 박사, 석사학위를 갖고 있다. 따라서 지금 제한요소가 되고 있는 포장 및 실험실 시설을 개선한다면 좋은 연구결과를 도출할 수 있을 것이 확실하다.
- 또한 지도부문과의 연계, 농민참여 연구과제의 확대를 통해 새로운 과제를 발굴할 필요가 있다. 농가현장에서 중요한 과제, 지도부문 또는 농민이 발굴한 기술과 아이디어를 연구에 활용하는 것이 중요하다.
- 농가포장에서 새로운 연구결과를 도출하기 위해서는 연구 전략을 잘 짜야 하며 수시로 연구방향을 개선해야 하며, 연구과제를 수시로 점검하고 평가하고 조정하여야 한다.

○ 조사 연구 결과에 대하여

- 보고서에는 주로 취약점과 문제점을 부각시키고 있다. 그러나 성공적인

결과나 경험을 발굴하여 추가 과제로 설정하는 방안도 있다.

- 홀레타 지역을 방문하였을 때 만난 여성 감자작목반은 관개가 되지 않는 밭에서 한 작기만 감자를 재배하고 있었다. 이러한 지역에 저렴한 관개 방법이 도입된다면 생산성을 높일 수 있을 것이다.
- 홀레타연구소 역시 다수 내병성 밀 품종을 육성하여 재배면적이 확대되고 있다. 정부가 개입하여 양질의 보급종 종자를 전국에 보급할 수 있을 것이다.
- 비정부기구인 SG2000에서 160 농가를 상대로 지도사업을 수행한 결과도 벤치마킹할 가치가 있다고 생각한다.

제 4 장

공동조사 추진 관련 제안 및 향후 일정

1. 자문결과

공동조사를 끝내고 파악된 기관들의 실상과 농업 현장의 상황을 분석하여 조사팀은 다음과 같은 결과를 제시하였다.

- 최근에 긍정적인 움직임이 있지만 에티오피아의 연구개발과 지도 시스템을 역동적으로 만들기에는 아직도 많이 부족함이 있음을 인정한다. 시스템을 개선하기위해 다음의 것들이 필요하다.
 - 공공 부문과 민간 부문 간의 더 나은 파트너십을 위해 다원적 시스템을 개발할 전략적 접근이 필요하다.
 - 연구자, 농업 전문가, 지도사들에게 반복적인 장단기 훈련과 경험을 나눌 수 있는 기회를 제공하여 능력배양을 시킬 필요가 있다. 그 내용으로는 개선된 농업기술, 계획, 모니터링과 평가, 리더십, ICT 및 소규모 기계화 기술 등이 포함된다.
 - 연구자들과 지도사들 그리고 개발담당자들의 높은 이직율과 이에 따른

영향을 줄이기 위하여 인센티브 제도나 지원 체제를 설계해서 적절히 적용해야 한다. 즉, 생산적 작업환경과 인센티브 제도를 통하여 이들에게 동기부여를 할 필요가 있다.

- 연구시설 및 물류이동을 위한 교통수단의 개선을 통한 우수한 연구결과와 신속한 기술보급을 보장할 필요가 있다.
 - 농민훈련 센터의 기능과 자원보강을 통해 개량기술의 접근과 이용을 활성화시킬 필요가 있다.
 - 연구 및 지도 기관들을 강화하기위한 예산의 뒷받침이 필요하다.
- 농민들은 작물과 가축에 관련된 개선된 기술에 접근하여 활용하는 데에 제약이 받았다. 따라서 우리는 연방정부나 지방정부에 효과적인 모델 연구-지도 연결 센터를 설립함으로써 농민들에게 기술보급이 원활하게 이루어질 수 있도록 보장해야 한다.
 - 연구와 지도 우선순위 설정과 혁신을 통해 농촌과 도시근교 지역에서의 여성과 청년 같은 농촌 공동체의 상이한 부문의 필요와 문제들에 대한 고려가 부족하였다. 연구와 지도 프로그램의 우선순위는 여성과 청년층의 필요에 맞춰져야 한다.
 - 낙농, 가금, 채소, 과일 등 소규모 농산가공 사업 및 마케팅을 위한 연결고리가 빠져있는 농촌 및 도시근교 농촌 농산업 활동에서 다양한 집단과 협력을 해야 한다.
 - 농업 연구-지도 시스템의 연계가 미흡하고 지도조직 내에서도 협력이 불충분하여 기술개발 및 효율적인 기술보급이 이루어지지 않고 있다. 따라서 고위층은 위원회와 파트너 연계에 책임이 있는 개인이나 전문가들의 능력과 동기부여를 위한 연계 기반 기능을 강조해야 한다.

상기 조사 결과에 근거하여 에티오피아 측에서 몇 가지의 ODA 사업을 다음과 같이 제안하였다.

- 한국의 경험을 공유하고 에티오피아 연구-지도 시스템에 관계되는 기관들과 이해당사자들에게 인식시킬 사업
- 연구-지도 연계 시스템의 모델 확립 : 연방정부 및 주 정부에 농업기술 정보 센터 설치. 농민훈련 센터를 농업기술센터로 승격시키고 ATVET 학교에 창업을 지원하기위한 농산업 훈련센터 설립
- 선발된 기술의 시범과 농가 보급을 위한 시범농장 설립 : 낙농, 가금, 및 곡물 수확 후 관리기술 시범을 위한 소규모 목장 및 공장
- 농업 연구자 및 지도전문가들의 능력 배양 : 한국연수 및 전문가 교류
- 모니터링 및 평가 사업

2. 시사점 및 제언

에티오피아 정부의 경제정책은 농업발전이 주도하는 산업화이다. 따라서 농업의 생산량과 생산성을 개선시키는 방향에서 농업기술 개발과 지도보급 시스템의 연계가 매우 중요함을 인식하고 있다. 그러나 정부의 노력에 비해 그 성과가 별로 나타나지 않아 지속적으로 조사사업을 수행하여 그 원인을 규명하고 개선하고자 한다. 이미 기존의 조사에서 많은 문제점이 파악되었고 그 대안이 제시되었다. 기존의 조사에 의해 밝혀진 문제점들을 보면,

- 농민이 필요로 하는 기술개발을 할 것
- 지도보급 사업을 대상자별(농민, 목축농가, 농목축농가, 여성, 청년층 등) 및 품목(작물, 축산 등)별로 확대할 것
- 농민훈련 센터를 물질적 및 금전적으로 강화할 것
- 일선 기술지도 보급 담당자인 DA들의 사고방식 개선, 능력 배양, 동기부여를 강화할 것
- 기술개발과 지도보급 시스템 간의 연결문제를 개선할 것
- 여성의 역할을 강화할 것
- 그리고 특정 품목 생산자 집단을 구성시킬 것 등

본 사업은 이 중에서 기술개발과 지도보급 체제 간의 연결이 잘 안 되는 문제를 집중적으로 조사했다고 봐도 과언이 아니다. 하지만 본 사업의 근본적인 목적이 기술보급을 통한 농가 소득 증대를 위하여 생산량 및 생산성 향상을 기하는 것이라면 기존 조사에서 제시된 모든 문제점들이 상호 연계되어 있음을 인식할 필요가 있다. 따라서 농업 기술개발과 지도보급 시스템의 원활한 연계가 단순히 에티오피아 측에서 제시한 ODA사업들을 지원함으로써 해결될 사항은 아니라고 판단한다.

더욱이 많은 과거 조사 결과에서 지적되었음에도 개선되지 못하고 있는 것은 에티오피아 경제와 사람들의 사고방식에 기인하는 것이 크다. 또한 에티오피아의 농업 연구와 기술지도 보급 시스템이 이원화되어 있어 효율성이 더욱 떨어짐을 개선시키지 않고는 현 상황을 타개하기가 쉬운 일은 아니라 판단된다. 이러한 정부조직은 효율성보다는 정치적인 배경이 더 많이 작용하기 때문에 현 체제하에서 어떻게 시스템을 효율화시킬 것인가를 고려해야 할 것이다. 근본적으로 경제가 어려운 나라에서 말단 조직인 농민 훈련 센터에 종사하는 DA들의 처우 개선이나 시설지원, 교통수단 지원 등을 국가 재정에서 지원하여 문제를 해결할 수 있는 가능성은 매우 희박하다.

따라서 시범 농장이나 목장을 설립하여 그것을 이용하여 수입을 올려 활용하는 방법으로 DA들의 사기를 올려주고, 농민들에게는 정부의 기술지도가 현실에서 작동하는 것을 경험할 수 있는 좋은 계기가 될 것이다. 더욱이 현장에 개발기술을 적용할 수 있는 기회가 제공되므로 연구자와 기술지도 보급 관계자들 간의 협력도 원활하게 이루어질 수 있을 것이다. 에티오피아의 DA양성은 ATVET 대학에서 주로 이루어지지만 에티오피아 사람들의 대학교(University)에 대한 선호도가 월등히 높은 상황아래에서 ATVET 대학을 활성화시킨다는 것은 장기적으로 볼 때 권장할만 하지 못하다. 우리나라의 역사를 봐도 농촌 지도사들은 전문대 출신이 아니고 4년제 정규 대학 출신들이었다. 농업기술 정보센터, 농산업 훈련 센터 및 ATVET 대학 설립 등과 관련하여 이러한 기관들의 설립은 바람직하지 않아 보인다. 기관이 설립되고 나면 운영예산이 뒷받침되어야 하지만 이 나라 재정형편상 예산배정이 힘들어질 때 설립된 기관은 기존의 부실한 농민훈련 센터 운영과 유사해질 위험이 있다.

3. 향후 추진방향

○ 에티오피아 농업기술개발 및 지도보급 체계에 관한 전반적인 이해 확대

본 조사를 통하여 에티오피아 농업연구 및 기술 지도보급 체계 전반에 관한 이해의 폭을 넓혔고 농업현장조사를 통해 문제점을 부각시켰다. 그러나 본 조사는 이 나라의 넓은 면적과 다양성을 고려한다면 지엽적 조사에 그쳤다는 생각이 들고 너무 짧은 기간에 이루어져 심층 분석을 할 수가 없었다. 작물의 경우 수자원 관련 기초조사와 작물별 재배 작형 및 재배면적, 생산량, 소비량, 수출입량 등 통계자료의 분석이 필요하다. 주로 방목에 의존하는 축산의 경우 사막화의 진행 등을 파악할 생태환경의 변화에 관한 조사도 수행되어야 할 것이

다. 또한 생산물의 수확후처리와 유통경로에 관한 정보도 수집할 필요가 있다. ODA 사업을 시작하기 전에 이러한 분야를 추가로 조사하여 정확한 농업현장의 문제점 파악이 필요하다는 생각이 든다. 추가적인 현장조사가 어렵다면 문헌조사를 활용할 수도 있을 것이다. 에티오피아에는 이미 많은 해외원조기관들이 활발하게 활동하였고 관련 보고서를 확보, 참조할 수 있을 것이다.

○ 농민훈련센터 활성화 작업

농민훈련 센터는 농업기술지도보급의 최 말단 조직이다. 이것이 활성화되려면 DA(Development agent)들의 노력과 농민들의 적극적인 참여가 필수적이다. 이것은 예산에 관련된 문제와 근무하는 DA들의 자질과 사고방식에 관련된 사항이다. DA의 대우와 시설관리 및 운영은 예산으로 해결할 수 있을 것이지만 이들의 사고방식은 예산으로 해결될 수 없다. 끊임없는 재교육으로 해결해야 할 것이다.

재교육은 상설 교육원 등을 만들어 DA와 농민 리더들을 교육할 수도 있겠으나 이미 지적된 바와 같이 에티오피아 국가예산 지원의 영속성이 담보되어야 할 것이다. 교육과정에는 농업기술분야는 당연히 포함되겠지만, 새마을교육을 포함시켜 정신무장을 우선적으로 교육하여야 한다고 본다.

○ 시범 농장, 목장 및 수확 후 관리시설의 설립 및 운영

농민들의 적극 참여를 유도하려면 그들이 눈으로 보고 믿게 만들어야 한다. 따라서 시범 목장이나 농장을 통하여 실질적인 수익창출을 보여준다면 농민들은 기술을 습득하려고 노력할 것이다. 아울러 창출된 소득은 DA들의 처우개선이나 기술보급 사업에 필요한 재료들을 구입하는 데에 유용할 것이다.

수확 후 손실은 농민들에게 상당한 경제적 손실을 야기한다. 따라서 수확 후 관리기술을 보여줄 시설을 운영한다면 농민들에게 간접적인 소득 증대를 기할 수 있는 좋은 기회가 될 것이다. 한국의 RPC(rice processing complex)는 가장

성공적인 수확 후 관리기술로서 벼에 국한하지 않고 다양한 곡물에 적용되어 동남아에 널리 보급되고 있다.

시범농장은 작물 및 사료작물의 재배, 가축 사양, 축산 배설물의 활용을 중심으로 하는 친환경 농업의 시범에 초점을 맞추어야 할 것이다. 기계화 농업 관련 전시포 등을 통한 미래지향적인 첨단농업보다는 에티오피아의 현실에 맞는 농업기술을 선정하여 보급하도록 하여야 할 것이다.

작물재배에서 가장 중요한 요소는 관개수의 확보와 저렴하고 효율적인 관개 방법을 도입하는 것이다. 따라서 시범농장에서는 지역에서 현실적으로 가능한 방법으로 수원을 확보하고, 간이점적관수(simple drip irrigation) 등의 개발도상국형 관개방법을 활용하여 수자원 사용의 효율성을 제고하는 방안을 강구하여야 할 것이다.

관개와 더불어 에티오피아 농업에서 먼저 시도되어야 할 점은 작물재배 작형의 개발이라고 하겠다. 일인당 재배면적이 0.16 ha로 아주 협소한 점을 고려한다면 간이 관개를 통해 연간 작물재배 작기를 늘리는 것이 무엇보다 급선무이다.

시범농장 및 시범목장은 울타리 너머의 '한국 농장'으로 인식되어서는 아니 되며, 주변 농민의 적극적인 참여를 유도하여야 한다. 같이 하고 싶어도 농민들은 투입자본이 없다. 무상지원은 바람직하지 않다. 따라서 소액금융의 도입도 고려해 볼 수 있겠다. Oxfarm이나 SG2000의 참여를 통해 대농민 기술지도, 여신업무 및 사후관리를 분담할 수 있을 것이다.

참고 문헌

- Alemayehu Seyoum, Dorosh, P. and Sinafikeh Asrat. 2011. Crop Production in Ethiopia: Regional Patterns and Trends. Development Strategy and Governance Division, International Food Policy Research Institute Ethiopia Strategy Support Program II (ESSP II) ESSP II Working Paper No. 0016.
- Amdissa Teshome. 2006. Agriculture, Growth and Poverty Reduction in Ethiopia: Policy Processes Around the New PRSP (PASDEP) A paper for the Future Agricultures Consortium workshop, Institute of Development Studies, 20-22.
- Berhanu Gebremedhin, Hoekstra D and Azage Tegegne. 2006. Commercialization of Ethiopian Agriculture: Extension service from input supplier to knowledge broker and facilitator. IPMS (Improving Productivity and Market Success) of Ethiopian Farmers Project Working Paper 1. ILRI (International Livestock Research Institute), Nairobi.
- Bernard, T. Gashaw T. Abate, Solomon Lemma. 2013. Agricultural cooperatives in Ethiopia: Results of the 2012 ATA Baseline Survey. International Food Policy Research Institute (IFPRI), Washington, DC.
- CSA. 2009. Central Statistical Authority population estimates, Addis Ababa.
- Davis, K., Swanson, B., 2009. and Amudavi. D. Review and Recommendations for Strengthening the Agricultural Extension System in Ethiopia IFPRI.
- Dejene Abesha, Aragay Waktola and Aune, B.J., 2000. Agricultural Extension in the Dry lands of Ethiopia Sahel-Sudan-Ethiopia Programme (SSE). Dry Land Coordination Group.
- Endale, Kefyalew. 2010. Fertilizer Consumption and Agricultural Productivity in Ethiopia. EDRI. Addis Ababa.
- Farnworth, R. C., and Gutema, H.T., 2010. Gender Aware Approaches in Agricultural Programmes - Ethiopia Country Report. A special study of the SIDA-Amhara Rural Development Programme (SARDP III) and the work of selected agencies in Ethiopia. UTV Working Paper 2010: 4
- International Food Policy Research Institute. 2010. In-depth assessment of the public agri-

- cultural extension system of Ethiopia and recommendation for improvement. IFPRI Discussion Paper. 01041.
- Kassahun Birhanu. 2012. The Political Economy of Agricultural Extension in Ethiopia: Economic Growth and Political Control. This paper was produced as part of the FAC Political Economy of Agricultural Policy in Africa (PEAPA) work stream.
- Kassa Belay. 2003. Agricultural extension in Ethiopia: the case of participatory demonstration and training extension system. *Journal of Social Development in Africa*. Vol. 18 No 1.
- Ministry of Finance and Economic Development (MoFED). 2006. A Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (2005/06-2009/10) Volume I: Main Text, Addis Ababa.
- Solomon Asfaw¹, Bekele Shiferaw, Franklin Simtowe and Messia Hagos. 2011. Agricultural technology adoption, seed access constraints and commercialization in Ethiopia. *Journal of Development and Agricultural Economics* Vol. 3(9), pp. 436-447.
- Solomon Asfaw and Bekele Shiferaw. 2010. Agricultural Technology Adoption and Rural Poverty: Application of an Endogenous Switching Regression for Selected East African Countries. Paper presented at the Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa.
- Yu, B. Nin-Pratt, A., Funes, J.m and Sinafikeh Asrat. 2011. Cereal Production and Technology Adoption in Ethiopia. Development Strategy and Governance Division, International Food Policy Research Institute (IFPRI). Ethiopia Strategy Support Program II (ESSP II) ESSP II Working Paper 31.

E15-2013-3

2013 개도국 식량안보를 위한 우리나라 농정성과 확산(KAPEX) 사업
에티오피아 공동조사 결과보고서

등 록 제6-0007호(1979. 5. 25)

인 쇄 2014. 1.

발 행 2014. 1.

발행인 최세균

발행처 한국농촌경제연구원

130-710 서울특별시 동대문구 회기로 117-3

전화 02-3299-4000 <http://www.krei.re.kr>

인쇄처 동양문화인쇄포럼

전화 02-2242-7120 e-mail: dongyt@chol.com

- 이 책에 실린 내용은 한국농촌경제연구원의 공식 견해와 반드시 일치하는 것은 아닙니다.
- 이 책에 실린 내용은 출처를 명시하면 자유롭게 인용할 수 있습니다. 무단 전재하거나 복사하면 법에 저촉됩니다.