

THE NATIONAL AGRICULTURAL RESEARCH SYSTEM OF ETHIOPIA¹

1. HISTORICAL BACKGROUND

The history of agricultural sciences in Ethiopia coincides with the establishment of the Ambo (AJCA) and Jima (JJCA) Junior Colleges of Agriculture in 1947, and of the Imperial College of Agriculture and Mechanical Arts in 1953, later called the Alemaya College (now University) of Agriculture (AUA).

Significant agricultural research (AR) activities started when the Alemaya College established a central experiment station at Debre Zeit, known at present as the Debre Zeit Agricultural Research Center (DZARC). Other field experiments were initiated during the 1963 crop season at Kuyera (near Shashemene) and at Addis Abeba; the major focus was screening for adaptability of selected crops and cultural practices. Varietal introductions and experimentation with dairy cattle and poultry were also conducted.

The inception of the Institute of Agricultural Research (IAR) in 1966 marked the beginning of organized AR and actual relations between agricultural research and development in the country. IAR was established with mandates to formulate the national AR policy; carry out AR on crops, livestock, natural resources, and related disciplines in various agroecological zones of the country; and coordinate national AR.

Another center, the Plant Protection Research Center (PPRC), which was established in 1972 and operated under the Ethiopian Science and Technology Commission, was merged with IAR in 1995. The Plant Genetic Resources Center of Ethiopia, which was founded in 1974, later became the Biodiversity Institute (BDI). Four other AR institutions were established later: the Forestry Research Center (FRC, 1975), the Wood Utilization Research Center (WURC, 1979), the National Soils Laboratory (NSL, 1989) and the Institute of Animal Health Research (IAHR, 1992).

Other institutions of agricultural higher education (AHE) were then created: Awasa College of Agriculture (ACA, established in 1977), Wendo Genet College of Forestry (WGCF, 1978), the Faculty of Veterinary Medicine at Debre Zeit of Addis Abeba University (FVMDZ, 1979), and Mekele University College (MUC, 1994).

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.

In June 1997, the Ethiopian Agricultural Research Organization (EARO) was established and merged all the existing AR institutions (IAR, DZARC, BDI, FRC, WURC, IAHR and NSL) except the RARCs. EARO is affiliated directly to

2. THE CURRENT NARS

2.1 Overview

As of 1997/98, the Ethiopian NARS is made up of two main sets of institutions:

- The scientific institutions which have AR as their central mandate; they include all the former institutions which have been merged within EARO and the Regional Agricultural Research Centers (RARCs). These account together for 86% of the total potential research years (pRYs: equivalent full-time researchers) and 97% of the total financial resources of all the NARS. These institutions are presented in Sections 2.2 and 2.3.
- The institutions of higher agricultural sciences education actually involved in AR, which account for 13% of the pRYs and only 3% of the total financial resources of the NARS (see Section 2.4).

A few other institutions² allocate some resources to AR, but a precise inventory of their AR activities and resources is not available.

¹ Monograph based on information provided in 1998, just before the effective starting of EARO, by **Dr Getinet Gebeyehu**, former Deputy General Manager, IAR, and reviewed in 1999 by **Dr Tadesse Gebremedhin**, Advisor to the Director General, EARO.

² These are: (i) the National Herbarium (NPM) of the Biology Department of Addis Abeba University (AAU, established in 1959); (ii) the Ethiopian Nutrition Institute (ENI, 1962); (iii) the Institute of Development Research (IDR, 1972) under Addis Abeba University; and (iv) the Agricultural Development Department (ADD, 1980) of the Ministry of Agriculture, renamed as the Crop Production and Protection Regulatory Department.

Little or no AR work is done by the private sector. Although not members of the NARS, some international AR organizations are either represented through their branch offices in Ethiopia or they operate in close collaboration with NARS through their various networks. These are CIAT, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, and ILRI.

2.2 The AR Institutions Now Managed by EARO

These are the former Institute of Agricultural Research (IAR), which now constitutes the heart of EARO, and the other institutions generally considered as research units within EARO: the Debre Zeit AR Center (DZARC), the Biodiversity Institute (BDI), the Forestry Research Center (FRC), the Wood Utilization Research Center (WURC), the National Soils Laboratory (NSL), and the Institute of Animal Health Research (IAHR). All these institutions were previously affiliated to the Ministry of Agriculture (MOA), except DZARC which was run by Alemaya University of Agriculture (AUA). They meet together 64% of the pRYs and 79% of the total financial resources of the NARS.

The Institute of Agricultural Research (IAR)

Mandate and Organization

IAR is the largest NARS institution (about 50% of the pRYs and 59% of the financial resources of the NARS). Since its inception, IAR has been a semi-autonomous research institution, functioning under the general supervision of a Board of Directors, the members of which are drawn from various ministries and organizations that are directly or indirectly involved in agricultural development in Ethiopia. AR is its central mandate and mobilizes almost all the time of its graduate staff.

It is headed by a Director General, who is assisted by a Deputy Director General for Research and one for Administration and Finance. The Head Office has technical and administrative support units. IAR had eight Federal Research Centers located in the different agroecological zones of the country, each one headed by a center manager who is assisted by commodity program leaders, sub-program leaders, and administrative and research support services. Now, under EARO, with the 5 units mentioned above, the number of research centers has increased to 13.

Human, Physical and Financial Resources

IAR currently (May 1998) has around 1901 national permanent full-time staff, consisting of 258 scientific and technical senior staff (43 PhD, 118 MS, 97 BS) (about 6% of whom are females); 166 technicians, which means a ratio of 0.6 technician to researcher, a rather low one compared to the general agreed upon standard (2); and 1477 other support staff (clerks, accountants, laborers, etc), with a ratio of 5.7 per researcher which is higher than the standard (34).

IAR operates through:

- its headquarters, located in Addis Abeba, which concentrate 6% of the scientific staff (not more than 0.8% of the PhD holders) and include the central offices and library;
- eight Federal AR Centers transferred from IAR (at Bako, Holetta, Jima, Pawe, Kulumsa, Ambo, Werer, and Nazareth), six sub-centers, and several testing sites spread across the various agroecological zones of the country. There are now also five research centers transferred from the Ministry of Agriculture (MOA) and AUA

program(s), but it is also responsible for specific regional research programs of the administrative region where it is located. It promotes and coordinates multidisciplinary commodity research at the national level. It also participates and collaborates with other national and regional research programs.

In general, research facilities, information services, and land resources (total: 1,800 ha) are considered inadequate. However, during the last 13 years, IAR has substantially improved its infrastructure, particularly in terms of office and laboratory space, laboratory equipment, farm machinery, and roads.

Financial resources (1997/98) amounted to Ethiopian Birr (ETB) 34.1 million (US\$ 4.9 million), coming mainly from national sources and from the government budget (ETB 30.9 million), with some external grants (ETB 3.2 million). For the last 10 years, national resources have steadily increased (US\$ 1.2 million in 1988, US\$ 2 million in 1993), but foreign grants have strongly decreased, especially after the completion of the National Agricultural Research Project (NARP), supported by the World Bank, which provided very large support to the institutional and physical development of the centers and sub-centers during the period 1987-1994.

In 1997, 35% of the national resources were allocated to salaries and 65% (ETB 20.1 million) to operation/capital costs (OCC). As most of the external grants are allocated to this second item, OCC amounts to around ETB 90,300 (US\$ 13,000) per graduate staff member, which is insufficient for covering the research needs (see Section 3.3).

Research Activities and Linkages

The largest number of researchers (72%) work on crop programs followed by livestock (19%) and natural resources (9%). This disparity in human resource distribution is further exemplified by the fact that 71% of the PhD, 73% of the MS, and 73% of the BS holders work on crop commodities alone. The corresponding figures are 9, 20, and 19% for livestock and 20, 7, and 8% for natural resources. The bulk of funds allocated to IAR went mainly to crop-related research because the government development plans and strategies emphasize food self-sufficiency. However, other sub-sectors such as livestock, natural resources, farm machinery, and agricultural economics should be given equal importance.

Most of the research centers are located in the major agroecological zones of the country. However, the arid and semiarid zones, mainly the northwestern and northern drought-prone sub-moist zones, and the eastern region of the country comprising western and eastern Harerge and the Somali and Afar regions, are least addressed.

Through the World Bank (IDA)/IFAD loan-supported Agricultural Research and Training Project (ARTP), research centers will be established at six sites: Jijiga in the Somali region, consisting of lowlands; Shiket in Afar region, hot to warm arid lowlands; Jinka in the southern region, hot to warm humid environment; Humera in Tigray region, hot and warm sub-moist to semiarid lowlands; Sekota in Amhara region, tepid to cool sub-moist environment; and Yavello in Oromia region, arid southern lowlands. These six new research centers will serve the agroecologies of the country which are not currently covered.

IAR had no formal linkages with the other NARS institutions. In the past, it organized a National Research Review Meeting that included all research centers, including those outside of IAR, such as the universities and development ministries, as well as other organizations engaged in AR. These meetings were held annually to review and approve research projects, particularly those of the IAR centers, as the universities or regional centers were not legally bound by decisions passed in the review system.

Collaboration exists with international research organizations through participation in projects executed in the country or involving other countries in the region. Some collaboration takes place through participation in networks; most of this collaboration was administered or handled by IAR, although other institutions also took part at all stages of planning, review, and execution of the research programs.

IAR, now EARO, has a long and fruitful experience in international cooperation which includes: (i) international AR centers (IARCs), where cooperation is generally in human resource development, germplasm exchange, consultancy services, and collaborative research in selected project areas; (ii) international or regional organizations which have supported and continue to support IAR in providing funds and technical assistance to further develop and strengthen IAR research programs; and (iii) bilateral arrangements. IAR also continues to have linkages with research institutions in developed and developing countries.

Debre Zeit AR Center (DZARC)

DZARC was formerly run by Alemaya University of Agriculture (AUA). It conducts research on crops (tef, durum wheat, chickpea, and lentil), forestry, and livestock (especially poultry), focussed mainly on the agricultural problems facing its surrounding area an extremely important agroecology endowed with fertile soils with research programs recently reoriented into an interdisciplinary team approach rather than a discipline approach.

It has 34 researchers (9 PhD, 19 MS, 6 BS). Its national financial resources amount to ETB 3.5 million (US 0.5 million); foreign grants which were important in the past are now very limited (ETB 80,000). Total resources provide an average of around US\$ 15,000 per researcher, which is insufficient (see Section 3.3).

DZARC has close relations with the farmers of the area. When it was under AUA, it cooperated with IAR in research on sorghum, maize, haricot beans, groundnuts, dairy cattle, beef, soil, etc.

The Biodiversity Institute (BDI)

BDI was established in 1976 in response to the threat of genetic erosion mainly as a result of over-exploitation and the collection, evaluation, documentation, and research on crop germplasm in the country; (ii) conserving crop genetic resources using both *ex-situ* and *in-situ* strategies and providing germplasm for the development of improved crops; and (iii) acquiring new germplasm from other countries and documenting indigenous knowledge in the field.

BDI has 11 researchers (4 PhD, 7 MS). Its total financial resources amount to ETB 9.3 million (US\$ 1.3 million), of which ETB 2.3 million is funded by the Government and ETB 7 million are grants provided by foreign donors, and allow optimal working conditions.

Even before its restructuring within EARO, BDI had strong linkages with IAR. It has strong collaboration with international AR centers (IBPGR, ICARDA, etc.).

The Forestry Research Center (FRC) and the Wood Utilization Research Center (WURC)

FRC and WURC conduct research on the conservation and development of forestry and sustainable utilization of forest products. Since their establishment, several adaptability trials, mainly of exotic species, have been launched nationwide. Research has been carried out on social forestry/ agroforestry and forest management. Agroforestry concentrates on off-farm and on-farm trials to test the adaptability and compatibility of multipurpose tree/shrub species with various crops and patterns of planting in different agroclimatic zones. Fuel wood consumption, fodder production, and a number of planting patterns have been studied.

The two centers employ 18 scientific and technical graduate staff members (1 PhD, 17 MS); the FRC graduate staff is fully committed to research, and the WURC staff is more oriented towards extension (around 15% of its time is allocated to research). Their budget amounts to around ETB 1.2 million (US\$ 0.17 million), which means an average of around US\$ 9,400 per graduate staff member, all costs included. These research centers, in their new capacity, will serve the agroecologies of the country which were previously not covered by research.

The National Soils Laboratory (NSL)

NSL, established in 1989 in Addis Abeba, is mandated to render laboratory services for research, development, and educational establishments. It has 6 scientific and technical graduate staff (2 PhD, 3 MS, 1 BS) in the field of soil sciences (pedology, plant nutrition, etc.).

The Institute of Animal Health Research (IAHR)

IAHR, established in 1992 in Sebeta, devises an effective and sustainable animal health management system to assist the sector in achieving its potential level of production and productivity, duly contributing to the national economy and public health.

Research objectives are to acquire sufficient and reliable information on animal health problems; develop new control and diagnosis techniques; assess and evaluate the existing animal health diagnosis, control, and surveillance methods; test, evaluate, and adapt new control and diagnostic technologies developed elsewhere before use in Ethiopia; and devise appropriate methods for transferring control and diagnosis research output to the end user. IAHR has 17 scientific and technical graduate staff (12 MS, 5 BS).

2.3 The Regional Agricultural Research Centers (RARCs)

The nine RARCs are the second largest of the NARS institutions, accounting for about 22% of the pRYs and 17% of the financial resources. They are located at Adet, Sheno, and Sirinka in the state of Amhara; Adami Tulu, Bako, and Sinana in the state of Oromiya; Awasa and Areka in the Southern Ethiopia Peoples Administrative Region (SEPAR); and Mekele in Tigray Administrative Region. They are administratively accountable to the Regional Agricultural Bureau and technically to EARO. Each RARC is headed by a center manager who is assisted by program and sub-program leaders and administrative and research support services.

The RARCs have 131 graduate staff members (5 PhD, 42 MS, 84 BS)¹. They are funded (budget: ETB 11.2 million or US\$ 1.6 million; i.e., US\$ 12,200 per graduate staff member) by the respective regions, except for national research projects, in which they collaborate with the EARO Federal AR Centers.

The RARCs conduct research that addresses the specific needs of a particular region. They promote multidisciplinary research at the regional level and have research activities. They also participate in collaborative national research programs in any one or more of the crop, livestock, and natural-resource commodity programs.

¹ 47 researchers (including 1 PhD and 14 MS) in Adet (crops), Sheno (small ruminants, crops), and Sirinka (natural resource management, crops) in the state of Amhara; 59 res. (including 1 PhD and 19 MS) in Adami Tulu (livestock), Bako (crops, livestock), Sinana (crops) in the state of Oromiya; and 25 res. (including 3 PhD and 9 MS) in Areka (crops) and Awasa (crops) in SEPAR.

2.4 The Institutions of Agricultural Sciences Higher Education (AHE)

The primary function of higher learning institutions is teaching, with research representing an important component in some of them. Included under these are:

- Alemaya University of Agriculture (AUA), with one AR centers affiliated to it (Alemaya). It is a chartered university run by a Board whose chairperson is the Minister of Education, and the secretary is the President of the University. It is the largest agricultural higher learning institution, with 106 academic staff members (asm), including 23 PhD and 61 MS; it offers BS and MS degree programs.
- Three colleges¹: Awasa College of Agriculture (ACA) (47 asm, including 11 PhD and 30 MS holders); Mekele University College (MUC) (21 asm, including 1 PhD and 19 MS holders); and Wendo Genet College of Forestry (WGCF) (22 asm: 5 PhD and 17 MS holders)². Each college, which evolved from a small capacity establishment, is now able to enroll students for BS degree programs.
- The Faculty of Veterinary Medicine at Debre Zeit (FVMDZ, 1979) of Addis Abeba University (57 asm, including 10 PhD and 20 MS holders), where 15 research projects are conducted at present (1997/98).

These five AHE institutions employ 253 academic staff members (50 PhD, 147 MS, 56 BS). Their financial resources came only from the government budget and were very limited; however, in 1997/98 these resources were more favorable, amounting to ETB 6.6 million (US\$ 0.94 million) from the Government and ETB 5.4 million (US\$ 0.77 million) from external sources, which means US\$ 6,800 per asm for all the training and research activities.

3. AR RESOURCES

3.1 Human Resources

The NARS employs 728 graduate scientific and technical staff members (114 PhD, 365 MS, 249 BS), mostly national, who represent 475 pRYs (see [Table 1](#)).

The salaries of graduate scientific and technical staff members at EARO and at the universities are comparable, with a slightly better advantage for EARO staff. For example, in 1996, monthly salaries of senior researchers at IAR were ETB 2330 (US\$ 330), and of graduate research assistants and technicians ETB 1530 (US\$ 220) and ETB 600 (US\$ 90), respectively. At the universities, e.g., AUA, the monthly salaries ranged between ETB 2,000 (US\$ 290) for a professor, ETB 1,300 (US\$ 190) for a lecturer, and ETB 470 (US\$ 70) for a technician (and lower for less skilled labor) compared to the respective salaries of ETB 1,440, 1,000, and 420 for national civil servants, and ETB 5,000, 2,500, and 800 in the private sector.

In 1996/97, the Government approved and implemented a new career structure for AR scientists that has boosted the morale of all professionals in AR.

3.2 Physical Resources

A limited number of facilities such as residential buildings, offices, laboratories, seed stores, and cold rooms have been constructed in several major research centers, and farm machinery, agricultural implements, motor vehicles, and office and laboratory equipment were made available to some major centers from various sources: IDA, UNDP/FAO, the Netherlands/ICARDA, and the Ethiopian Government. However, many of the equipment and vehicles are old and have been kept working beyond reasonable service life, thus resulting in frequent breakdowns and high maintenance cost. All research centers are not well equipped and this has hampered their operation and reduced the amount of off- and on-station work.

¹ The Ambo and Jima Junior Colleges of Agriculture are not taken into account in this monograph as they are not offering graduate studies and are not involved in AR activities.

² WGCF was established in 1978 for diploma-level training in forestry. It then started training at the BS level in 1996 and developed a joint MS program with the Swedish University of Agricultural Sciences. It is governed by a Board under the Ministry of Education. Currently, the college staff is conducting 13 research projects in various forestry programs, soil conservation, community forestry, and agroforestry practices, with adequate teaching and research facilities now available. In 1997/98, WGCF received a budget of US\$ 0.32 million from the Ethiopian Government and US\$ 2.69 million from Sweden for capacity building.

Attempts have been made to build laboratories in most research centers, yet none of them can serve as a referral laboratory. A few run at full capacity despite the fact that they house old equipment. Some, like Areka, have only laboratory space provision, with nothing as much as a test tube. The same holds true for most of the centers in terms of libraries, greenhouses, seed and chemical stores, etc.

The status of motor vehicles and farm equipment in most of the centers is also quite discouraging. While some centers are fairly equipped with office equipment like computers and printers, some have none. As regards laboratory facilities, Holetta, Alemaya, and Debre Zeit are in a better position, while a few conduct some analyses and the majority lack the basic laboratory facilities. However, now, through the Agricultural Research and Training Project (ARTP), the facilities of almost all the research centers are expected to be improved.

3.3 Financial Resources (see [Table 1](#))

Total financial resources allocated to AR at present (1997/98) by the Ethiopian NARS are ETB 58.1 million (US\$ 8.3 million) per annum. They are made up of:

- ETB 47.6 million of national origin, mainly from the national treasury, and partly from the income resulting from experimental station produce sales;
- ETB 10.5 million from external sources, in the form of small grants from the World Bank/IFAD, UNDP/FAO, EU, IDRC, the Netherlands, and Sweden. These resources are used mainly for human resource development, technical assistance, laboratory supplies, field facilities, and vehicles.

National AR and total expenditures represent 0.20 and 0.24%, respectively, of the Agricultural Gross Domestic Product (AGDP, estimated at US\$ 3.4 billion in 1996). Such ratios are much lower than the 1% recommended by some international organizations (World Bank, European Union, etc.).

Areas of expenditure vary considerably between the NARS institutions; however, in most of the institutions, the available OCC is relatively low and inadequate for allowing satisfactory conditions of work, except for BDI. At IAR, OCC per graduate staff member amounts to US\$ 13,000, which represents around US\$ 14,000 per pRY¹; in the other ARIs, this number may not exceed US\$ 8,000 per pRY. Such numbers 25,000/30,000 per RY used by many developing countries in drawing up long-term plans, which means that the AR scientific potential in the Ethiopian NARS is currently far from being fully mobilized.

According to this last reference, IAR should have roughly around 130 actual RYs (50% of its pRYs) and the other AR institutions around 65 actual RYs (30% of the pRYs). As seen above, the institutions of higher agricultural sciences education are even less endowed and may hardly represent 25 actual RYs. Therefore, the NARS may mobilize roughly a total of 220 actual RYs, instead of the 475 pRYs estimated above.

4. RESEARCH ACTIVITIES

4.1 Research Orientation and Coordination

In the early 1990s, efforts to formulate and implement a national AR policy were not sustainable, largely due to the lack of sufficient political commitment and the necessary resources. These efforts have been re-initiated with the establishment of the National Agricultural Research Council (NARC), operating under the auspices of the Ethiopian Science and Technology Commission (ESTC). NARC was the main body for implementing the AR policy and strategy of the country and coordinating research at the national level. It was mandated to promote and support AR at the federal as well as the regional level for about two years. These responsibilities have been taken over by EARO after its establishment in 1997/98.

Research coordination occurs at two levels: interdisciplinary and inter-institutional. The diversity of the Ethiopian agroecologies and the limited human and material resources call for a multidisciplinary approach. Interdisciplinary coordination in the Ethiopian NARS has become important, especially after the research programs were organized by commodities in 1979, and has been operational since then. This seems to be working relatively well although there is a need for establishing a mechanism for recognizing the contribution of all disciplines in an equitable manner.

¹ As the number of pRYs is lower than the number of graduate staff members, and part of the OCC is allocated to other activities than research (see [Table 1](#), note n).

Annual professional conferences such as the National Crop Improvement Conference (NCIC) have helped in the past, where they provided a forum for exchange of ideas on agricultural research and development, and in minimizing duplication of efforts by different organizations. NCIC was also instrumental in the creation of the Ethiopian Seed Enterprise (ESE) and the National Variety Release Committee. This organization is almost defunct at present.

Over the last quarter century, several initiatives have been launched to improve the functioning, organization and coordination of agricultural research in IAR. These initiatives have resulted in well-coordinated, organized, and functionally improvable and long-lasting research foundations through a number of contemporary approaches.

National Commodity Research (NCR) involves all commodities that have been given national priority. NCR is organized and coordinated by national commodity research teams. Each team is composed of researchers drawn from different specializations. NCR acquires its annual budget from the Government or from special funds administered by EARO. In its technical and administrative function, NCR is semi-autonomous and hence its accountability is to EARO management. The NCR programs are coordinated at research centers where the commodity, as a biological organism (crop), is dominant in the locality and where facilities (human and material resources) are relatively adequate. NCR experiments are executed in EARO and non-EARO institutions.

For crops that are not yet promoted to commodity level, researchers are also organized in teams. In principle, the organization of these teams is similar to that of NCR except that they are thinly stretched and their autonomy is minimal. The non-commodity teams and disciplines that are not part of NCR are functionally organized and coordinated by centers or departments. However, under EARO, all research programs have been promoted to commodity status.

Research is undertaken by several departments in the different research centers, sub-fields. The Research Extension Liaison Committee (RELC), represented by regional offices of MOA and farmers, was an important forum for discussing and exchanging ideas on production constraints, research programs, and research findings. Recently, the Input Coordination Unit replaced RELC as an important interface between research and extension at all levels of the government structure. Research extension farmer linkage councils are recently being established at zonal and center levels to strengthen these linkages.

Both NCR and the departments are engaged in many experiments, usually more than 1,000 annually, involving crops, livestock, agricultural mechanization, natural resources, and agricultural economics.

EARO management provides centralized and decentralized technical and administrative assistance in support of NCR and other research programs.

There were no research institutions for fisheries, but at present, the fisheries program of MOA has been transferred to EARO and is included as a national research commodity.

4.2 Relations with Development

With the broad objectives of AR in Ethiopia, the technological opportunities offered by research give AR a central role in changing the livelihood of the people and supporting the Agriculture-Led Industrial Development (ALID) plan of Ethiopia. This is based on the assumption that AR 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.

4.3 Cooperative Relations

Partnerships exist among the different NARS institutions and between them and international organizations. On a national level, partnerships exist between EARO, AUA, ACA, MOA, ESE, Regional Research Centers, ESTC, and SG 2000. On an international level, cooperative relations exist with CIAT, CIDA, CIMMYT, CIP, IBSRAM, ICARDA, ICRAF, ICRISAT, ILRI, the EU, and the World Bank.

5. CONCLUSION

The need for coordination of the NARS has been felt since the establishment of IAR in 1966. Although IAR was mandated to coordinate research at the national level, its accomplishment in this respect has not been satisfactory, primarily because it did not have the means to enforce the rules; IAR had the technical know-how but budget allocation and release was done by an outside institution.

Initiatives have been taken by the Government in recent years to strengthen inter-institutional coordination. The issuance of the National Agricultural Policy in 1993 and the subsequent establishment of the Ethiopian Agricultural

Research Organization (EARO) by the Ethiopian Government in 1997 are expected to resolve that problem. Major tasks of EARO include developing agricultural policies, coordinating agricultural research on a national level, and advising the Government on matters relating to agricultural research and development. As of 1997/98, the different AR dination.

One of the major bottlenecks of NARS has been the problem of retaining qualified staff, mainly due to the poor salary scale and incentives. The Federal Government of Ethiopia has recently upgraded the salary scale of researchers and lecturers as a step to improve their status and attract them. In addition, the Government has launched a program to improve the trained manpower status by opening additional faculties and colleges. It is also sponsoring staff abroad in various fields.

The Ethiopian Government has formulated a national science and technology policy in the major economic sectors, including agriculture. In order to encourage science and technology, the Government has committed itself to allocating up to 1.5% of the GDP to these activities.

The Economic Development Policy of Ethiopia has given the highest priority to agriculture under the aegis of an agriculture-led industrial development. In an effort to raise the productivity of the agriculture sector and to be self-sufficient in food production, the Government has recently formulated the National Agricultural Research Policy which focuses mainly on generating technologies that will enable improving agricultural production in quantity and diversity. Other supporting tools have been the formulation of the National Seed Industry and National Fertilizer Policies.

Main Acronyms

MOA: Ministry of Agriculture. **NARC:** National Agricultural Research Council. **NCIC:** National Crop Improvement Conference. **NCR:** National Commodity Research. **RELC:** Research Extension Liaison Committee. **SEPAR:** Southern Ethiopia Peoples Administrative Region. **SG 2000:** Sasakawa Global 2000.

AAU: Addis Abeba University. **ACA:** Awasa College of Agriculture. **AUA:** Alemaya University of Agriculture. **BDI:** Biodiversity Institute. **EARO:** Ethiopian Agricultural Research Organization. **FRC:** Forestry Research Center. **IAHR:** Institute of Animal Health Research. **IAR:** Institute of Agricultural Research. **WURC:** Wood Utilization Res. Center.

ETB: Ethiopian Birr.

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Table 1 - The National Agricultural Research System: Synthesis Table (1997/98)

Italics

| NARS Institutions | | | | Scientific & Tech. Graduate Staff (Units) | | | Potential Research Years | | | Total Budget (1000 ETB) | | AR Expendit./Resources (E) (1000 ETB) | | | | |
|--|---|-------------------------------|-------------------|--|------------|------------------|--------------------------|------------|-------------|-------------------------|------------------------------------|---------------------------------------|---------------|---------------|---------------|---------------|
| No. | Name - Acronym Head Office - Year Established | Mandates AR Fields | Gover. Minist. | Nationals Total - (PhD , MS) | Exp. | Total | Nat. | Ext | Total | Nat. | Ext. | Nat. NE | For. FE | Total TE | | |
| a | b | c | d | e | f | g | h | i | j | k | l | m | n | o | p | |
| 1.1 | Institute of Agric. Research - Addis Abeba IAR - 1966 | AR - All exc. cot., tobac. | MOA | 258 | 43 , 118 | | 258 | 306* | | 306 | 30,900 | 3,200 | | | 46,200 | |
| 1.2 | Debre Zeit Res. Center - Debre Zeit DZARC - 1953 | AR - Crop, liv., natural res. | EARO | 34 | 9 , 19 | | 34 | | | | 3,500 | 80 | | | | |
| 2.1 | Biodiversity Institute - Addis Abeba BDI - 1974 | AR - Crop genetic res. | EARO | 11 | 4 , 7 | | 11 | | | | 2,330 | 6,960 | | | | |
| 2.2 | Forestry Research Center - Addis Abeba FRC - 1975 | AR - Forestry | EARO | 18 | 1 , 17 | | 18 | | | | 890 | | | | | |
| 2.3 | Wood Utilization Research Center - Addis Abeba WURC - 1979 | | | | | | | | | | 320 | | | | | |
| 2.4 | Institute of Animal Health Research - Sebeta IAHR - 1992 | AR - AD - An. health | EARO | 17 | 0 , 12 | | 17 | | | | 350 | | | | | |
| 2.5 | National Soils Laboratory - Addis Abeba NSL - 1989 | AD-(AR) - Soil, fertil. | EARO | 6 | 2 , 3 | | 6 | 250 | | | | | | | | |
| A | Total actually under EARO | EARO - 1997/98 | AR (90%) | PMO | 344 | 59 , 176 | 0 | 344 | 306* | | 306 | | | | 46,200 | |
| B | Regional Agricultural Research Centers | 1969, 1993 | AR (80%) | RBA | 131 | 5 , 42 | | 131 | 105 | | 105 | 11,200 | | | 10,100 | |
| 1/2 | Total AR Institutes | | | | 475 | 64 , 218 | 0 | 475 | 411 | 0 | 411 | 49,750 | 10,200 | 46,600 | 9,700 | 56,300 |
| 3.1 | Alemaya Univ. of Agriculture - Alemaya AUA - 1953 | AHE - (AR) All | ME | 106 | 23 , 61 | 5 | 111 | 27 | 1 | 28 | 2,920 | | 440 | | 440 | |
| 3.2 | Awasa College of Agr. (Ad. Ab. Univ.) - Awasa ACA - 1977 | AMHE - (AR) All | ME | 47 | 11 , 30 | | 47 | 12 | | 12 | 1,080 | | 160 | | 160 | |
| 3.3 | Mekele University College - Mekele MUC - 1994 | AHE - (AR) All | ME | 21 | 1 , 19 | | 21 | 5 | | 5 | 140 | | 20 | | 20 | |
| 3.4 | Wendo Genet College of Forestry - Wendo Genet WGCF - 1978 | AHE - (AR) Forest. | ME | 22 | 5, 17 | | 22 | 5 | | 5 | 2,200 | 3,800* | 330 | 570 | 900 | |
| 3.5 | Fac. of Vet. Med. - Debre-Zeit (Addis-Ab. Univ.) FVMDZ - 1979 | AHE-(AR)- An. prod./heal. | ME | 57 | 10, 20 | | 57 | 14 | | 14 | 290 | 1,550 | 40 | 230 | 300 | |
| 3 | Total Agr. Sciences Faculties/Colleges | | | | 253 | 50 , 147 | 5 | 258 | 63 | 1 | 64 | | 5,350 | | 800 | |
| 4 | Other Institutions (see Section 2.1, footnote 2) | | | | | | | | | | | | | | | |
| 5 | Total NARS | | | | 728 | 114 , 365 | 5 | 733 | 474 | 1 | 475 | 56,350 | 15,550 | 47,600 | 10,500 | 58,100 |
| Exchange Rate: ETB 1 = US\$ 0.143 (1998 average rate) | | | | Actual Research Years (aRY) (Estimate) ---> | | | | 220 | | | AR Expendit. (US\$ million) | | 6.8 | 1.5 | 8.3 | |

MOA: Ministry of Agriculture. **ME:** Ministry of Education. **EARO:** Ethiopian Agricultural Research Organization. **PMO:** Regional Bureaus of Agriculture.
c: Mandates: AR (.. %): Approximate average % of human resources devoted to ag. research (AR); **R:** Research; **AHE:** Ag. higher education; **AD:** Ag. development/services (for AR and AHE institutes: seed production, soil and water analysis, extension, studies, etc.). **j, k, l:** Potential research year (pRY) = equivalent full-time researcher; for EARO, the pRYs have been estimated by multiplying the number of graduate staff by the percentage of their time allocated to AR activities, roughly estimated by 90% for all institutions, except for NSL: 25%); for the FASs, the pRYs have been estimated by multiplying the number of academic staff by 0.25. **n:** For the AR ins $\omega + 0.5(100\% - \omega)$, ω being the % of time devoted to AR by the graduate staff. **3.4*:** Assuming that the US\$ 2.69 million received by WGCF from Sweden for capacity building in 1997/98 is over a 5-year period.
 National AR expenditures (NE): **0.20%** of the Agricultural Gross Domestic Product (AGDP: US\$ 3.4 billion in 1996). Total AR expenditures (TE): **0.24%** of the AGDP.