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Agricultural Research and Development in Ethiopia

Efrem Bechere
Texas Tech University

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AGRICULTURAL RESEARCH AND DEVELOPMENT IN ETHIOPIA

By

**EFREM BECHERE (PhD)
TEXAS TECH UNIVERSITY**

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Acronyms

NARS	- National Agricultural Research System
GDP	- Gross Domestic Product
AR	- Agricultural Research
IAR	- Institute of Agricultural Research
PPRC	- Plant Protection Research Center
BDI	- Biodiversity Institute
FRC	- Forestry Research Center
WURC	- Wood Utilization Research Center
NSL	- National Soils Laboratory
IAHR	- Institute of Animal Health Research
ACA	- Awasa College of Agriculture
WGCF	- Wondo Guenet College of Forestry
FVMDZ	- Faculty of Veterinary Medicine at Debre Zeit
MUC	- Mekele University College
RARCs	- Regional Agricultural Research Centers
EARO	- Ethiopian Agricultural Research Organization
EIAR	- Ethiopian Institute of Agricultural Research
DZARC	- Debre Zeit Agricultural Research Center
ARTP	- Agricultural Research and Training Program
WB	- World Bank
CIAT	- Int. Center for Agricultural Research in the Tropics
CIMMYT	- International Center for Wheat and Maize Improvement
ICARDA	- International Center for Agricultural Research in the Dry Areas
ICRAF	- International Center for Research in Agro-Forestry
ICRISAT	- International Center for Research in Semi-Arid Tropics
ILRI	- International Livestock Research Institute
CIP	- International Potato Improvement Center.
MOARD	- Ministry of Agriculture and Rural Development
CBE	- Commercial Bank of Ethiopia
NVRC	- National Variety Release Committee
NSIA	- National Seed Industry Agency
RELC	- Research and Extension Liaison Committee
WANA	- West and North Africa
MOA	- Ministry of Agriculture
ALID	- Agricultural Led Industrial Development
AISE	- Agricultural Inputs Supply Enterprise
TPLF	- Tigray Peoples Liberation Front
NGO	- Non-governmental Organizations.
CGIAR	- Consultative Group of International Agricultural Research

1. Objectives

To review past and current agricultural research activities and assess their impact on agricultural development in Ethiopia and discuss some challenges and opportunities that need to be addressed.

2. Historical Background

The agricultural sector in Ethiopia represents 45 % of the GDP and about 85 % of the population gains their livelihood directly or indirectly from agricultural production including livestock. The importance of agricultural research and its impact on development in Ethiopia can hardly be over emphasized. Agricultural research started with the establishment of the Ambo and Jimma Colleges of Agriculture in 1947 and the Imperial College of Agriculture and Mechanical arts (today's Alemaya University) in 1953. Relative to other African countries, agricultural research in Ethiopia is quite young. Organized agricultural research activities and actual relations between agricultural research and development started with the inception of the Institute of Agricultural Research in 1966 (Tsedeke et al., 2004). Other agricultural research centers established at various times include:

1. The Plant Protection Research Center at Ambo – established in 1972 and merged with the Institute of Agricultural Research in 1995.
2. Plant Genetic Resources Center – founded in 1974 and later became the Biodiversity Institute.
3. Forestry Research Center (1975).
4. Wood Utilization Research Center (1979).
5. National Soils Laboratory (1989).
6. Institute of Animal Health Research (IAHR, 1992)

Higher education institutions historically involved in agricultural research include:

1. Alemaya University (1953)
2. Awassa College of Agriculture (1977)
3. Wondo Guenet College of Forestry (1978)
4. Faculty of Veterinary Medicine at Debre Zeit (1979).
5. Mekele University College (1994).

3. The Current National Agricultural Research System

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) under the respective regional bureaus of agriculture. In June, 1997, the Ethiopian Agricultural Research Organization (EARO), today's Ethiopian Institute of Agricultural Research (EIAR) was established and merged all the existing agricultural research institutions which included:

1. The original IAR research centers at Holetta, Nazreth, Jima, Bako, Melka Werer, Ambo, Kulumsa and Pawe.
2. Debre Zeit Agricultural Research Center (previously under Alemaya University), the Biodiversity Institute, the Forestry Research Center, the Wood Utilization Research Center, the Institute of Animal Health Research, and the National Soils Laboratory (all previously under the Ministry of Agriculture).
3. The newly established research centers through the World Bank Agricultural Research and Training Program (ARTP) which include – Jijiga (Somali Region), Shiket (Afar Region), Jinka (Southern Region), Humera (Tigray Region), Sekota (Amhara Region), and Yavello (Oromia Region). (Figure 1).

EIAR is overlooked by a board which is chaired by the minister of MoARD. It is run by a director general appointed by the board and has two deputy directors (for research and for administration and finance) (Figure 2). The Regional Agricultural Research Centers (RARC's) remained under their respective regional bureaus of agriculture. The mandate of the EIAR stated in the Federal Negarit Gazeta (1997) is that it is responsible for generating, improving and adapting technologies and coordinating, encouraging and assisting research activities in order to fulfill the current and long-term agricultural requirements of the country. The higher learning institutions do agricultural research relevant to their local conditions and through contractual arrangements with EIAR on national commodity crops or livestock. Little or no agricultural research work is done by the private sector in Ethiopia. Although not members of the NARS, some international agricultural research organizations are either represented through their branch offices in Ethiopia or they cooperate with the NARS through their various networks. These are CIAT, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, and ILRI. The Ethiopian Agricultural Research Institute and the

Regional Agricultural Research Centers account for 86 % of the total agricultural research activities in the country and 97 % of the total financial resources allocated to agricultural research by the federal government. The higher learning institutes share is only 13 % and 3 %, respectively.

Figure 1. Organizational Structure (1997/98) of Agricultural Research in Ethiopia

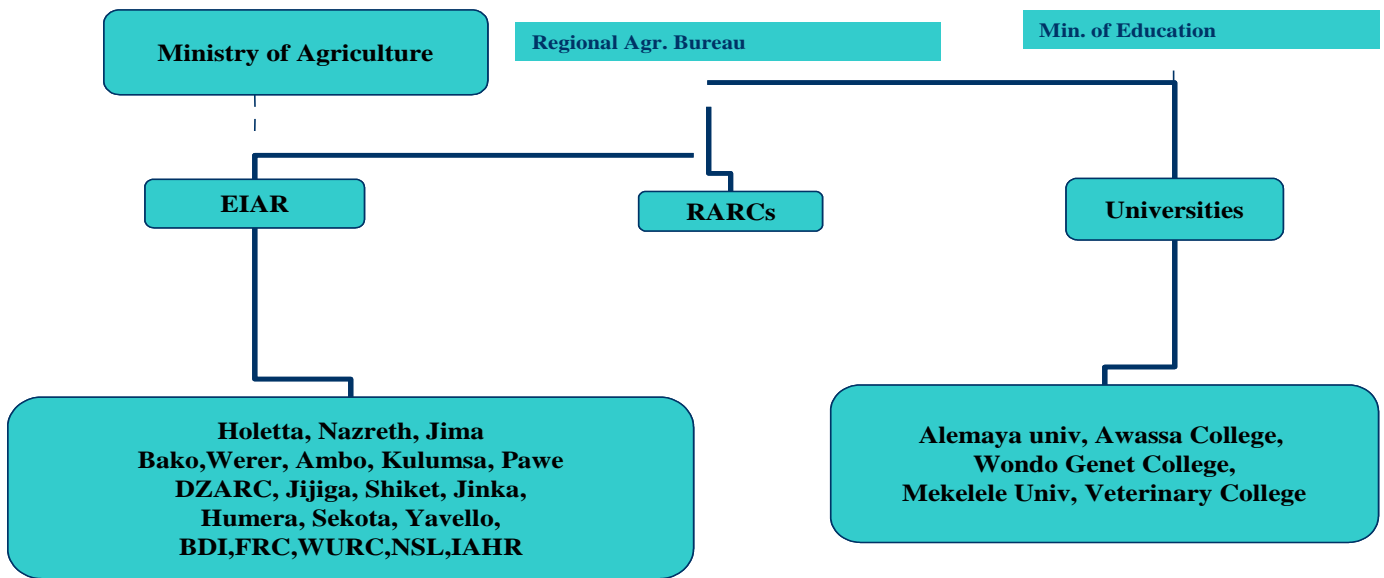


Figure 2. Research Activities Structure at Management Level EIAR.

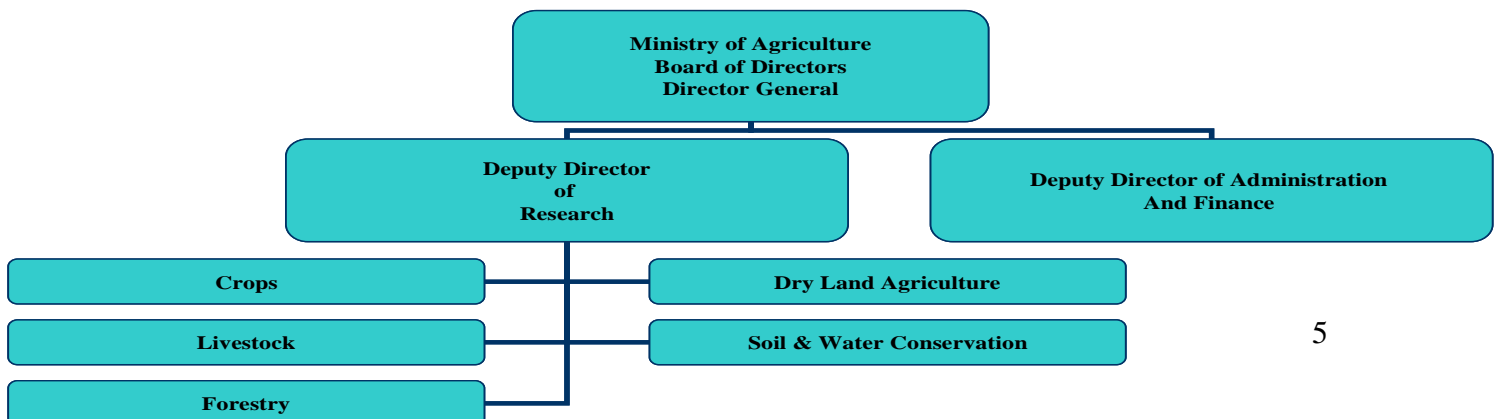
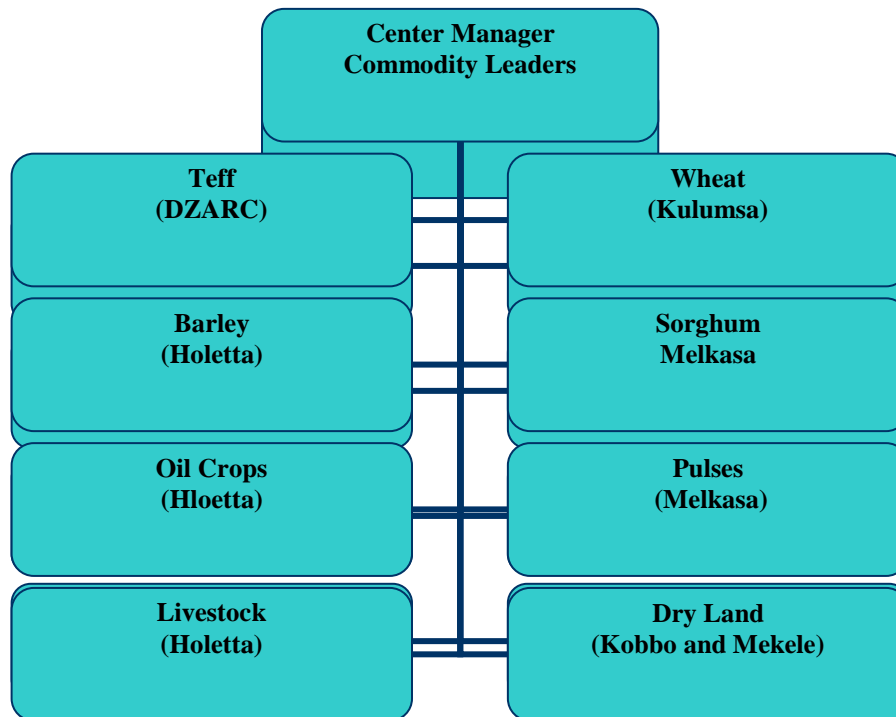


Figure 3. Research Activity Structure at Center Level.



4. Research Orientation and Coordination

Research Coordination: Starting in 1979, all research programs have been organized by ‘commodities’ (Figure 3). This is a multi-disciplinary approach where each commodity crop has a leader (the breeder in most cases), a pathologist, agronomist, extension specialist, etc. These expertises (except the breeder) are shared with other commodities since there aren’t simply enough trained personnel to go around.

This approach appears to be sound and practical in situations where there are shortages of trained manpower. The only complaint sometimes heard from this approach is that contributions are not acknowledged in a balanced fashion across the commodity members.

Project Review: Projects are reviewed first at the commodity level, and then at the center level. It is only projects that pass these two levels that go for review at the EIAR level. Once the project passes the scrutiny at the EIAR, it is forwarded to the government for funding.

Variety Release: The National Variety Release Committee (NVRC), established in 1982, under the National Seed Industry Agency (NSIA), establishes technical committees every year to evaluate candidate varieties of various crops for release. Currently, NVRC is under the Ministry of Agriculture and Rural Development (MoARD) (Hailu Tefera, 2006).

Seed Multiplication: After the NVRC approves the variety for release, the breeder submits a certain amount of seed to the Ethiopian Seed Enterprise which produce certified seeds and market the same. The problem with this approach is that there is no separate agency that handles the certification process.

5. Research and Extension

Just like agricultural research, extension has also been decentralized. The Research and Extension Liaison Committee (RELC) has been established in all regions. RELC is represented by the regional offices of the MoARD, the research centers in the region and representative farmers. RELC members discuss and find solutions for issues like production constraints, research programs and findings and effective ways to disseminate these findings. Recently, the 'Input Coordination Units' replaced RELC as an interface between research and extension at all levels (WANA NARS Study, 1999).

6. Human, Physical, and Financial Resources

6.1 Human Resources:

Table1. Research staff of EIAR and RARIs, 2004

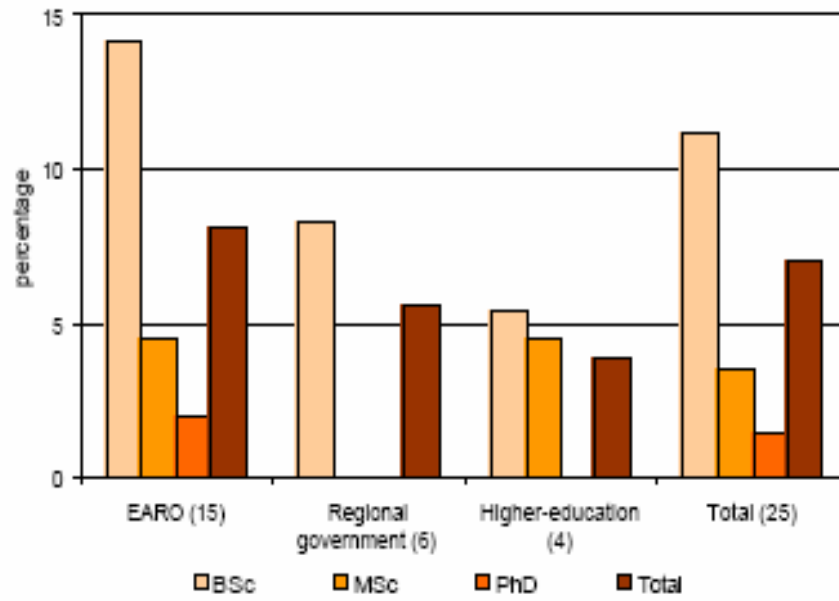
Center	PhD	MSC	DVM	BSC/BA	Total
EIAR (Federal)	64	224	14	337	639
RARI (Regional)	25	169	13	296	503
Total	89	393	27	633	1142

Source: Tsedeke et al., 2004

Distribution by commodity: 72 % of the agricultural research personnel in Ethiopia are involved with crop research programs. Only 18 % and 7 % are involved in livestock research and natural resources, respectively. This disparity is further exemplified by the fact that 71 % of the PhD, 73 % of the MSc, and 73 % of the BSc holders work on crops while only 9 % of the PhD, 20 % of the MSc, and 19 % of the BSc holders work on livestock. The figure for natural resources is 20 % PhD, 7 % MSc, and 8 % BSc.

Distribution by gender: Female researchers account on the average 7 % of the total research staff of the Ethiopian NARS. This is among the lowest even by the East and Central African standard of 18 % (Tsedeke et al., 2004).

Figure 4. Share of female researchers in the Ethiopian NARS



Source: Beintema and Menelik, 2003.

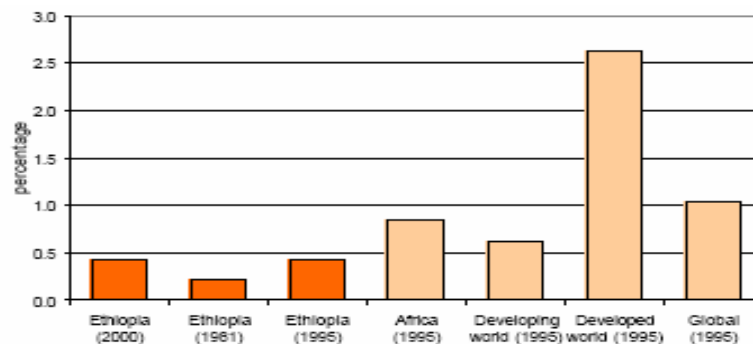
6.2 Physical Resources :

There is about 1,800 hectares of research facilities and land resources allocated for agricultural research in the Ethiopian NARS. During the last 13 years there has been substantial improvement in infrastructure (offices and laboratory spaces, laboratory equipments, farm machinery, and roads) funded by the World Bank's Agricultural Research and Training Program. Yet critical shortages in terms of laboratory spaces, equipment, chemicals, green houses and chemical stores and transportation still exists.

6.3 Financial Resources :

On the average, the total financial resources allocated for agricultural research in Ethiopia is about 60 million birr (about US \$ 8 million) per year. There are three main sources for this finance – 80 % from the government, 8 % loan from the World Bank and 6 % to 11 % from contributions from donor agencies. In 1981 the country invested \$0.22 for every \$100 of AgGDP. In 2000, this grew to \$0.43 (Figure 5). These figures are lower than the average ratio (0.85%) and the developing world (0.62%). Thirty five percent of the agricultural research budget was allocated to salaries and 65% to operation/capital costs (WANA NARS Studies, 1999).

Figure 5 . Public agricultural research intensity compared regionally and globally.



Source : Beintema and Menelik, 2003

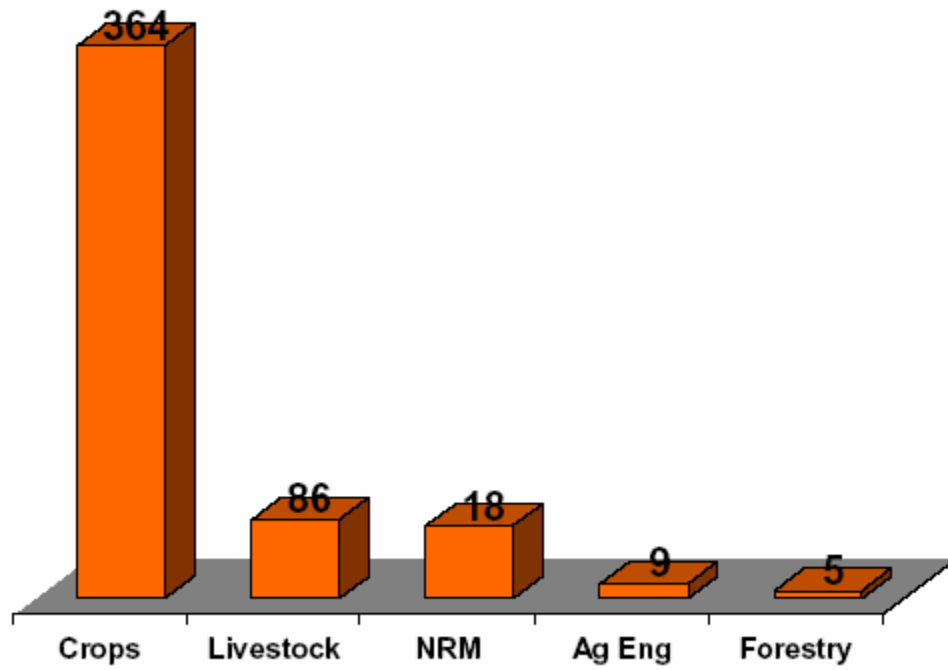
6.4 Agricultural Credit :

Currently about 2.5 million farmers (25% of total smallholders) obtain credit annually for the purchase of inputs, mainly fertilizers. The bulk of this credit is provided by the Commercial Bank of Ethiopia (CBE) with the intervention of the state governments to underwrite the loans. In 2005/06 CBE approved a total of 1.2 billion birr for agricultural input loans to the different regional states. This is 21 % higher than the 2004/05 figure and the highest for the last cropping years. The interest on the loans is 7.5% shared between CBE which receives 5.25% on the disbursed amounts and the regional governments which receive 2.25% for loan disbursement, recovery and administrative charges (Robinson et al., 2006).

7. Technology Development and Dissemination (TDD)

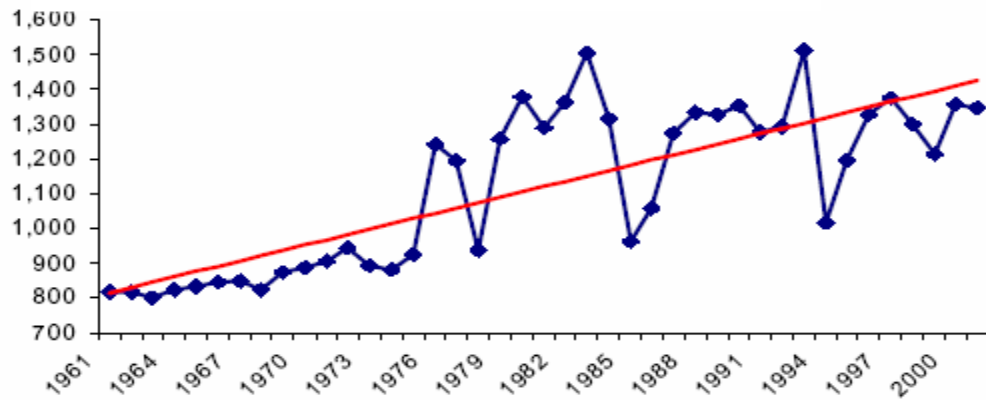
Until 1997 the focus on agricultural research was on three broad subjects – crops, animal production and natural resource management. Crops, however, relatively gained more focus. After 1997, more focus was also given to forestry, soil, animal health and fisheries. Over the past four decades, the Ethiopian NARS developed and disseminated 482 agricultural technologies in five major research areas. A total of 364 new and improved crops/plant varieties were released, making the crops share 75.2% of the total TDD record (Figure 6). The new improved released varieties were developed in 29 crops/plants (EARO, 2003). TDD in animal production focused on dairy, beef production and improving oxen traction. In agricultural engineering, the major focus was on developing small implements like oxen pulled broad bed and furrow makers and row planters and cultivators. Some milestone achievements that contributed greatly to yield increases since the 1960s are in cereals, pulses and coffee (Figure 7 to Figure 10).

Figure 6. Released technologies by the Ethiopian NARS.



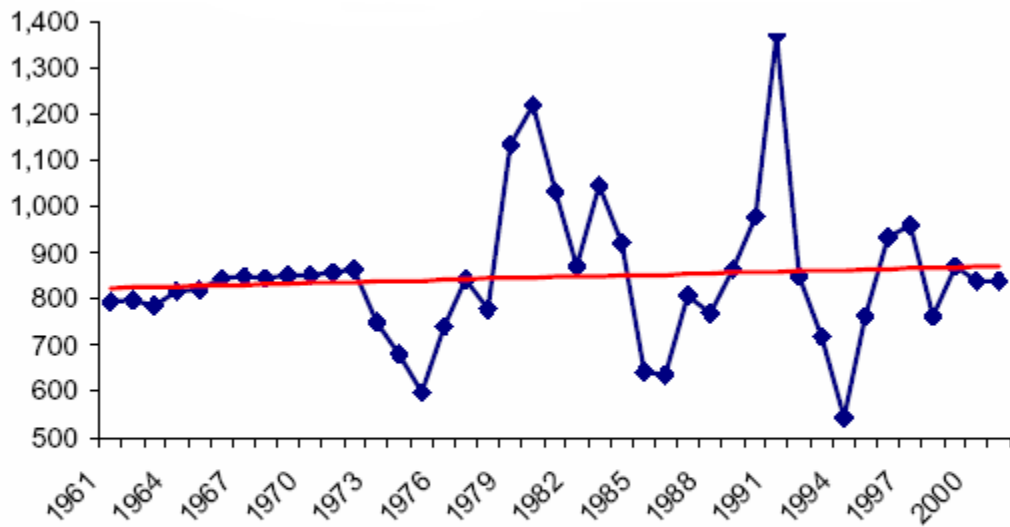
Source: EARO 2003

Figure 7. Crop Yields - Cereals, 1961-2000 (kg/ha)



Source : Tsedeke et al., 2004

Figure 8. Crop Yields - pulses, 1961-2000 (kg/ha)



Source : Tsedeke et al., 2004

Figure 9. Crop Yields - Oil Seeds, 1961-2000 (kg/ha)

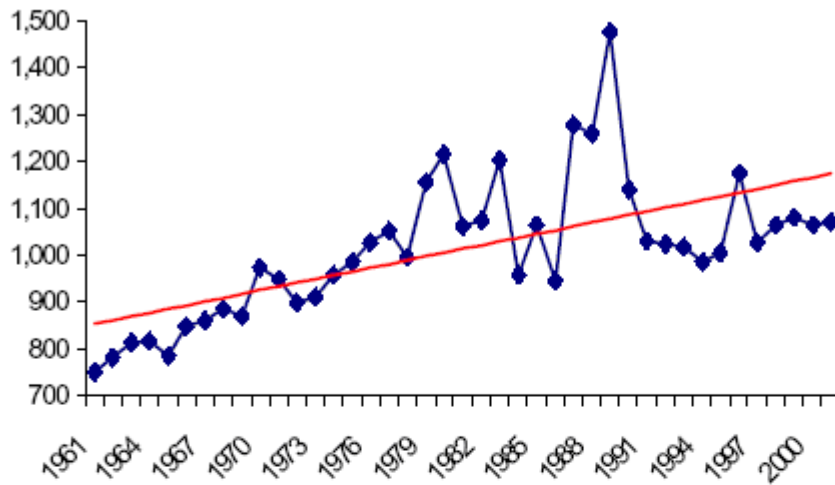
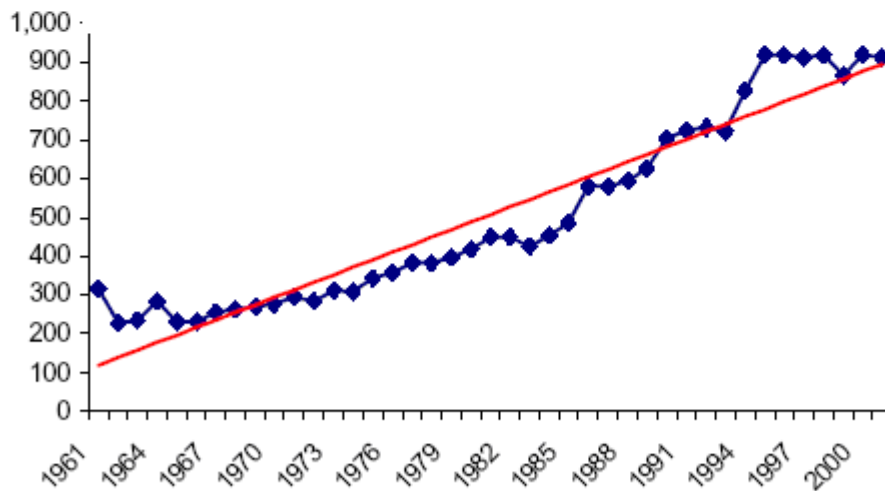


Figure 10. Crop Yields - coffee, 1961-2000 (kg/ha)



Source: Tsedeke et al., 2004

Some other milestones worth mentioning are: Coffee Berry Disease resistant varieties developed and released in the 1970s, 'Acala' type cotton varieties developed in the 1970s, hybrid maize varieties developed in the 1990s, and several other crop varieties and management technologies developed and released over the years. Various reports also indicate that Ethiopia has recently become the world's biggest exporter of green beans (http://www.usaid.gov/stories/ethiopia/ss_et-greenbeans.html). The currently booming flower industry in the country is also another good news (Amber Henshaw, BBC News, May 25, 2006). These are few indications that investment in agricultural research really pays.

8. Agricultural Research and Biotechnology

Current activities in biotechnology are very minimal and scattered among four institutions (Hailu, 2006) and currently only about 30 scientific staff are involved in biotechnology research (Table 2).

8.1 Ethiopian Institute of Agricultural Research (EIAR): Tissue culture and double haploid breeding is carried out at four research centers:

- Jimma – on coffee (Coffee Berry Disease)
- Melkasa – on banana
- Debre Zeit – on tef, endod and grape vine
- Holetta – on potato and barley

In tissue culture, priority is given to rapid multiplication and disease cleaning. No DNA based work is currently done at EIAR.

8.2. Addis Ababa University: Molecular characterization, tissue culture, marker assisted selection, genetic engineering (transformation), wild crosses, molecular phenology, and protoplast fusion. Most of the work done is by graduate students as thesis works for completing their graduate studies. In the laboratory of the Biology Department, genetic characterization of crops is done by using RAPD, RFLP and isozyme markers. The overall work carried out by Addis Ababa University is not well coordinated with other institutions.

8.3. Institute of Biodiversity Conservation: Work in the biotechnology area involves characterization of indigenous accessions of various crops using isozyme markers.

8.4 Regional Centers: The Tigray Agricultural Research Institute is the only regional center where some sort of biotechnology activity is carried out. The center works on micro propagation protocols of indigenous tree species that produce gum and incense.

Ethiopia is building its first Agricultural Biotechnology Research Institute (ABRI). The ABRI is part of the overall agricultural research capacity building project funded by a World Bank loan, and will be part of the Holeta Agricultural Research Center, about 45 kilometers from Addis Ababa (Sawahel, 2005).

Table 2. Number and education level of full time equivalent plant biotechnologists (1985-2004).

Institution ¹	Education level	1985	1990	1995	2000	2004
EARO	B.Sc.	-	-	2	2	13
	M.Sc.	-	-	1	1	3
	Ph.D.	-	-	-	2	4
Sub-total		-	-	3	5	20
IBC	B.Sc.	2	2	2	2	1
	M.Sc.	2	2	2	2	2
	Ph.D.	1	1	1	1	3
Sub-total		5	5	5	5	6
AAU	B.Sc.	-	-	-	-	-
	M.Sc.	-	-	-	-	-
	Ph.D.	-	-	2	2	2
Sub-total		-	-	2	2	2
TARI	B.Sc.	-	-	-	-	-
	M.Sc.	-	-	-	0	2
	Ph.D.	-	-	-	-	-
Sub-total		-	-	-	0	2
Grand-total	B.Sc.	2	2	4	4	14
	M.Sc.	2	2	3	3	7
	Ph.D.	1	1	3	5	9
		5	5	10	12	30

¹EARO = Ethiopian Agricultural Research Organization, IBC = Institute of Biodiversity Conservation, AAU = Addis Ababa University, ARARI = Amhara Regional Agricultural Research Institute, TARI = Tigray Agricultural Research Institute

9. Agricultural Research Relations with Development

With the broad objectives of research in Ethiopia, the technological opportunities offered by research give agricultural research a central role in changing the livelihood of the people and supporting the Agricultural-Led Industrial Development (ALID) plan of Ethiopia. This is based on the assumption that agricultural research is a major mechanism for growth in agriculture, that there is a close liaison between research and development, and that policies and strategies will stay on track. The issuance of the National Agricultural Policy in 1993 and the subsequent establishment of EIAR in 1997 will go a long way in alleviating some of the agricultural research problems in Ethiopia. Other supporting tools have been the formulation of the National Seed Industry and National Fertilizer Policies.

10. Challenges and Opportunities

Despite the modest achievements of agricultural research on developments in Ethiopia in the past few years, there are some serious challenges that literally dilute/neutralize the progress achieved. Even during the last couple of years when the country received more than adequate, well distributed rain in the major crop producing areas, about four million Ethiopians need food assistance. Developments through agricultural research do not occur in a vacuum. Obstacles to achieve these goals should be constantly accessed and given serious considerations to help the country become food self-sufficient and food-secure. Good governance emanates from listening to professionals and the farmers at large and making changes as the needs arise especially when realities on the ground do not conform to political policies. In this regard, some serious issues need to be addressed by the Ethiopian government for agricultural research to have a meaningful impact on alleviating the chronic and perpetual food shortages the country is facing. In the following pages, I will try to enumerate and discuss some of these issues which I believe should be given the utmost priority.

10.1 Sub-optimal levels of agricultural technologies

- **Irrigation** – The water body covers 7,400 km square comprising 11 major lakes. Annual surface flow from 12 major river basins is about 110 billion meter cube. Nearly 75% of the water drains into the neighboring countries of Eastern Africa, signifying that Ethiopia is surely a water tower of Africa (Alemneh Dejene, 2003). Unfortunately, of the 11 million hectares presently farmed to cereals and pulses, only some 190,000 hectares are irrigated in 2005 (Robinson et al., 2006). If the country is ever to come out of its current unfortunate situation, irrigation should be given the utmost priority. Serious investments on both the research and development sides on this issue should be made by the government. Relying on irregular rainfall, as is the experience in the past many years, will not solve Ethiopia's food self-sufficiency problem. Low cost water harvest and irrigation technologies such as construction of earth dams, river diversions, and hand pumps should be expanded and encouraged. On the research side, crop varieties and management practices for irrigated agriculture should be given due emphasis.
- **Fertilizers** – Ethiopia totally depends on fertilizer imports. The sector has been deregulated and opened for private competition since the mid 1990s and subsidies have been removed. However, the state owned Agricultural Input Supply Enterprise (AISE) and the two TPLF owned companies, Ambassel and Wondo hold 80% of the market (Robinson et al., 2006). In 2004/05 total fertilizer availability amounted to 482,000 metric tones (US \$ 122 million). Demand for 2005/06 amounted to 347,000 tones, 7% more than the previous year. DAP (diamonium phosphate) price is 380 birr/100 kg (US \$ 439/tonne), and Urea (nitrogen source) is priced at 318 birr/100 kg (US \$ 368/tonne). The Ethiopian Central Statistics Authority indicated in 1996 that only 32.8 % of farmers used fertilizers in 1995. Only 10.8 kgs. of nutrient is applied per hectare of arable land compared to 48 kgs in Kenya and 60 kgs in Zimbabwe (World Bank, 1993). In general, applications rates are well below the recommended rates of 200 kg/hectare. The issue here is not that farmers are not aware of the benefits of fertilizers. It is an issue of being able to afford the recommended level. We are telling a poor subsistent farmer to spend 700-800 birr per hectare on fertilizer alone.

The costs of improved seeds, herbicides and insecticides will bump this figure to over 1000 birr per hectare. The Ethiopian government needs to seriously think about subsidizing fertilizers until such a time that farmers can afford to use this input. Currently, the government is subsidizing fuel. Why not fertilizers? Which one is a priority? In the long term, establishing fertilizer factories in the country should also be taken seriously. Even though this is an expensive venture, it will be a worthwhile investment.

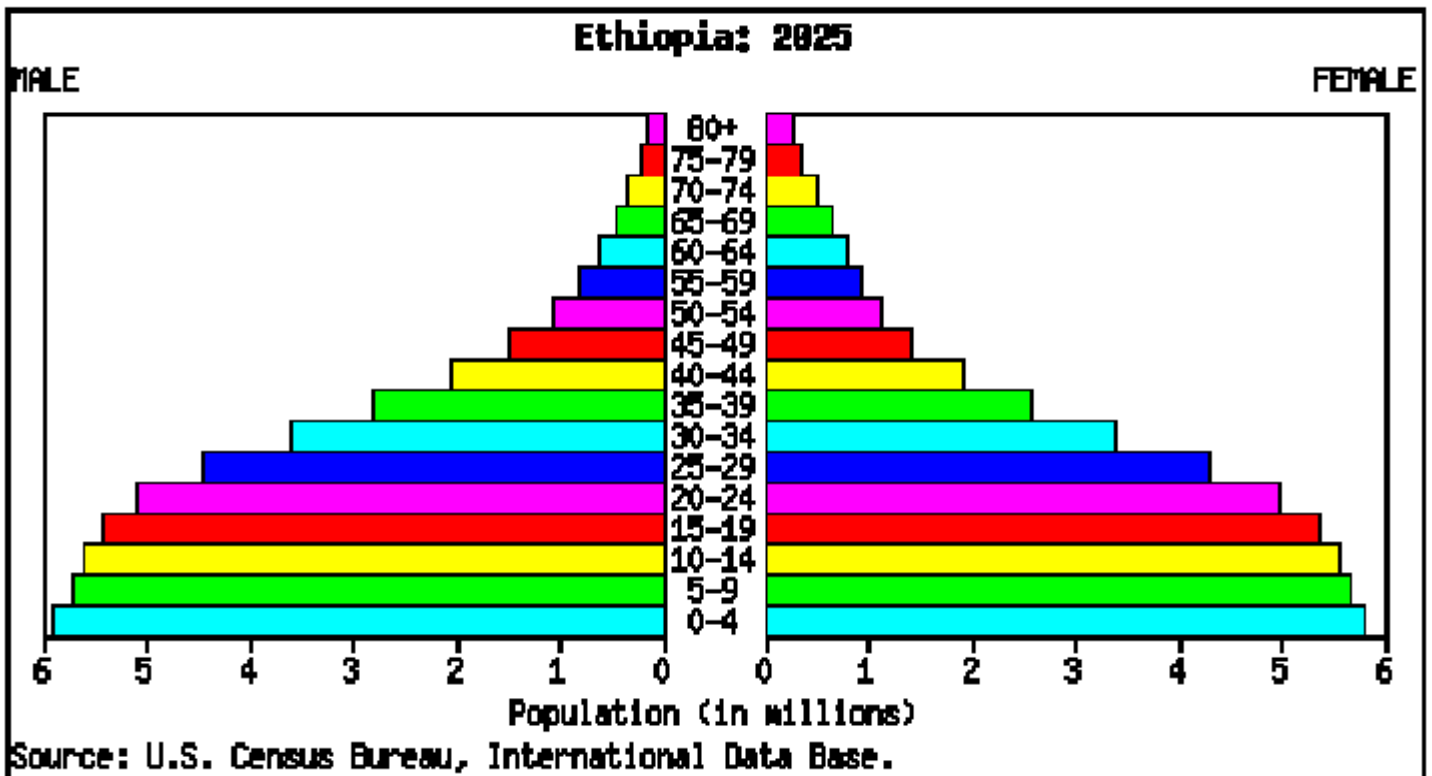
- **Improved Seeds** – In the 2005 crop season, 98% of the seeds used for planting were local seeds carried over from the previous harvest. Of the remaining 2%, amounting to 15,900 tones of improved seeds sold, 6,600 tones were maize and 6,800 tones were wheat seeds (Robinson et al., 2006). It is inconceivable to think of increasing agricultural production without the use of improved, high yielding and disease resistant seeds of crop varieties. Local landrace varieties are low yielding and susceptible for the most part. The development and dissemination of these varieties is of utmost importance to boost agricultural production.
- **Other Resources** – By current estimates, there are only 3,000 tractors and 100 harvesters/threshers in use in all Ethiopia (FAO, 2000).

10.2 Population Increase

Probably the one of the greatest development problem facing Ethiopia today is population explosion. It puts a heavy toll on the resource base and the economy. Ethiopia's population is estimated to be 77 million, second only to Nigeria in sub-Saharan Africa (Maddux, 2006). Some two million people are added to the population every year. This despite the heavy AIDS toll (4.4% of adults aged 15 to 49 were HIV positive in 2003 according to the joint UN programme on HIV AIDS). By the year 2050, the Washington based Population Reference Bureau says Ethiopian population will grow by an astounding 120%. That means in just 44 years the population will grow to 169 million. The World Bank estimates that the rate of population growth per year is 2.2% and the population density is 66 people/sq. km. The Ethiopian government puts the rate at 2.9% per year. The population is still overwhelmingly rural, with only 16% living in towns. Ethiopia is the least urbanized country in Africa (Robinson et al., 2006). By the year 2025, at the current rate, 35% of the population will be under 20 and above 60 years old (Figure 11).

The government needs to adopt a strict national policy to reduce the current birth rate which is six children/woman. Education and family planning services should be expanded to the rural communities. The regional governments could play a vital role in this. All avenues, including contraceptives and other birth control methods should be pursued. These is a dark cloud looming on the horizon and unless this population explosion is curbed, the country will not be able to feed and care and improve the lives of its citizens. The degradation of the environment which goes hand in hand with the increase of population, will lead the country into further abyss and unimaginable poverty.

Figure 11. Population distribution by 2025.



10.3 Land Policy

In Ethiopia land belongs to the government. The farmer can farm it only as long as he/she stays on the farm. He/she can not sell it or lease it legally. Tenure security is vital for a successful agricultural development, especially in a country like Ethiopia where 85% of the population lives in the rural area. Security of tenure and ownership of land provides the right incentives to invest or make improvement in land and natural resources. Today, if one goes to the rural areas in Ethiopia it will not be hard to see stark evidences of land and soil degradation and deforestation. The farmer does not care to plant trees or other greeneries around his hut. Nor does he build terraces to protect the soil and conserve moisture because he feels the insecurity of land ownership from state or government monopoly of land ownership. A study by the Ethiopian Economic Association in 2002 indicated that the majority of smallholders (76%) are not sure whether their current land will belong to them in five years. In the central highlands, unprecedented population pressure has contributed to decreasing plot size. Average land holding has declined from 0.5 hectares per person in the 1960s to 0.11 hectares in 1999 making an increasing number of households dependent on inadequately small and unproductive plots (Robinson et al., 2006). Catherine Maddux wrote in newsVOAcom from Washington on March 8, 2006 that the situation currently is so bad that because of population pressure the government was obliged to apportion land, not in hectares but in square meters. This has resulted in loss of fertility, degradation and ecological imbalances with long reaching consequences especially in the northern and central highlands where 90% of the population live. It is indeed puzzling to observe how the Ethiopian government cannot see this unless it has a vested motive in following this destructive path of holding 85% of the population in servitude on a dwindling, eroded and unproductive and ever decreasing farm land. If agricultural development is ever to bring betterment for the lives of farmers and improve the national economy, land should be privatized. The government's and private sector's responsibility will be to create jobs to absorb farmers displaced by this approach. With the little piece of land the farmer owns today, even if he/she adopts the best available agricultural research technology, he/she will never make it out of the perpetual cycle of poverty and contribute to the growth of the national economy.

The governments logic that the 'landlords' will return and displace the farmers if land is privatized is a bogus political and self-serving argument to say the least. It is rather a cover up for holding land for political leverage with the rural community. It will continue to trap millions of farmers as dependent serfs. Past history tells us that Ethiopian farmers do not sell their land unless they are confronted with situations beyond their control. Anyway, as things stand now farmers are flocking to the cities as beggars because their land is too small and unproductive to provide for their families. One can attest to this fact by simply looking at Addis Ababa, where thousands live on the streets and try to make it from day to day. It is also the case; farmers cannot get credit since it requires land as collateral by law. So, small farmers cannot get needed credit to buy farm inputs or invest on agriculture. The land to the tiller question that was demanded by young revolutionaries at the eve of the revolution by the Military Junta in 1974 has not been answered. Before, 1974 there was land owners of different sizes: small, medium and large. The revolutionaries simply wrongly assumed this was the cause of country's poverty and famine. The reality is the greatest famine in recent history was created in 1984-86. Ethiopia before 1974 had easily contained famines which are locally specific such is Wello famine 1972-73. In other areas such as Arsi and Gojjam there was surplus production of food and the problem was lack of access or distribution. Ethiopia is today is permanently food aid dependent and threatened with recurrent famines. Privatization of land creates optimal patterns of land of different sizes through market transactions and increases productivity. While efforts to boost agricultural and food marketing through innovative ways are helpful, the fundamental problem stagnation or decline per capital agricultural and food production remains which cannot be resolved without injecting knowledge, technology, and capital to agriculture. The monopoly of land has also created to extremely high prices of urban land and housing, which is beyond the capacity of the common Ethiopians. But, the very few wealthy can buy land in Addis Ababa with inflated price and the effect of monopoly of land is to create shortage of housing under rapidly growing demand.

10.4 Underdeveloped rural infrastructure

The road networks are limited and do not reach many villages in the rural areas. It is difficult to transport heavy items like seeds and fertilizers especially during the rainy seasons. Farmers stop work and travel miles to transport these items on the back of donkeys. This happens at pick times when farmers are busy with farm chores.

10.5 Retention of qualified staff - who leave the country mainly due to poor salary scales and incentives. The attrition rate is simply staggering and the government is not simply doing enough to reverse this scenario.

10.6 Recurring drought – Droughts and famines are the common features of the legacy of the three governments Ethiopia had in the last five decades. Drought itself is not the fundamental problem in Ethiopia. After all droughts prevail in many parts of the world and in affluent societies like the U.S.A., it is no more than a nuisance. The real problem in Ethiopia is the lack of development and misguided policies and wrong priorities by the government and external donors. These have resulted in our inability to cope with the natural environments. Even though one can not deny the effects of the environmental forces, it is our activities and decisions that translate drought into famine.

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