Regional Reviews, towards the Global Conference on Agricultural Research for Development in WANA Region

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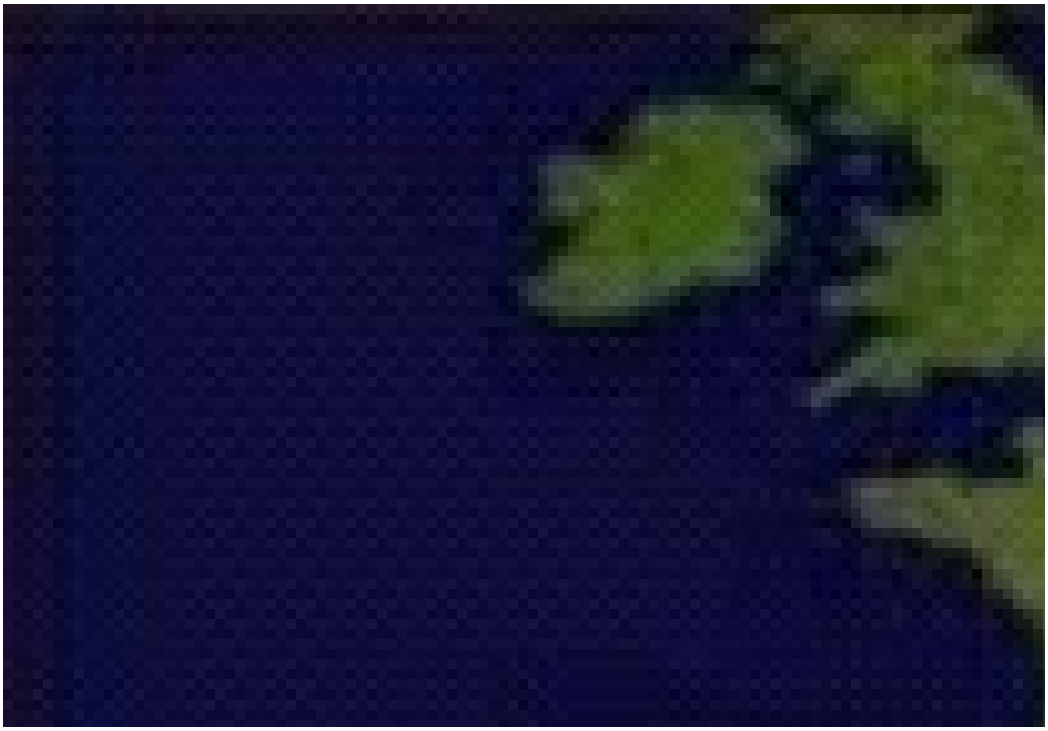

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Abbreviations

AARINENA	The Association of Agricultural Research Institutions in the Near East and North Africa
AKST	Agricultural Knowledge, Science and Technology
APAARI	Asia Pacific Association of Agricultural Research Institutions
AP	Arabian Peninsula.
ARIs	Agricultural Research Institutions
CACAARI	Central Asia and the Caucasus Association of Agricultural Research Institutions
CAC	Central Asia and Caucasus.
CG	Consultative Group
CGIAR	The Consultative Group on International Agricultural Research
CWANA	Central and West Asia and North Africa Region
EFARD	The European Forum on Agricultural Research for Development
EGFAR	E-Global Forum on Agriculture Research
FAO	Food and Agriculture Organization for the United Nations
FARA	The Forum for Agricultural Research in Africa
GFAR	The Global Forum on Agricultural Research
GCARD	Global Conference on Agricultural Research for Development
IAASTED	International Assessment of Agricultural Knowledge, Science and Technology for Development
ICARDA	International Center for Agricultural Research in the Dry Areas
ICBA	International Center for the Biosaline Agriculture
ICLARM	International Center for Living aquatic Resources Management
ICRAF	International Center for Research and Agro forestry- World Agro forestry Center.
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFAD	The International Fund for Agricultural Development
IFAP	The International Federation of Agricultural Producers
IFPRI	The International Food Policy Research Institute
IPM	Integrated Pest Management
IPPM	Integrated Production and Protection Management
ISNAR	International Service for Agricultural Research
IWMI	International Water Management Institute
FORAGRO	Forum for the Americas on Agricultural Research and Technology Development
JAS	Japanese Agricultural Standards
MDG	Millennium Development Goals
NARS	National Agricultural Research Systems
NVRS	Nile Valley and Red Sea
NA	North Africa
NR	Natural Resources
NENA.	Near East and North Africa
NCARE	National Center for Agricultural Research and Extension
TNCs	Transnational Corporations
WA	West Asia
WANA	West Asia and North Africa

Executive Summary

The process of consultation towards the March 2010 Conference began with synthesis of existing documents, including development reports, regional research priorities, national and regional agricultural frameworks, etc. with the purpose of: 1) Producing a high-level regional development targets and refreshed high-level set of regional agricultural research priorities 2) Evaluation of current frameworks and modalities for implementing regional priorities 3) Identification of areas of specific need in agricultural research for the poorest in the WANA Region 4) Producing a set of key issues requiring wide public consultation to improve the value of agricultural research in achieving Millennium Development Goals 5) Developing an action plan for implementing the identified regional priorities that would enhance regional integration and food security.

West Asia and North Africa (WANA) includes five sub regions: Arabian Peninsula (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE), Maghreb (Algeria, Libya, Malta, Mauritania, Morocco, Tunisia), Mashreq (Cyprus, Iraq, Jordan, Lebanon, Palestinian Authority, Syria), Nile Valley & Red Sea (Djibouti, Egypt, Sudan, Somalia, Yemen) and Western Asia (Iran, Pakistan, Turkey). The main development goal of all the governments in the WANA region in the last two decades was to improve the living standard of the people. To achieve this, the countries needed to provide fast and effective economic growth and implement social reforms and programs. This Regional Review that covered WANA region except Maghreb Sub-Region, aimed mainly at identifying areas of specific need in agricultural research for the poorest in it, producing a set of key issues requiring wide public consultation to improve the value of agricultural research in achieving Millennium Development Goals (MDG) and developing an action plan for implementing the identified regional priorities that would enhance regional integration and food security.

AARINENA established 7 Networks on: Date-Palm, Cotton, Olive, Medicinal Plants, Water Use Efficiency, Agricultural Biotechnology and Plant Genetic Resources. These Networks were established to reduce duplicative efforts among national institutions in several countries and to provide a cost-effective instrument for information exchange and institution building. The technical cooperation networks have become a generic model for the establishment of functional mechanisms for collaboration and enhancement of communication and exchange of experiences among different countries in the region and other regions.

An inventory of the resources in the regional NARS is available and a comprehensive priority setting exercise for agricultural research for the Central and West Asia and North Africa (CWANA) region has been undertaken by ICARDA and the sub-regional organizations, AARINENA and the CAC-Forum.

Previous research has identified five researchable issues in the region in 2002. It The first one was germplasm management in which different issues could be discussed like germplasm improvement & biotechnology, genetic resources conservation, integrated pest management and seed production. The second key issue was the production and productivity of crops (wheat & barley, forages, vegetables, industrial crops, legumes, fruit trees, maize, potato, and forest). The third key issue was related to livestock and animal production, which include small ruminants, cattle, camel and

bees. The other important key issue was related to the human behavior e.g. socioeconomic issue & policy; many issues could be discussed under this category like marketing, the quality and adding value of the products, policies, technology dissemination and post harvesting. The last one was the natural resource management which could be one of the most important of the researchable issues that include mainly water management, soil conservation and degradation, land use and range land management.

West Asia and North Africa Region is characterized by an arid and semi arid environment. Being at a junction between three continents it is considered as one of the most diverse areas on earth. Moreover, the region is characterized by variations in elevation ranging from the lowest point on earth at the Dead Sea area (more than 420m below sea level) to high mountains rising above 3000 m above sea level. The vertical and the horizontal variation from north to south create high biological diversity. The marine components in the region also reflect great diversity, centered on the Mediterranean Sea, but including the Atlantic Ocean, the Red Sea, the Gulf, Arabian Sea, Black Sea, Caspian Sea and the Indian Ocean. The variation in ecosystems across the region is reflected by high diversity in flora and fauna. Endemism is considerably high particularly among marine invertebrates and in some hot spots like the Socotra Islands of Yemen.

Global challenges for the development include the elimination of extreme hunger and poverty, sustainable use of natural resources, reducing emission of greenhouse gases, adaptation to, and mitigation of effects of climate change, increasing the use of renewable sources of energy and combating the spread of epidemic diseases and pests affecting humans, animals and plants. The solutions to all these challenges lie with agriculture and its development. Agricultural research and innovation is crucial for agricultural development. Agricultural research and innovation generates new knowledge and skills necessary for agricultural progress. The neglect of agriculture globally has had a parallel in the neglect of investing in agricultural research and innovation. The need to attract investment and use it effectively for agricultural research and innovation is of global importance.

A short questionnaire in the form of template was sent to several research institutions and researchers. Twenty three NARS, four universities and one NGO participated in filling the questionnaire. The total number of researches analyzed was 1411 research which covered about 30 research main topics. Each research was identified according to year of publication/completion, its field, whether conducted, planned or on-going the level of priority, the level of cooperation with other researchers and institutions, either local or international.

Based on the review of different reports and data collection from the literature seven major challenges for AR4D have been identified for the WANA region. These research issues were distributed to the scientists who participated in the e-conference as a base for discussion. These key research issues were:

1- Food Security:

Key issue 1: Need for research on the comparative and competitive advantage of the products to be produced in each country, thus this country can sell the products having comparative/competitive advantage and imports other commodities.

Key Issue 2: Most of the countries need effective financing of agriculture and farms to support small-scale farmers in the region
Key Issue 3: Enhance the sustainable productivity of agriculture in the irrigated or rainfed /less-favored or "lagging" areas while protecting the natural resource-base
Key Issue 4: Need to explore the full potential of livestock sector in the region
Key Issue 5: Need to emphasize on research on fisheries and aquatic production systems
Key Issue 6: Need to pay attention to trans-boundary animal and plant diseases and pests

2- **Issue Relating to Improvement of the Living Standards and Livelihoods of Farmers**

Key Issue 1: Study and analyze the declining living standards and livelihoods in rural areas and develop opportunities for household income generation
Key Issue 2: Organize and promote the role of rural women in agriculture, and agricultural research and development

3- Issues Relating to Protection of the Environment

Key Issue1: Enhancing efforts on protecting the land and water resources
Key Issue 2: Protect the much useful forests and range land from degradation
Key Issue3: Enhance efforts on protecting vast natural biodiversity present in the region

4- Meeting the special challenges (existing and future)

Key Issue1: Aligning agricultural research and development to meet the challenges of global warming, i.e. adaptation to, and mitigation of climate change
Key Issue 2: Need to address the issue of desertification.
Key Issue 3: Need to meet the political unrest in the region.

5- Technology, information, knowledge and innovations

Key Issue 1: To enhance investment in and strengthen agricultural research, innovation, extension and education systems, related institutions and research processes to make them more inclusive
Key Issue 2: To revitalize, strengthen and reorient agricultural extension system
Key Issue 3: To improve quality of agricultural education and employability of agricultural graduates and to increase availability of appropriately trained human resources at different levels
Key Issue 4: To establish regional alliance for sharing technology, information, knowledge and innovation and regulatory frameworks

6- Market and marketing

Key Issue 1: To effectively link small and marginal farmers with markets, including the fast emerging large (multi-national) retailers and super markets
Key Issue 2: To benefit small farmers and to protect consumer from food price rise and fluctuation

7- Energy

Key Issue 1: To develop bioenergy as a complement to, and not at the cost of food security.
Key Issue 2: To enhance energy security compatible with economics and ecology.

The e-consultation was conducted in September during the period 2nd to 21st 2009 aiming at soliciting opinions from all those involved with agricultural research for development so as to fill some gaps in the preliminary review. Participants suggested and discussed valuable ideas, experiences, information and innovations which will be of help to have greater impact on major development needs of the region.

The participants of the e-consultation agreed on the above key issues that have been distributed to all of them before the e-consultation. The participants added some new key researchable issues, discussed and elaborated on the above issues as follows:

1. **Water Scarcity:**

Key Issue 1: Need to introduce crop varieties and management practices that result in better water use efficiency.
Key Issue 2: Improve management of water resources and conserving the quantity of this resource through water harvesting.
Key Issue 3: Improve on-farm water-use efficiency and rationalizing the use of scarce water resources by all means especially through adapting new irrigation techniques and enhancing the uptake of improved irrigation technologies and practices in connection with irrigation scheduling
Key Issue 4: Rationalize use of ground water and decrease the expansion of withdrawal from shallow aquifers

2. **Food Security and Poverty in the WANA region:**

Key Issue 1: Need to emphasis on environmental poverty (explained by intensified water scarcity, land degradation and desertification) and to enhance local food production by increasing the productivity of water and land under the conditions of water scarcity, land degradation and desertification as well as increased demand for food.
Key issues 2: Need to develop accurate, efficient and economic surveillance and monitoring systems and sharing information that helps in managing the impact of plant and animal diseases.
Key issue 3: Need to improve high yielding high quality crop varieties using traditional and advanced tool.
Key issue 5: Need to use the nuclear techniques to improve crops yield.
Key Issue 6: Need to explore the full potential of livestock sector in the region.
Key issue 7:Research should utilize the good traits in the local breeds and improve their productivities using different techniques including biotechnology interventions. Cross breeding is a possible option in this regard.
Key Issue 8: Need to emphasize research on comparative and competitive advantage in fisheries and aquatic production systems.

Key issue 9: In the field of medicinal, herbal and aromatic plants there is a need to find the best ways to use them in agro- industries producing medicines, cosmetics, and food additives, etc.

3. Protection of the Environment

Key Issue 1: Protecting water resources from all types of pollution.
Key Issue 2: Finding suitable alternative environment friendly crops that tolerate drought and land saltiness and water salinity.
Key Issue 3: Utilization of indigenous rangeland grass species to grow commercially for replacing high water consuming exotic grass species.
Key Issue 5: To protect the land from salinization and sustain it for the coming generations and to pay attention to the soil degradation.
Key Issue 6: Conservation of local plant and animal genetic resources developing mechanisms to preserve genetic resources and establishing" Gene Banks".

4. Meeting the Special Challenges

Key Issue 1: Over grazing is another large contributor to our desertification problem and should have a strategic decision about it especially toward reducing herd load and
Key Issue 2: The impact of political conflicts, especially war, on the viability and sustainability of land and water resources**.**

5. Policy and Institutional Research

Key Issue 1: Need to support research and development in all nationally needed fields of agriculture by local, regional and international funding agencies**.**
Key Issue 2: Need to link research to development projects, especially for natural resources management research.
Key Issue 3: Need to identify policies and improve decision makers and politician awareness on the importance and role of agricultural research and innovation
Key issue 4: Building impact-oriented research, knowledge and development institutions.

6. Technology, Information, Knowledge and Innovations

Key Issue 1: Need to enhance the monitoring and evaluation system and developing the researches.
Key Issue 2: Need to identify policies and improve decision makers and politician awareness on the importance and role of agricultural research and innovation
Key Issue 3: Search for a mechanism and activate it to link all the centers in the region with a viable communication network for mutual coordination, and to benefit from the expertise of each other. An ICT integrated system involving all the stakeholders could access it and share their last information. It is important to build on the several active networks in WANA networks to strengthen inter-country collaboration
Key Issue 4: Need to strengthen the linkages between NARS and International R&D Centers in the region, between NARS and local extension services and between extension services and farmers
Key Issue 5: Participatory approach should take priority which involves researchers, farmers and extension agents in the transfer of technology.
Key issue 6: Need to adopt methods for disseminating and scaling out improved technologies under rain fed conditions.

Key Issue 7: Need for "Knowledge Management" experts and implementing scientists in research for development.

7. **Improvement the Standards of Living and Livelihoods of Farmers:**

Key Issue 1: The need for agricultural research that benefits the resource poor farmers and producers.

8. **Market and Marketing Systems**

Key Issue 1: Enhancing socially based economic agro-enterprises through enhancing and empowering the farmers' cooperatives economical and marketing activities.
Key Issue 2: Long-term relationships, planning, technical cooperation and transparency are necessary throughout the supply chain between the wide collection firms, the intermediate buyers and processors, and the end-user and finished product manufacturers.
Key Issue 3: Organizing a regional project that aims to document specifications and the definition of taste and smell to those favorable for WANA consumers on the fruits horticultural crops to identify their DNA fingerprint as first step for registration in a database.
Key Issue 4: Developing a Geographic Identification system (GIs) for agro-food produced to register and protect the name, origin and intellectual property rights of the distinguished rural agro-food products (fresh or traditionally processed agro-food) produced in certain geographical areas, to increase their marketing value, highlight their superiority due to the nature, inherited practices, nutritional value, encourage diverse agricultural production and rural sustainability.

9. **Energy**

Key Issue 1: Enhance the utilization of renewable energy resources for agricultural practices to reduce the utilization of chemicals and reduce polluting practices.

Recommendations

Drivers and Challenges were identified, and the methods to meet the challenges were suggested. The main recommendations of the review process:

- Prioritize research and its programming; it is necessary to improve coordination in research and funding, prioritize and update drivers and research agendas, and improve civil society participation and research agenda setting.
- Undertake specific research on technology generated by farmers themselves, understand local modes of knowledge transmission, and adapt conventional research to the specific conditions of small farms. The objective is sustainable, economic intensification of the various categories of small farms.
- The representatives of countries should come forward for participation in common research with self motivation to achieve common goal to harvest the benefits of the research, using their wisdom in convincing their policy makers/ higher authorities the merits of common research/ network with confidence. Moreover, the national representatives should actively participate

in periodic meetings-annual or bi-annual to review the progress of research implementation and discuss on its future line.

- Information and knowledge transfer could be achieved through the increase in financial support for knowledge transfer, enhancing the attraction of agricultural education in the region, helping farmers be better represented, providing incentives for innovation in rural areas including vocational training, supporting professionals involved in knowledge transfer, and fully exploiting existing knowledge. This could be strengthened through innovation systems with strengthened links to strengthened extension systems and dissemination of successful case studies resulting from agricultural research among farmers that could benefit them through adoption of new agricultural research technologies for sustainable development in the region.
- The research should focus on the needs of the poor though promoting people centered research, i.e. research that is demand driven and focused on the needs of the poor, empowering the voice of poor farmers by the involvement of stakeholders, collecting contemporary data on poverty in agriculture to ensure good monitoring and evaluation practices.
- Promote NGOs and farmers' organizations involvement to act as interface between poor farmers, women and research institutions. In addition, there is need to increase the administrative capacities of farmers' organizations and NGOs for research activities while avoiding "bureaucratization"
- There is also a need for substituting traditional extension systems with farmer participatory knowledge systems that are more gender sensitive. Community-based farmers' organizations must be established more widely and existing ones strengthened to facilitate the development of such farmer participatory knowledge systems and to promote value addition, agro-processing and marketing that can better exploit economies of scale and encompass vertical, horizontal and lateral integration from production to markets.
- There is need to design agricultural research strategy/s at the local, regional and international levels directed towards the poor, sustainable agriculture, and food security.

1- Introduction

1.1 Background

The Global Forum on Agricultural Research (GFAR) is organizing a series of GCARDs working through its constituent agencies and networks, which include CGIAR, FAO and IFAD, the International Federation of Agricultural Producers (IFAP), the Regional Research Fora (FARA, EFARD, AARINENA, APAARI, CACAARI and FORAGRO) and representatives from civil society, the private sector and donor agencies.

The processes of consultation leading to each GCARD Conference will bring together diverse partners to develop agendas, capabilities and ways of working in agricultural research for development, that address the challenges of the future, are centered on the needs of the resource poor, in particular for poor farmers and agricultural producers and demonstrate a robust and investable international partnerships able to deliver development impact.

The Global Conference aims to ensure that:

- Research is focusing on the right approaches and questions to meet the needs of resource-poor farmers and the needs of poor consumers for sufficient, affordable, healthy food, to increase global food supplies, and sustainability harness agriculture as an engine of economic growth.
- Research is embedded into development processes, with outputs accessible and relevant to the poor
- Scientific knowledge and advances impact development thinking and practices
- Funding systems are aligned between research and development funding, to ensure effective investment in the new forms of institutions and partnerships required for delivery of development impacts drawing from the generation and use of knowledge.
- The international research system is effectively integrated with national partners (public, private and civil) and responds to national and sub-regional (or trans-national) demands to help ensure development impact

To meet global development commitments, effective agricultural research for development systems linking international institutions with national needs and capabilities and with projected future concerns, are essential. So, also are systems of innovation (and its scale-out) that link science and society through public, private and civil partners working together in more coherent ways?

1.2 Research objectives

The process of consultation towards the March 2010 Conference began with a synthesis of existing documents, including development reports, regional research priorities, national and regional agricultural frameworks, etc. with the purpose of:

- Producing a high-level regional development targets and refreshed high-level set of regional agricultural research priorities
- Evaluation of current frameworks and modalities for implementing regional priorities
- Identification of areas of specific need in agricultural research for the poorest in AARINENA countries
- Producing a set of key issues requiring wide public consultation to improve the value of agricultural research in achieving Millennium Development Goals
- Developing an action plan for implementing the identified regional priorities that would enhance regional integration and food security.

1.3 Methodology

The research methodology was implemented through the following steps:

A. Emphasizing on the lessons learnt from the study titled: Setting agricultural Research Priorities for the Central and West Asia and North Africa Region conducted in 2002. and other related studies.

B. Survey implementation and information collection from the region:

Understanding the evolution and identify complementary roles of different research partners, including NARSs, ARIs, and CG centers.

The sources of information in this step were secondary sources; these included national and/or institutional agricultural strategies and reports, and primary sources which depended on questionnaires were filled by relevant research institutions working in agricultural and social sectors.

After finishing the review of the current priority setting, these settings were evaluated depending on the following elements: productivity, poverty alleviation, resource conservation, food security, and contribution to development. Moreover, the evaluation took the agro-ecologies into account, these include: dry lands, irrigated lands, range lands and forests.

The main constraints that faced data and information collection were the timing during which it took place, i.e. July and August. In these two months the key persons in the institutions took their annual leaves. Moreover, the response to our e-mails was very week. The only two countries that we were able to collect more or less complete information were Egypt and Sudan where the focal points themselves collected personally from the concerned institutions.

After receiving and analyzing the information gathered from the sub-regions, we extracted and formulated key issues that require public consultation

regarding whether support to research is focused on the right questions or is divorced from the reality of resource-poor farmers and consumers.

C. Implementing of E- Consultation:

The GCARD e-Consultation was held during the period from 2nd to 24th of September, 2009. The key issues formulated in the previous step (from the survey and data collection) were discussed in this e-consultation. The GCARD e-Consultation aimed to solicit opinion from all those involved with agricultural research for development on the following issues: 1) To what extent do the priorities identified from the regional review capture the key regional needs for delivering greatest development impacts? (i.e., "researchable themes") 2) In relation to "researchable themes", what mechanisms and partnerships are required in innovation pathways turning research into development impacts at scale? 3) What are the key blockages, barriers and bottlenecks that prevent research from benefiting the poor? How best should these be resolved and what enabling investments, policies and capacities are most needed?

The e-Consultation was moderated by one main moderator and three sub-regional moderators. The researchable themes addressed in the e-Consultation were identified through the prior regional reviews. A synthesis report on the e-Consultation was presented and the results were included in the regional review.

D. Face to Face Workshop:

These key issues will be discussed in a workshop that will be held in November 2009 in Alexandria-Egypt. Some of the participants who were active in the e-Consultation will be invited to these regional face-to-face discussions. The results of this meeting will be included in the final regional review.

2. Characteristics of West Asia and North Africa Region

The West Asia and North Africa region is characterized by an arid and semi arid environment. Being at a junction between three continents it is considered as one of the most diverse areas on earth. Moreover, the region is characterized by variations in elevation ranging from the lowest point on earth at the Dead Sea area (more than 420 m below sea level) to high mountains rising above 3000 m above sea level. The vertical and the horizontal variation from north to south create high biological diversity. The marine components in the region also reflect great diversity, centered on the Mediterranean Sea, but including the Atlantic Ocean, the Red Sea, the Gulf, the Arabian Sea, Black Sea, Caspian Sea and the Indian Ocean. The variation in ecosystems across the region is reflected by high diversity in flora and fauna.

Endemism is considerably high particularly among marine invertebrates and in some hot spots like the Socotra Islands of Yemen. [1]

The region features a unique experience in land management for conserving natural resources, which is the *hema* system. *Hema* is an Arabic word, which means an area that is protected. The concept of *hema* is demonstrated in the practice of setting aside and protecting an area with good vegetation cover. Such an action was usually taken by a governing authority, a group of people (a tribe or a clan), or an individual. Those sites were mostly protected for grazing during drought seasons and in other instances for multiple uses such as bee-keeping and for the protection of large trees. Grazing and other uses, such as cutting grasses for fodder, were banned most of the time and only allowed with restrictions and under certain regulations set by those who established or managed the *hema*.

Managing natural resources in an efficient and sustainable manner is now one of the most critical issues for food production in the Region. Most countries of the Region have invested heavily in irrigation over the past half century. Wherever land and water are available, large irrigation schemes have been established requiring heavy public investments, such as in Pakistan, Iran, Turkey, Egypt, Syria, Morocco and Sudan. Small and medium schemes were also established in all countries.[2]

Recent assessments show that performance of irrigation in terms of water productivity and irrigation efficiency is low, as a result of bad irrigation water management. Surface irrigation methods still prevail and account for 80-90% of the irrigated area (98% in Iran, 96% in Tajikistan, 87% in Morocco, etc.) Surface irrigation methods coupled with bad practices are resulting in the loss of large amounts of the applied water.

Modern irrigation methods such as sprinkler and drip irrigations have been introduced in the Region, but they still account for limited areas with the exception of Cyprus and Jordan where the total irrigated areas are small. The Gulf countries, particularly Saudi Arabia also have more than 2/3 of their irrigated areas equipped with modern systems, particularly central pivots. However, even where these systems have been introduced, their efficiency is generally low in comparison with the potential because of bad on-farm management. The overall irrigation efficiency in the Region is estimated at 45-50%, inferring to the loss of nearly 50% of the amounts of water used for irrigation. Although part of this water loss is recycled, the rest is lost irreversibly; in addition, it results in lowering of water quality, degrading the environment (soil and water), and decreasing profits for farmers.

3- Overview of Agricultural Research Priorities in Previous Studies

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[1] Mahjoub, M.M, Wcpa North Africa / Middle East / West Asia. Iucn,

[2] FAO. Agricultural Development Policies in the Near East: Situation, Issues, Institutional Requirements and Approaches. Proceedings of the Joint FAO/NAPC Regional Workshop on Institution Building for Agricultural Policies in the Near East. 6 - 7 December 2003. Damascus, Syria

Priority setting is a dynamic process and in view of the substantial development that have occurred in the Central and West Asia and North Africa (CWANA) region, AARINENA, ICARDA and CAC-NARS Forum revisited their long term vision and strategies with the aim of enhancing the process of regionalization of agricultural research and fostering CGIAR/NARS collaboration and integration.

An inventory of the resources in the regional NARS is available and more recently a comprehensive priority setting exercise for agricultural research for CWANA region has been undertaken by ICARDA and the sub-regional organizations, AARINENA and the CAC-Forum.[3]

Many of the findings of these two initiatives have been confirmed recently in the UNDP report on the Arab countries.

The above mentioned reports indicate that in the WANA region, an estimated 70% of the poverty is in rural areas even though only some 43% of the total population lives there. Despite the large dependence of the rural population on agriculture there is a declining emphasis on agriculture and rural development. In addition the region is facing a number of converging trends that threaten the future livelihoods of the poorest sector of society. These include:

Water scarcity: The region is already one of the most water scarce in the world and this is predicted to worsen markedly over the next 25 years. As a result the food security situation will also likely to worsen. Currently the region is a large importer of grain (about 51 million tones per year in 1998-2000).

Population growth rates: The region is characterized by the second highest population growth rates on the planet with some countries in the region growing at 3.5% per year.

Land degradation: As much as 45% of the total land area dedicated to agriculture and rangeland is experiencing some form of land degradation, thus reducing the already low productive potential of the land.

Global climate change: As a consequence of climate change, the region is projected to become warmer and drier with reduced crop productivity.

Study on "Setting Agricultural Research Priorities for Central and West Asia and North Africa Region (CWANA)- Towards a new NAR/NARS and CGIAR/NARS Collaboration Spirit"

[3]Richard Thomas, Aden Aw-Hassan, Abdul Bari Salkini and Roberto LaRovere. Minutes of Consultation for the CWANA region on the Proposed International Assessment of the Role of Agricultural Science and Technology in Reducing Hunger, Improving Rural Livelihoods, and Stimulating Environmentally Sustainable Growth. The Natural Resource Management Program of ICARDA. ICARDA, The World Bank and the Department of Agriculture and Land Reclamation, Egypt. 2003

In 2002, ICARDA, in close collaboration with AARINENA and CAC forums, has launched a regional wide initiative aimed at revisiting and refocusing CWANA research priorities through an innovative consultation mechanism relying on a bottom–up approach and broader participation of non-traditional stakeholders.[4]

The set of *Technical Research Priorities*, both factor and commodity related, generally well recognized, included the following: (with no priority ranking)

- Water management and water use efficiency
- Land degradation and measures for its control
- Rangeland rehabilitation & management
- Crop improvement for adaptability and tolerance to stresses
- Animal breeding
- Livestock nutrition
- Management and sustainable use of salt-affected soils
- Sustainable use and management of dry land areas
- Farming system research
- Agro-forestry research
- Aquaculture research
- Natural resource management and
- Biotechnology

The institutional research priorities are mainly policy and management-related and :include the following

- Formulating agricultural research strategies at national and sub-regional levels.
- Improving all components of research management.
- Enhancing information systems at all levels.
- Strengthening collaboration among research institutions.
- Establishing formal mechanisms for linking research institutions with extension agencies and end users

The key features of the new approach consist of:

- Broadening participation of wide range stakeholders (farmers, NGO's, private sectors, universities and donors) in addition to NARs.
- Enhancing coordination and integration of the CG centers' research activities in the region
- Seeking complementarity in tackling the regional research agenda based on comparative advantages of NARS and CG centers and Capitalizing on NARSs' strengths to serve regional needs
- This approach is centered around three pillar activities:
  - A series of sub regional brainstorming meetings
  - A questionnaire widely distributed to various stakeholders; and

[4] Belaid, A., A.M. Solh, and Ahmed Mazid. Setting Agricultural Research Priorities For The Central And West Asia And North Africa Region- (CWANA)- *Toward A New NARS/NARS And CGIAR/NARS Collaboration Spirit. NINAACA, ICATRDA, and CAC forum. 2003*

- A final regional meeting that included national, regional and international stakeholders.

The main research issues identified priorities in this research were: Productivity, Poverty Alleviation, Resource Conservation, Food Security, and Contribution to Develop.

The study reached at the following recommendations:

1- Asking CGIAR to consider the inclusion of CWANA as another region of its geographic priority regions, in addition to Sub-Saharan Africa and south Asia.
2- Impediment actions in order to fill the gap areas in research priorities by proposing corrective measures for the high duplication of the international organizations in the field of agricultural research.
3- Strengthen AARINENA and CAC-NARS Forum and other CG Centers, such as ILRI, ICRAF, CIFOR, ICLARM, IWNI, ISNAR, and OFPRI, to enable them to fully play their role with regard to the implementation of the identified research priorities.
4- Expand the mandate of ICARDA to include fruit trees and dry land oil crops.
5- Enforce regional cooperation and collaboration and facilitate implementation of the identified regional research priorities through networks, coordination meetings, and traveling workshops (Scientists-to-scientists interaction).
6- It was recommended that the dry areas be included as a special focus in the Constraint Programs (CP) dealing with water and agriculture, and include the CAC region, the Atlas Mountains of North Africa, and the Anatolian Highlands in the CP dealing with mountain agriculture.
7- Encourage and stimulate the development of new ideas, derived from the identified regional priorities that could be presented as proposals for new CG CPs, but could be initiated within the region for direct presentation to potential donors.
8- The establishment of a committee, by AARINENA and CAC forum with ICARDA as facilitator, to ensure that the region moves rapidly forward on the priorities identified and on the recommendations of the meeting.

3.2 Study on the "Priorities of Agricultural Knowledge, Science and Technology for Development"[5]

The study investigated the main challenge of Agricultural Knowledge, Science and Technology (AKST) is to increase the productivity of agriculture in a sustainable manner. AKST must address the needs of small-scale farms in diverse ecosystems and create realistic opportunities for their development where the potential for improved area productivity is low and where climate change may have its most adverse consequences.

[5]IAASTD. Agriculture Cross Roads. International Assessment of Agricultural Knowledge, Science and Technology for Development.2008.

The main challenges for AKST posed by multifunctional agricultural systems included:

1. How to improve social welfare and personal livelihoods in the rural sector and enhance multiplier effects of agriculture?
2. How to empower marginalized stakeholders to sustain the diversity of agriculture and food systems, including their cultural dimensions?
3. How to provide safe water, maintain biodiversity, sustain the natural resource base and minimize the adverse impacts of agricultural activities on people and the environment?
4. How to maintain and enhance environmental and cultural services while increasing sustainable productivity and diversity of food, fiber and biofuel production?
5. How to manage effectively the collaborative generation of knowledge among increasingly heterogeneous contributors and the flow of information among diverse public and private AKST organizational arrangements?
6. How to link the outputs from marginalized, rain fed lands into local, national and global markets?

Successfully meeting development and sustainability goals and responding to new priorities and changing circumstances would require a fundamental shift in AKST, including science, technology, policies, institutions, capacity development and investment. Such a shift would recognize and give increased importance to the multifunctionality of agriculture, accounting for the complexity of agricultural systems within diverse social and ecological contexts. It would require new institutional and organizational arrangements to promote an integrated approach to the development and deployment of AKST. It would also recognize farming communities, farm households, and farmers as producers and managers of ecosystems. This shift may call for changing the incentive systems for all actors along the value chain to internalize as many externalities as possible. In terms of development and sustainability goals, these policies and institutional changes should be directed primarily at those who have been served least by previous AKST approaches, i.e., resource-poor farmers, women and ethnic minorities. Such development would depend also on the extent to which small-scale farmers can find gainful off-farm employment and help fuel general economic growth. Large and middle-size farmers continue to be important and high pay-off targets of AKST, especially in the area of sustainable land use and food systems.

Success would require increased public and private investment in AKST, the development of supporting policies and institutions, revalorization of traditional and local knowledge, and an interdisciplinary, holistic and systems based approach to knowledge production and sharing.

Success also depends on the extent to which international developments and events drive the priority given to development and sustainability goals and the extent to which requisite funding and qualified staff is available.

4- The Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA) Role in Enhancing Communication and Research Experiences in WANA Region

AARINENA mission is to contribute to the enhancement of agricultural and rural development in the region through fostering agricultural research and technology development and by strengthening collaboration in this regard within and outside the region to achieve greater degree of self-reliance in food and agriculture, and to improve the nutritional well being and overall welfare of the people of the region, while at the same time sustaining and further improving the productive capacity of the natural resource base.

AARINENA includes five sub-regions:

- Arabian Peninsula (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE)
- Maghreb (Algeria, Libya, Malta, Mauritania, Morocco, Tunisia)
- Mashreq (Cyprus, Iraq, Jordan, Lebanon, Palestinian Authority, Syria)
- Nile Valley & Red Sea (Djibouti, Egypt, Sudan, Somalia, Yemen)
- Western Asia (Iran, Pakistan, Turkey)

4.1 AARINENA Networks

The technical networks have become a generic model for the establishment of functional mechanisms for collaboration and enhancement of communication and exchange of experiences among different countries in one region and/or different regions of the world.

Networks are found to reduce duplicative efforts among national institutions in several countries and to provide a cost-effective instrument for information exchange and institution building (including training). When the resources are limited, networks become more effective means for the optimal utilization of indigenous expertise and available resources among the countries themselves.

Four commodity networks including: date-palm, olive, cotton, medicinal and aromatic plants, in addition to three technical networks for water use efficiency (WUE), agricultural biotechnology and Plant Genetic Resources have become an increasingly important means of action and to further collaboration in agricultural research and innovation in the region. The new Regional Plant Genetic Resources (PGR) Network should be country driven to further strengthen national and regional genetic resources programs, fostering the conservation and sustainable use of PGR in the region, and promoting the exchange of PGR scientific and technical experience and information.

4.2 Successful Stories

There are many successful stories in WANA region reported by AARINENA. From Jordan, where a group of small olive farmers constituted a cooperative

for producing high quality organic olive oil. The main objectives of this project are improving the economic, social, and environmental impacts of olive cultivation, Establishing the fair-trade system between farmers group, olive mill and the final market (mainly export market) under project monitoring to obtain appropriate price according to quality, introducing of organic farming techniques, introducing of JAS (Japanese Agricultural Standards) organic certification, introducing of Jordanian organic olive oil to international market, and establishing a pilot farm for olive organic farming for future training.

From Egypt where small farmers started to produce exportable off-season vegetables in small areas in the reclaimed desert near Qina. The farmers implemented the recent developments in fertigation techniques to improve the desert land which consists of virgin land but very poor in fertility.

From Yemen there is a program entitled "Revitalization Community Based Traditional Seed in Yemen". The main objectives of this program were to prepare the local communities to handle seed production of their indigenous landraces, ecotypes and local materials, to assist the local groups with simple devices for cleaning, storage, packaging, treatment and assessment of seed quality attributes, to diffuse and access to information leading to betterment of handling seeds at village levels, and to encourage the sustainable activities related to farmers groups and documenting their practices.

From Oman a successful case study demonstrated that seed of indigenous pasture could be produced in the Gulf climate through out the year to re-vegetate degraded range lands. The study indicated that the seed of the species Cenchrus ciliares could be harvested within couple of weeks to obtain optimum quantity of high quality seed under the climatic conditions of Oman.

The Benchmark Project in Jordan sponsored by ICARDA achieved good progress in helping local community to improve range lands productivity, increase local community income and conserve the natural resources. The project adopted participatory approach in helping local community, also introduce appropriate forage species for animals and, finally, promote rainfall harvesting to help local farmers utilize water for irrigation.

5. The Role of Agriculture in the Economic Development in the Countries of WANA Region

Familiarity with and access to new technology are facilitated by the presence of large migrant workers in developed countries e.g. the Turkish and North African workers in Europe. This presence will lead to promotion of the development and application of technology that improves yield, reduces risk and is environmentally sustainable. For crops this involves extending the area under irrigation wherever economically feasible and sustainable, improving water resources management, breeding and use of high, yet stable, yielding varieties and optimal use of fertilizers. For livestock it involves integration with crop production, optimal use of natural grazing, forage crops and crop by-products, improved breeding management and animal health measures. Nevertheless attention is still needed through more training and extension programs in

these areas and through strengthening and expanding post-harvest food storage facilities and documentation services.

Biotechnology has great potential to influence and benefit agriculture, forestry and fisheries. Modern techniques of biotechnology offer the potential of moving any cloned gene from any organism into any other organism and confer much greater precision and speed in achieving results as compared to conventional techniques. In conjunction with conventional technologies, modern biotechnology holds promise of increased and sustained productivity, efficient processing for improved product diversification and utilization, adaptation of product quality to functional requirements, and decreased reliance on agrochemicals and other external inputs. It may also promote better conservation and use of genetic resources, and environmentally friendly management of natural resources. However, the number of marketable products and their influence at the farm level still seems to be limited, but is likely to increase in the next decade.

Biotechnology also poses certain challenges. These are largely determined by how, where and when it finds application. In general, the fast-paced research, predominantly funded by private-sector investment and use of intellectual property rights in industrialized countries are seen as evidence that the application of biotechnology will hold the key to competitiveness and comparative advantage in many fields, including agriculture and food.

Biotechnology, with its vast potential and challenges, is thus of the utmost importance to agricultural development. However, the application of biotechnology tools in the development process requires preconditions which are hardly exist in most the countries of the Near East. Therefore, one of the major concerns of the countries of the Region is the development of more capacities and expertise in this area.

Knowledge and information are increasingly becoming the key factors of production and exchange, and this has major implications for developing countries. The innovations are so numerous and radical that they are deeply affecting competition, social organizations, institutions, materials, and even life itself. Driving today's rapid technological change are dramatic improvements in information and telecommunication technology, aided by advances in the tools of scientific inquiry and in the codification of knowledge.

In electronic information processing, performance per unit cost has doubled every two to three years since the start of the computer revolution. In the life sciences, the increased ability to measure, analyze, and model living processes allows opening new possibilities to agriculture. The most immediate consequence of these developments is to increase the speed of production and product development. This in turn is leading to a revolution in business practices. Time and speed are now more central to competitive success, providing an advantage to producers with the best links to the markets and the greatest flexibility. In addition, the continuing rapid decline in the costs of transporting information and goods due to advances in telecommunications and the use of information technology have led to the growing irrelevance of the boundaries of geography and even of time, unifying national economies in a fast-moving, highly interdependent world economy.

Global challenges for development include the elimination of extreme hunger and poverty, sustainable use of natural resources, reducing emission of green house gases, adaptation to and mitigation of effects of climate change, increasing the use of renewable sources of energy and combating the spread of epidemic diseases and pests affecting humans, animals and plants. The solutions to all these challenges lie with agriculture and its development.

Agricultural research and innovation is crucial for agricultural development. Agricultural research and innovation generates new knowledge and skills necessary for agricultural progress. The neglect of agriculture globally has had a parallel in the neglect of investing in agricultural research and innovation. The need to attract investment and use it effectively for agricultural research and innovation is of high importance globally.

In support to all of the above policy and institutional concerns, the international community has identified the reduction of poverty and hunger as overarching goals for development policy in the new millennium. Commitments to achieve the Millennium Development Goals (MDGs) constitute a framework for development actions and a benchmark for measuring development progress. Countries are now in the process of formulating strategies and policies to fulfill the commitments they have subscribed to in the context of the MDGs.

The article prepared by FAO entitled "Hunger in the Face of Crisis"[6] emphasized on the fact that in order to fight hunger a twin track approach remains key, involving both measures for immediate relief and more fundamental structural changes. In the short term, safety nets and social protection programs must be improved to reach those most in need. Simultaneously, small-scale farmers must be given access to indispensable tools and technologies that will allow them to boost production. These include high-quality seeds, fertilizers, and adequate farming equipments. Higher local production will be instrumental to lower food prices for poor consumers, both rural and urban.

In the medium and long term, the structural solution to hunger lies in increasing agricultural output in countries prone to food shortages. Stable and effective policies, regulatory and institutional mechanisms, and functional market infrastructures that promote investment in the agricultural sector are paramount.

Many countries in the Region have already started implementing policy reforms, notably Structural Adjustment Programs (SAPs) in the early 1980s. The countries like Egypt, Turkey, Iran, Morocco, Pakistan, Syria and Sudan, for example, have cut explicit food subsidies. Such policy reforms affect both availability and access to food in a number of ways. The radical changes involved in SAPs, while essential for increased food production, have costs that threaten the short-term welfare of the poor.

The importance of agriculture is much greater than its economic value. Agriculture underpins the availability of common goods in both the natural and the social sphere. Ecologically, it is mainly through agriculture that humans shape the natural

[6] FAO. Hunger in the Face of Crisis- Global Economic Slowdown Underscores Urgency of Addressing Long-Term Challenges. Policy Brief 6. Sep. 2009.

commonwealth and the biodiversity surrounding us. Socially, first and foremost agriculture is the basis for food security and subsistence. In addition, agriculture is the mainstay of the rural world, including its contributions to other sectors of the rural economy, as well as to social cohesion, community life, and religion.[7]

Agriculture remains one of the most promising instruments for reducing world poverty. It is portrayed as a way to raise GDP; to create jobs; to manage natural resources, but not as a way of life. The WDR 2008 considers agriculture's role as a provider of environmental services, but it limits its view on how poor management of such services, and the resulting deterioration in the quality and quantity of natural resources available, damages agriculture's economic performance. Similarly the WDR 2008 discusses agriculture "as a livelihood", but merely with a view to poverty reduction, where poverty is measured in dollar terms. By defining poverty reduction simply as raising the income of those who live in poverty beyond the one-dollar-a-day threshold, the report reduces the problem and solution to a monetary issue.

On the other hand, it should be emphasize that agriculture and agricultural knowledge, science and technology (AKST) across world regions are complex and diverse. The main challenge of AKST is to increase the productivity of agriculture in a sustainable manner. AKST must address the needs of small-scale farms in diverse ecosystems and create realistic opportunities for their development where the potential for improved area productivity is low and where climate change may have its most adverse consequences.[8]

The Global Forum has taken cognizance of the following global priorities for agricultural research for development: 1) Increasing food production and productivity and ensuring profit to primary agricultural producers, especially small holders, when they participate in markets 2) Enabling sustainable use of natural resources and preventing further degradation of the environment and contributing to its recovery 3) Reducing the emission of "greenhouse gases" and other polluting gases and enabling adaptation to and mitigation of effects of climate change on agriculture5) Enabling development and use of efficient, renewable sources of energy especially in agriculture 6) Preventing the spread of diseases and pests of animals and plants that have potential to cause global pandemics and damage 7) Ensuring safety of food supplies globally

For the Global Forum, each of the above priorities will require actions for advocacy, institutional change, innovative and strategic partnerships and sharing and exchange of knowledge and technology among all actors.

[7]Murphy Sophia and Tilman Santarius. The World Bank's WDR 2008: Agriculture for Development. November 2007.

[8] International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTED). Agriculture at the Crossroad. 2009

6. Agricultural Researchable Issues

Nations, specially the developing countries, have to secure enough food for their growing population; Natural calamities and climate change along with other factors have put it into challenge. Thus, it is vital for developing nations to produce necessary food domestically. National policies should be directed to attain food security which will lead to agricultural development. There is vital role that NARS can play to achieve food security in each country through conducting appropriate research starting from the bottom up, i.e. looks on the needs of farmers and consumers.

6.1 General View

Research in most countries in the region is still based on a routine of repeating the same thing rather than following a more creative and demand driven research priorities. Lack of vision in setting research policies and agendas was a real obstacle. This was faced by lack of interaction and openness with the other stakeholders within the innovation system. The missing link where all the different stakeholders could meet to make the agricultural innovation effective, efficient and sustainable is not given due importance.

The region is water poor, suffering from political and/ or social problems and unrests, high poverty ratios and high dependency on import to meet its food requirements, in addition to high vulnerability to environmental problem such ad desertification and climate changes.

Despite the fact that innovation and its diffusion is a major contributor to agricultural development, it should be considered as an integral part of the political, social, institutional and economic systems, which normally constitute the environment and dictate the pre requisites for the success of innovation.

It is important to ask how much more research we can plan and conduct, to answer the question "what was the impact of what we have done so far on the developmental issues of the region?" We believe that the impact was little, particularly on the level of the national research systems.

We think that linkage between NARS and International R&D Centers in the region is weak. The linkage between NARS and the local extension services is also weak. The linkage between extension services and the farmers is very weak. Therefore in this kind of a situation, we should not expect any real impact of R&D products on the needy farmers in our region. Let us strengthen the linkages between the different parties in order to move forward.

6.2 Survey Results

A short questionnaire in the form of template was sent to several research institutions and person. There were replies from some countries/persons. The results of these replies are analyzed bellow.

Three out of five sub-regions in AARINENA participated in data collection; nine countries in these regions fill the questionnaire. Twenty three NARS, four universities and one NGO participated in filling the questionnaire.

The total number of researches analyzed is 1411 research, which covered about 30 research main topics. Each research was identified according to year of publication/completion, its field, whether conducted, planned or on-going the level of priority, the level of cooperation with other researchers and institutions, either local or international.

6.2.1 Distribution of the Main Fields of Research between the AARINEA Sub-Regions

Table 1 shows the distribution of the research topics between the three sub-regions, Arabian Peninsula, Mashreq, and River Nile &Read Sea. The majority of the research was conducted in the third sub-region, i.e. the River Nile & Read Sea, where it constituted the majority of the total research topics, then comes the Mashreq sub-region. The research topics ranking revealed that livestock, with its all components except fisheries, constituted the majority of the research, and then comes food technology and nutrition, then Germplasm Improvement & Biotechnology and then plant nutrition.

Although the region in general suffers from water shortages, only 38 researches were conducted on water, most of them were in the Mashreq sub-region.

On the other hand, only four researches were devoted to environmental aspects, although the whole world is emphasizing on these aspects. Moreover, it is noticed that there is few research on fisheries and only one research each in human resources, integrated farming systems, rural development, poverty, range impact assessment and indigenous knowledge.

Table 1 Distribution of the Main Fields o Main Fieldf Research between the AARINENA Sub-Regions during the Period 2004-2009

Main Field	Sub-Region			Total
	Mashreq	Arabian Peninsula	River Nile& Red Sea	
Water	20	1	17	38
Agricultural Policies	5			5
Bio-Safety And Quarantine	19			19
Capacity Building	4			4
Environment	3		1	4
Farm Management	1			1
Fisheries	1	1	1	3
Food Security	1			1
Food Technology And Nutrition			342	342
Gender	4			4
Genetic Resources Conservation	4		10	14
Plant nutrition	7	4	198	209
Human Health	8	1		9
Human Resource Development			1	1
Impact Assessment	1			1
Indigenous Knowledge	3			3
Information And Communication	1		2	3
Integrated Farming System	1			1
Integrated Pest Management	8	1		9
Integrated Farming System			2	2
Livestock	14	1	425	440
Marketing/Commerce And Trade	12	1		13
Natural Resource Management	2		49	51
Network	4			4
Participatory Community	1			1
Plant Nutrition		2		2
Plant Production And Diversification	14	6	22	42
Plant Nutrition			145	145
Post Harvest Technology	10	2	6	18
Poverty	1			1
Range	1			1
Remote Sensing			5	5
Rural Development	1			1
Technology Dissemination	7	2		9
Fisheries		4		4
Indigenous Knowledge			1	1
Total	158	26	1227	1411

6.2.2 Level of Implementation of the Main Fields of Agricultural Research in AARINENA Sub-Regions

The majority of the listed research in the survey was conducted and published, whereas 54 and 47 research topics were planned and still on-going respectively (Table 2)

Table 2 Level of Implementation of the Main Fields of Agricultural Research in AARINENA Sub-Region

Main Field	Conducted, Planned or ongoing			Total
	Conducted	Planned	On-going	
Agricultural Policies	5			5
Bio-safety and quarantine	17		2	19
Capacity building	4			4
Environment	4			4
Farm Management	1			1
Fisheries	2		1	3
Food Security	1			1
Food Technology and Nutrition	295	47		342
Gender	3		1	4
Genetic Resources Conservation	11		3	14
Germplasm Improvement & Biotechnology	208	1		209
Human Health	9			9
Human Resource Development			1	1
Impact assessment	1			1
Indigenous knowledge	3			3
Information and Communication	1		2	3
Integrated Farming System	1			1
Integrated Pest Management	9			9
Integrated farming system	2			2
Livestock	430	4	6	440
Marketing/Commerce and Trade	13			13
Natural resource Management	2			2
Natural resource Management	49			49
Network	3		1	4
Participatory Community	1			1
Plant Production and Diversification	22		20	42
Plant nutrition	146			146
Post Harvest Technologies	15		3	18
Poverty	1			1
Range	1			1
Remote Sensing	5			5
Rural development	1			1
Technology dissemination	8		1	9
Water	32		6	38
Fisheries	3	1		4
indigenous knowledge		1		1
Total	1310	54	47	1411

6.2.3 Distribution of the Main Fields of Research with Respect of the Type of the Research

The detail of main fields of the research in WANA region as indicated from the survey is shown in table 3. The major fields of research were: livestock, Food Technology and Nutrition Distribution, Germplasm Improvement & Biotechnology and Plant nutrition,

Table 3 Distribution of the Main Fields of Research with Respect of the Type of the research

Main Field	Type of the Research					Total
	Crops	Animals	Crops and Animals	Human	Environment	
Agricultural Policies	4		1			5
Bio-safety and quarantine	7	9	1	2		19
Capacity building				4		4
Environment	1				3	4
Farm Management			1			1
Fisheries	1	2				3
Food Security			1			1
Food Technology and Nutrition				342		342
Gender	1			3		4
Genetic Resources Conservation	14					14
Germplasm Improvement & Biotechnology	209					209
Human Health	1			8		9
Human Resource Development				1		1
Impact assessment				1		1
Indigenous knowledge	3					3
Information and Communication	2		1			3
Integrated Farming System			1			1
Integrated Pest Management	9					9
Integrated farming system	2					2
Livestock	1	439				440
Marketing/Commerce and Trade	12		1			13
Natural resource Management	50				1	51
Network	2		2			4
Participatory Community	1					1
Plant Nutrition	2					2
Plant Production and Diversification	42					42
Plant nutrition	145					145
Post Harvest Technologies	18					18
Poverty				1		1
Range	1					1
Remote Sensing	5					5
Rural development	1					1

Technology dissemination	7	1	1			9
Water	38					38
Fisheries		4				4
indigenous knowledge		1				1
Total	579	456	10	362	4	1411

6.2.4 The Level of Type of Research at Country Level in AARINENA Sub-Regions

Egypt was the leading country of the research in the region, out of which one-third in crops and the same in animals. Research in Qatar, KSA and UAE were in crops only as shown in table 4.

Table 4 The Level of Type of Research Country Level in AARINENA Sub-Region

Country Name		Type of the Research					Total
		Crops	Animals	Crops and Animals	Human	Environment	
Cyprus	No	45	3	4	1	3	56
	%	80%	5%	7%	2%	5%	100%
Jordan	No	15	6		5		26
	%	58%	23%		19%		100%
Lebanon	No	23	15	1	10	1	50
	%	46%	30%	2%	20%	2%	100%
Syria	No	18	1	4	3		26
	%	69%	4%	15%	12%		100%
Qatar	No	4					4
	%	100%					100%
Saudi Arabia	No	5					5
	%	100%					100%
Bahrain	No	1	4				5
	%	20%	80%				100%
United Arab Emirates	No	12					12
	%	100%					100%
Egypt	No	431	415		342		1188
	%	36%	35%		29%		100%
Sudan	No	25	12	1	1		39
	%	64%	31%	3%	3%		100%
Total	No	579	456	10	362	4	1411
	%	41%	32%	1%	26%	0%	100%

6.3 Priorities of the Researchable Issues

1- Food Security:

Food security is an important issue especially in developing countries. The issue of food availability and food access are major problems facing the poor people. Several obstacles are facing the agricultural sector to cope with the significant increased demand due to the increase of population numbers and the scarcity of natural resources as well as the human and natural threats.

Key issue 1: Need for research on the comparative and competitive advantage of the products to be produced in each country.

In this case the country will direct its limited resources to producing crops that have comparative/competitive advantage, export them and import other essential crops which the country could not produce

Key Issue 2: Most of the countries need effective financing of agriculture and farms to support small-scale farmers in the region

There is consensus within the development community that to bridge the supply gap for finance and help governments reach their commitments to achieve the Millennium Development Goals (MDGs), microfinance should be provided in a sustainable manner. Microfinance mechanisms should be investigated.

Key Issue 3: Enhance the sustainable productivity of agriculture in the irrigated or rainfed /less-favored or "lagging" areas while protecting the natural resource-base

The region suffers from shortage of food and is a major importer of the major food commodities. AR4D should focus in increasing food production in a sustainable way, reducing the yield gap and at the same time sustain the resource base.

Key Issue 4: Need to explore the full potential of livestock sector in the region

Due to the fact that most of poor farmers are livestock holders, it is important to concentrate research and technology transfer on the improved breeds and training of farmers about animal health and animal husbandry.

Key Issue 5: Need to emphasize on research on fisheries and aquatic production systems

There is a need to strengthen national program scientists and strengthen networking between NARS, including NGOs, and to assist NARS in strengthening their research policies and management related to fisheries research.

Key Issue 6: Need to pay attention to trans-boundary animal and plant diseases and pests

Animal health and trans-boundary disease is a major constraint that need research effort to find solutions. We need to strengthen the NARS capacity, both human and institutional, to face the challenges ahead. This will be aggravated by impact of climate change on spreading new diseases and pests.

2- **Improvement the Standards of Living and Livelihoods of Farmers:**

Key Issue 1: Study and analyze the declining living standards and livelihoods in rural areas and develop opportunities for household income generation

For better standards of living for the disadvantage people, the poor and women, in the developing countries, among other things, the research should concentrate on increasing agricultural productivity, better natural resource management, and transformation of rural economies, post-crisis rehabilitation and appropriate water harvesting techniques.

Key Issue 2: Organize and promoting the role of rural women in agriculture, and agricultural research and development

The development of women's groups should be promoted as a strategy to expand women's access to information, increase their comparative bargaining power, and create opportunities for collective action to access economic inputs.

3- **Issues Related to Protection of the Environment**

Key Issue1: Enhancing efforts on protecting the land and water resources

This region is a water scarce one. This problem needs special attention in the regions' research agenda. It needs to be coupled with crop varieties and management practices that result in better water use efficiency, water saving and supplemental irrigation (when and how much to apply). Salinity (soil and water) is a growing problem in many parts of the region, so innovative research need to address this problem. In many parts of the low rainfall areas such as the rangelands, there is need to focus on water harvesting and rangeland rehabilitation coupled with proper grazing management.

Key Issue 2: Protect the much useful forests and range land from degradation

Research into degradation processes, their underlying causes and their long-term effects and consequences on the land and the environment should be solution-oriented.

Key Issue3: Enhance efforts on protecting the vast natural biodiversity present in the region

It would be crucial to have biodiversity underpin all policies, via a national biodiversity strategy as part of the national sustainable development strategy and

regional strategies, and to ensure transparent, independent monitoring of the implementation of all biodiversity and natural resources adopted programs.

4- Meeting the special challenges

Key Issue1: Aligning agriculture research and development to meet the challenges of global warming.

To face climate change and scarcity of water, developing climate resilient crops and associated technologies is one of the areas which would need long term commitment and attention, since the development of climate resilient crops has the potential to make a difference in terms of development impact in the region.

Policies and investments that support trade, sustainable agricultural practices, and technological progress would help mitigating the negative impacts of climate change on agriculture and food security.

Key Issue 2: Need to address the issue of desertification.

This is a very serous issue in the WANA region and in spite of the" Convention on Combating Desertification" CCD, this complex phenomena still is threatening the survival of the human civilization in many parts of the arid and semi arid region. The policy and socio-economic of the phenomena needs more attention in research. Partnership among all stakeholders from researchers, extension officers, farmers and end users, policy makers, donors, CSOs, NGOs, etc are imperative in the successful outcomes of the program. Research alone will not resolve the issue and need more research to development continuum and big investment.

5- Technology, information, knowledge and innovations

Key Issue 1: To enhance investment in and strengthen agricultural research, innovation, extension and education systems, related institutions and research processes

There is still a need to strengthen the human resources and institutional capacity of the NARS to face the challenges ahead. To meet the MDGs and have an impact on agricultural development in any country of the WANA region, partnership among various stakeholders involved in ARD is very essential. Without effective partnership, scaling out the research outputs and dissemination of technologies generated by NARS or IARCs and consequently their impacts on development will be limited.

Key Issue 2: To revitalize, strengthen and reorient agricultural extension system

Farmers' participation in research planning and the creation/identification of innovations generates the potential for their diffusion and is thus an essential component of the diffusion process. The participation of extension agents in agricultural research is equally important for the diffusion of innovations, and is a feature unfortunately lacking in many projects

Key Issue 3: To improve quality of agricultural education and employability of agricultural graduates and to increase availability of appropriately trained human resources at different levels

It is also important to encourage investment in the management, use and exchange of research information, through strengthening the national agricultural research information systems which could be an important component for strengthening the regional and international information systems. This should be given a priority in the restructuring of research institutions.

6- Market and marketing

Key Issue 1: To effectively link small and marginal farmers with markets, including with the fast emerging large (multi-national) retailers and super markets

Marketing of the product for small farmers in particular is always the major constraints that hindering the investment in agriculture to be profitable. More focus in market research is needed. Agricultural research agenda is not based on commodity chain approach (crops, trees, livestock, fisheries) from production, processing, marketing and trade.

Key Issue 2: To benefit small farmers and to protect consumer from food price rise and fluctuation

Some analysts have been exclusively blaming agrofuels, the increasing world demand and global warming for the current food crisis. But actually, this crisis is also the result of many years of destructive policies that have undermined domestic food production. Trade liberalization has waged a virtual war against small producers

If food on the market comes from domestic producers, usually benefits of higher prices are reaped by companies and other intermediaries that buy the products from the farmers and sell them at a high price.

7- Energy

Key Issue 1: To develop bioenergy as a complement to and not at the cost of food security;

Over the past few years, world economic powers such as the US and the EU have rapidly developed agrofuel production. Massive subsidies and investments are flowing into this "booming" sector. As a result, land is rapidly being converted from food into fuel production and an important part of the US maize suddenly "disappeared" as it was bought up for ethanol production. This uncontrolled explosion of the agrofuel sector created a shock in the already unstable international agricultural markets.

Key Issue 2: To enhance energy security compatible with economics and ecology.

Most of the countries in WANA region who are producing biofuel, are using the second-generation feedstocks or specialized biofuel crops, such as Jatropha which are produced in marginal land and using non-conventional water for irrigation. There is a strong need to evaluate, economical and environmental, of using the second-generation biofuel. The evaluation should cover both the farmers' side and the consumers' side.

7 - The E-Consultation Results

180 persons participated in the e-consultation from: Bahrain, Cyprus, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, Pakistan, Palestine, Sudan, Syria, Tunisia, Turkey, United Arab of Emirates and Yemen in addition to some guests of WANNA region. About 150 messages have been received from about 85 participants. The language of this e-conference was English. The consultations were based on electronic dialogues with the possibility to consult and participate via a public Web site or by sending e-mails.

The participated institutions working on agricultural research for development in WANA region were mainly ICARDA, FAO Regional Office, ACSAD, AOAD, IDRC, USAID. Moreover, universities, Ministries, Research Centers NGOs and private sectors from different countries participated in this event.

The fruitful ideas and discussions in this e-conference reflect strong qualifications and experiences from different organizations, research institutions, universities, NGOs and private sectors from different countries.

The main fields of specialization of the participants were:

- Livestock and animal breeding.
- Plant Protection (Integrated Pest Management, Pesticides, Cereal Rusts resistance and management).
- Field Crops, Agronomist, Crop Physiologist, Vegetable and Ornamental Plants.
- Plant breeding.
- Microbiology.
- Resource and Agricultural Economics.
- Soil, Irrigation, Water Management and Environment.
- Land use management (GIS. RS).
- Extension
- Geo-informatics.
- Computer Science and Information and Communication Technologies.

The consultation that started on Wednesday September the 2nd, 2009 and continued for two and a half weeks up to 24th of September 2009. In the first week, the participants introduced themselves and shared their experiences and views from the region, relating agricultural innovation to development impact. In the second week

they reflected on the issues raised in the preceding week and put their experiences in perspective of the regional review findings. Participants suggested and discussed valuable ideas, experiences, information and innovations which will be of help to have greater impact on major development needs of the region. The final phase in the last week was sending the final summary to the participants and make closing remarks.

7.1 The Major Points in the E-Consultations

The major three points in the discussion were:

1. Food security, food safety and water scarcity: One of the main discussions was about water scarcity and food security as main problems facing the region. The participants have mentioned the need to improve water use efficiency, finding suitable alternative environment friendly crops that tolerate to drought and salinity and capable to give better economic returns.
2. Linkage research, extension and farmers in the region: Many of participants mentioned that there is a weak relation and also a gap in this regard. They have expressed the need of sharing knowledge between these three groups. This linkage needs to be addressed in relation to technology uptake and adoption. In fact, lack of integration partly explains the low adoption rates of improved technologies in dry areas.
3. Polices and strategies: The discussion reflected the need to develop clear polices and strategies for agricultural research, identifying areas and priorities of research. It has been mentioned that research in most countries in the region is still traditional; there is a lack of vision in setting research policies and priorities, there is a need to differentiate between research policies (which include research prioritization and funding) and enabling policy and institutional options to enhance the uptake and adoption of improved technologies and practices. The participants emphasized that the policies and institutions should go side by side with the development of the technologies and integrated within the research process.

The other points in the discussion are summarized as follows:

- Innovation in agriculture.
- Importance of regional cooperation, networking and knowledge sharing.
- Livestock and trans-boundary animal and plant diseases
- Salinization.
- Climatic change effect
- Standard of Living of Farmers.
- Genetic resources.
- Land degradation and combating desertification region.
- Increasing agricultural productivity.
- Satellite Remote Sensing data.
- Rural development and empowering the women in the rural areas.

7.2 The Challenges for Agricultural Research in WANA Region

From the previous points of discussions the challenges of the region have been formulated as follows:

- In WANA region, most of its countries are suffering from water shortage and the agricultural sector is consuming, in average, more than 80% of the available water. It is also the inefficient use and misuse of scarce water resources.
- Agriculture production in WANA is characterized by low efficiency in the use of all production inputs.
- Disparity of living conditions between urban and rural areas is quite obvious. Rural migration is still on the rise.
- The region suffers from shortage of food and is a major importer of the strategic food commodities.
- The poverty levels are increasing through time in the region.
- In many livestock activities, research is not integrated in WANA region with other disciplines of agriculture, i.e. crops, water, soils, energy etc.
- The impact of the spread of peri-urban areas which decreases the agricultural land and the effect of commercialization /industrialization on livestock.
- Lack of sharing information about animal and plant diseases which can be effectively managed.
- Loosing more and more land due to soil and water salinization.
- The research in most countries in the region is still based on a routine of repeating the same thing rather than following a more creative and demand driven research priorities.
- The missing link between the different stakeholders.
- Market and policy research is overlooked in the research priorities.
- Rainfall now comes erratically in showers in huge quantities over very short time.
- The climate change will affect agricultural production and food security, and its negative impacts are expected to be more severe in dry areas.
- Agricultural extension has not yet played the required active, effective and efficient service role.
- Conservation of biodiversity and plant genetic resources and utilize them in a good manner.
- Agricultural research agenda is not based on commodity chain approach (crops, trees, livestock, fisheries) from production, processing, marketing and trade until it reaches the consumers.
- The research on the natural resources management (soil, water, biodiversity, range and forest) is carried out without adequate attention to the socio-economic constraints and environmental conditions.
- The negative impact of political conflicts, like wars in many countries in the region on the availability and sustainability of land and water resources.
- Soil and water pollution.

- Restructuring of the current agricultural research system to meet the needs and challenges of the agricultural development in the WANA region.
- The feedstuff shortage is a serious problem facing livestock producers,
- The significant increase in the costs of production inputs.

7.3 Key Issues

From the discussions of E-consultation most of participants agreed on all the researchable issues that have been formulated from the data and survey of research in WANA region and from the lessons of the study of 2002. Based on the discussions in the e-consultation other major researchable issues for agricultural development have been identified. The water scarcity and policies and institutions have been added as separate researchable issues because they have been focused of the main discussions. In addition to the researchable issues of the survey and data collection the following listing includes other researchable issues that have been discussed in the e-consultation and reflects the priorities of them:

1. Water Scarcity.

- *Key Issue 1:Need to introduce crop varieties and management practices that result in better water use efficiency.*

  WANA Region is a water scarce region. This problem needs special attention in the regions' research agenda. It needs to be coupled with crop varieties and management practices that result in better water use efficiency, water saving and supplemental irrigation (when and how much to apply). Salinity (soil and water) is a growing problem in many parts of the region, and innovative research need to address this problem. In many parts of the low rainfall areas such as the rangelands, there is need to focus on water harvesting and rangeland rehabilitation coupled with proper grazing management.

- *Key Issue 2: Improve management of water resources and conserving the quantity of this resource through water harvesting.*

  Improved productivity and quality of the limited water resources currently and potentially available for agricultural use in dry areas through improving the technologies and management options for rainfall, conventional and non-conventional water resources available to attain higher water use efficiency and sustainable agricultural production.

- *Key Issue 3: Improve on-farm water-use efficiency*

  Research should be conducted on advanced water management techniques, such as drip, sprinkler, pivot systems, and the like. Moreover, knowledge of how to benefit properly from the non-conventional water, such as brackish, treated wastewater, grey water should be disseminated to the farmers.

- *Key Issue 4: To rationalize use of ground water and decrease the expansion of withdrawal from shallow aquifers.*

Groundwater is a reliable resource for drinking and production both in terms of quantity and quality. However, the resource is now under severe stress in many WANA region countries because of the excessive groundwater abstraction in the course of socioeconomic development.

Problems such as water table drawdown, decreasing well yield, land subsidence, and salinity intrusion that have emerged as the results of overexploitation of groundwater may incur socioeconomic losses and disturb the development of the cities that face the problems. Therefore, we need to consider how we can conserve this precious resource while taking full advantage of it for the development of the region.

Key issue 5. Policies and institutional arrangements related to the optimization of the use of scarce water resources and enhancing the adoption of improved irrigation technologies

2. Food Security, instable food and Poverty in WANA region

- *Key Issue 1: Need to emphasis on environmental poverty:*

  Environment Poverty is explained by intensified water scarcity, land degradation and desertification. There is a need to enhance local food production by increasing the productivity of water and land under the conditions of water scarcity, land degradation and desertification as well as increased demand for food.

- *Key issues 2: Need to develop accurate, efficient and economic surveillance and monitoring systems and sharing information that helps in managing the impact of plant and animal diseases.*

  The issue of food safety and managing the trans-boundary livestock and plant diseases are highly important in the WANA region. Animal health and trans-boundary disease is a major constraint that need research effort to find solutions. We need to strengthen the NARS capacity, both human and institutional, to face the challenges ahead.

- *Key issue 3: Need to improve high yielding high quality crop varieties using traditional and advanced tool.*

  Seed is one important input that will help farmers overcome food shortages so we have to work in the seed value chain.

- *Key issue 4: Need to use the nuclear techniques to improve crops yields.*

  There is need to increase investment in the plant breeding technique to bolster efforts aimed at pulling millions of people out of the hunger trap. For this purpose, it is suggested to use nuclear technologies to improve crop varieties and to fight world hunger.

- *Key issue 5: Research should utilize the good traits in the local breeds and improve their productivities*

  In areas where local breeds of livestock have developed, or where they have been farmed for a considerable period of time, the animals and the system under which they are kept have evolved together. These animals are ideally suited to the conditions in which they are kept.

  Increased productivity can be achieved through using different techniques including biotechnology interventions. Cross breeding should be considered in this regard.

- *Key issue 6: In the field of medicinal, herbal and aromatic plants (MAPs)*

  There is need to conduct research to grow and extract medical and aromatic ingredients from MAPs and find the best ways to use them in agro-industries producing medicines, cosmetics, and food additives, etc.

- *Key Issue 7: The impact of political conflicts, especially war, on the availability and sustainability of land and water resources.*

  Many Countries in WANA Region are characterized by political instability and conflicts. This leads to migration, poverty and neglecting agriculture and its resources. The research should be directed for sustainable and water resources under these conditions.

3. Protection of the Environment

- *Key Issue 1: Protecting water resources from all types of pollution.*

  Water pollution is a global problem, which differs with levels of development. In general terms, water pollution has severe impacts on the usefulness and value of water resources, with negative impacts on ecosystems, fisheries, food production, health and social development, and economic activities. Water pollution can cause or aggravate tension and conflict, among water users and even between countries.

- *Key Issue 2: Finding suitable alternative environment friendly crops that tolerate drought and saltiness/salinity.*

  The main reason for the success in increasing food production during the last 50 years has been the ability of science to increase the yield potential of the plants and livestock, and to improve their ability to cope with a range of hostile conditions.
  Both genetic engineering and marker assisted selection rely on the growing knowledge of genes being provided by genomics which aims to describe and decipher the location and function of all the genes of an organism, and the interactions between them.

- *Key Issue 3: Utilization of indigenous rangeland grass species to grow commercially for replacing high water consuming exotic grass species.*

  Exotic species are now being grown for fodder, however these use large volumes of irrigation water and the practice is not sustainable. One approach to the conservation of biological diversity and the promotion of sustainable animal production is the conservation and utilization of these indigenous plant species.

- *Key Issue 4: To protect the land from Salinization and sustain it for the coming generations*

  The researchers paid more attention to identifying the salt effected soils and their characteristics than to predicting the possibilities salinaization or sodification of particular area or project.

- *Key Issue 6: Conservation of local plant and animal genetic resources by establishing" Gene Banks".*

  There is a major concern in animal husbandry today about the diminishing biodiversity among the species involved. There is strong demand for preserving the unique genetic resource, and techniques or methodology from the area of animal reproduction may play a major role in meeting this demand.

  Current and future trends include characterization of the genotypic basis of phenotypic variation and the evolutionary, ecological, and human factors that have shaped the crop genetic resources

4. Meeting the Special Challenges

- *Key Issue 5: Over grazing is a large contributor to desertification problem*

  Research should be directed towards evaluation the grazing capacity in the rangeland so as to reduce herd load and regulate grazing.

5. Policy and Institutional Research

- *Key Issue 1: Need to support research and development in all nationally needed fields of agriculture by local, regional and international funding agencies.*

  Because of insufficient access to capital and a misperception of the opportunities that arise from innovation, farmers and private-sector companies invest less in innovation than is optimal on the individual and social levels. As a result, governments and development agencies have supplemented private innovation efforts not only by providing funds, but also by establishing research capacity in public research organizations.

  To capitalize on the demonstrated high returns to agricultural research and development and its unique role in enhancing productivity and

food security and reducing poverty across all the heterogeneous production systems, agricultural research funding to national agricultural research systems should increase in real terms.

- *Key issue 2: Need to identify polices and Improve Decision makers and politician awareness on the importance and role of agricultural research and innovation.*

  Politician should be involved in what is done by researchers. If politicians do not believe in what the researchers do and do not bless it, they will not be able to reach out and participate in the actual development of the region.

  Efforts should be linked with international R&D organizations in the region; share their knowledge with extension workers and even social workers in order to reach the real end users of our research efforts, i.e. the farmers.

- *Key issue 3. Building Impact-oriented Research, Knowledge and Development Institutions*

  Institutional arrangements to achieve a shift towards an innovation, information, knowledge, and education coalition may differ from country to country and each must be encouraged to learn from its own experiences. There is a need to start from the bottom up in developing rural knowledge systems and institutions using participatory methods. There is also a need for substituting traditional extension systems with farmer participatory knowledge systems that are more gender sensitive. Community-based farmers' organizations must be established more widely and existing ones strengthened to facilitate the development of such farmer participatory knowledge systems and to promote value addition, agro-processing and marketing that can better exploit economies of scale and encompass vertical, horizontal and lateral integration from production to markets.

6. Technology, Information, Knowledge and Innovations

- *Key Issue 1: Need to enhance the monitoring and evaluation system and developing their researches.*

  Monitoring and evaluation (M&E) plays a central role in ensuring accountability, informing decision-making and, more broadly, facilitating learning. There is a need to adopt evolution in thinking in M&E, moving from a focus on the M&E of research products to recognition that the context and mechanisms for adoption of research products are equally important, as is the effect on poverty reduction.

- *Key Issue 2: Search for a mechanism and activate it to link all the centers in the region with a viable communication network for mutual coordination, and to benefit from the expertise of each other.*

An ICT integrated system involving all the stockholders could access it and share their last information. It is important to build on the several active networks in WANA networks to strengthen inter-country collaboration.

- *Key Issue 3: Need to strengthen the linkages between NARS and International R&D Centers in the region, between NARS and local extension services and between extension services and farmers*

- *Key Issue 4: Participatory approach should take priority which involves researchers, farmers and extension agents in the transfer of technology.*

  It should take priority that has to involve researcher, farmers and extension agents in the transfer of technology because farmer is involved from the beginning to test the entire technology package. This issue is a learning process for all partners in the system. The neighboring farmers will learn through field days and field visits

- *Key issue 5: Need to adopt methods for disseminating and scaling out improved technologies under rainfed conditions.*

  Studies on approaches for technology dissemination and out-scaling to have a larger impact such as using GIS, RS, and the expert system and other Information technology tools need more attention in our research agenda.

  There is a need for efficient management of food and agriculture information and knowledge through regional, sub-regional and national networking of food and agricultural institutions. The main objective is improving efficiency, quality and relevance of knowledge exchange and dissemination in food and agriculture, and using electronic media to enhance communication for food, agriculture and rural development.

  Science and research based agricultural systems have delivered real benefits and innovations to farmers, processors and consumers through the development and implementation of new knowledge and technologies. Agricultural development in WANA region, continue relatively susceptible by the ineffective and incompetent exchange of knowledge and information. Building and strengthening the capacity to access and exchange information, and to convert it into useful knowledge and innovation, is very essential for the development objectives of poverty eradication, food security, sustainable agricultural development and NRM and increased productivity and competitiveness.

- *Key Issue 6: Need for "Knowledge Management" experts and implementing science in research for development.*

7. **Improvement of the Standards of Living and Livelihoods of Farmers**

- *Key Issue 1: The need for agricultural research that benefits the resource poor farmers and producers.*

  Studies should be directed to improving the contribution of agricultural research to farmers' livelihoods. There is a need to establish forums of stakeholders, especially of farmers, who are to play key roles in the co-construction of knowledge during the field experimental phase that followed the diagnostic studies.

8- Market and Marketing Systems

- *Key Issue 1: Enhancing socially based economic agri-enterprises through enhancing and empowering the farmers' cooperatives economical and marketing activities.*

  The growing number of small farms and declining average size of operational holdings indicate the weakness in their access to critical production resources. Therefore, they are operating at a lower equilibrium. Several studies indicate that small farmers encounter entirely different set of problems in both input and output markets due to their unique characteristics. To overcome constraints, the small producers need an organization, such as cooperatives, capable of mitigating their constraints

- *Key Issue 2: Long-term relationships, planning, technical cooperation and transparency are necessary throughout the supply chain between all the market participants*

  The integration and management of supply chain organizations and activities through cooperative organizational relationships, effective business practices, and high levels of information sharing to create high-performing value systems that provide member organizations a sustainable competitive advantage.

- *Key Issue 3: Developing a Geographic Identification system (GIS) and remote sensing (RS) for agri-food produced*

  This is necessary to register and protect the name, origin and intellectual property rights of the distinguished rural agro-food products (fresh or traditionally processed agro-food) produced in certain geographical areas, to increase their marketing value, highlight their superiority due to the nature, inherited practices, and nutritional value, and encourage diverse agricultural production and rural sustainability.

9- Energy

- *Key Issue 1: enhance the utilization of renewable energy resources for agricultural practices to reduce the utilization of chemicals and reduce polluting practices.*

Renewable energy flows involve natural phenomena such as sunlight, wind, tides and geothermal heat. There is significant potential for agricultural involvement in the production and consumption of solar, wind, geothermal, and biomass energy.

Livestock and dairy operations often have substantial air and water heating requirements. For example, commercial dairy farms use large amounts of energy to heat water for cleaning equipment. Heating water and cooling milk can account for up to 40 percent of the energy used on a dairy farm. Solar water heating systems may be used to supply all or part of these hot water requirements. Other solar applications include greenhouse heating and solar crop drying standards.

7.4 The Analysis of the Current Status of Regional Cooperation/ Collaboration

There is a need to enhance the involvement of other partners. In our opinion we must involve the politician in what we do as researchers. If politicians do not believe in what we do and do not bless it, we will not be able to reach out and participate in the actual development of the region. Political support is therefore a must for any successful impact sought after.

Technological options are usually evaluated in isolation from the associated enabling policies and institutional set up. This especially important when we address Agricultural resources (land, water and vegetation/biodiversity) the integration in this case is very essential, where enabling policies and proper institutional set up is critical for technology adoption and dissemination (scaling-out).

Inter-country/interregional/intercontinental experiences (success or failures) in one place can serve as lessons for implementing actions in another place for better addressing key challenges related to the poor. It could be interregional or intercontinental exchange of experience.

To re-enforce regional cooperation and collaboration and facilitate implementation of the identified regional research priorities, we should not work in isolation as research groups. We must link our efforts with international R&D organizations in the region; share our knowledge with extension workers and even social workers in order to reach the real end users of our research efforts, the farmers.

The research-extension and farmers' linkages need further strengthening. In most countries, the researchers are doing their research in isolation and no systemic contact with extension workers and some time with farmers. Now there is a growing awareness of this fact and slow progress as being made. This is rather critical when we talk about research that will serve the development.

Similarly, if we want AR to serve the development, then our partners in the research process should include partners in the development, private sector, CSO, NGOs and alike. My experience in the region showed that this is not happening; we need to find tools and approaches that will ensure the involvement of those partners in the process. In some cases their involvement might be needed at a later stage in the Research for

Development Continuum process, this will depend on the type of the problems that the research is addressing

Agriculture research finance, locally or internationally, is very important to enhance applicable research which reaches directly to the stakeholders. One of suceesful methods of local finance is "Sectorial Finance" applied in Brazil. In this method, part of taxes collected from the big corporations is distributed to cover specific objectives in research and development. Moreover, there should be interaction between the universities and NARS in one side and the corporations in the other side.

7.5 Changes Required to Achieve the Desired Objectives

- An integrated research approach should be undertaken in this area. Water, land and vegetation are the main natural resources which are threatened by degradation and misuse. Research approaches that will be implemented by multidisciplinary and interdisciplinary teams from different national, regional and international institution should work to address the Integrated Natural Resource Management (INRM). The policy issues are very important in enabling technological intervention to bring the change, and thus should be addressed along with the technological interventions.

- To achieve food security in WANA region, research should concentrate on:

  - Sustainable use of indigenous genetic resources, conservation and utilization of indigenous crops (cultivars) of food security in relation to water & salinity stresses being faced by the region
  - Development of new varieties for higher productivity through breeding via biotechnological tools involving indigenous cultivars that are economically viable for cultivation under moisture stress/ salinity conditions
  - Conservation and utilization (through animal breeding techniques) of indigenous livestock species in relation meat / milk production

- Protection of environment is considered as a special challenge to sustainable agricultural production. Emphasis should be directed on:

  - Conducting economically feasible water/salinity management which can be affordable to practice by the poor farmers
  - Utilization of indigenous range land species for improvement of degraded rangelands
  - Utilization of indigenous rangeland grass species to grow commercially for replacing high water consuming exotic grass species.

- Research on the methods of technology transfer for development should be conducted. The following should be stressed:

  - There should be investigations on socio-economical feasibility of adopting new technologies such as new water/salinity management technique, soilless culture techniques etc. to know whether or not these can be easily

affordable by the poor farmers, the end users. There have been few scattered studies on such aspects to look at the functional feasibility (in terms of economics) of the technique in question, but there are almost none to show that the newer techniques can reach (be affordable by) the poor farmers for adoption.

- Transfer of technology from Lab (research) to Land (end-users/ farmers) is not very strong in the region, there is need to be investigated by the concerned experts to know about how the end users, the poor farmers at large can be made accessible to the end-products/ new technologies.
- Investigation on economically viable seed production techniques which can be affordable by the poor farmers to purchase and/or multiply, if possible or use in cultivation, at large scale.

Table 5 summarizes the main drivers for agricultural research, Challenges the methods to meet these challenges.

Table 5 Drivers, Challenges and the Methods to Meet the Challenges

No	Drivers	Major Challenges	How Can Research Face These Challenges
1	Food Insecurity	- The region suffers from shortage of food and is a major importer of the strategic food commodities - Malnutrition, drainage in hard currencies caused by imports, And Social unrest	Conduct Research on: - Finding suitable alternative environment friendly crops that tolerate to drought and salinity and capable to give better economic returns. - The comparative and competitive advantage of the products to be produced in each country - Effective financing of agriculture activities specially to support small-scale farmers in the region - Enhancing the sustainable productivity of agriculture in the irrigated or rainfed /less-favored or "lagging" areas -Emphasizing on research on fisheries and aquatic production systems - finding and implementing high technology that increase the

			productivity of land and livestock
2	Water Scarcity	- Water use Efficiency in and off farms is low in most WANA Countries - Water pollution has severe impacts on the usefulness and value of water resources, with negative impacts on ecosystems, fisheries, food production, health and social development, and economic activities	- Improving management of water resources and conserving the quantity of this resource through water harvesting - Improving on-farm water-use efficiency - Rationalizing use of ground water, especially in Shallow Aquifers -Protecting water resources from all types of pollution
3	Climate change	climate change-induced vulnerability and risks	Conduct Research on: - Developing climate resilient crops and associated technologies - Policies and investments that support trade, sustainable agricultural practices, and technological progress

4	Research, extension and farmers in the region are not linked	The low adoption rates of improved technologies by farmers	- Strengthening the human resources and institutional capacity of the NARS - Building Impact-oriented Research, Knowledge and Development Institutions - Participatory approach which involves researchers, farmers and extension agents in the transfer of technology - Revitalizing, strengthening and reorienting agricultural extension system -Improving quality of agricultural education and employability of agricultural graduates
5	Environment Protection	- The research on the natural resources management (soil, water, biodiversity, range and forest) is carried out without adequate attention to the socio-economic constraints and environmental conditions.	- Finding suitable alternative environment friendly crops that tolerate drought and saltiness/salinity. -Protect the land from Salinization and sustain it for the coming generations
6	Research, knowledge and Development Institutions	Institutional arrangements to achieve a shift towards an innovation, information, knowledge, and education coalition is weak	-Build Impact-oriented Research, Knowledge and Development Institutions -Identify polices and Improve Decision makers and politician awareness on the importance and role of agricultural research and innovation. -Support research and development in all nationally needed fields of agriculture by local, regional and international funding agencies.

7	Markets and marketing Systems	Globalization affects the small farmers in the region	-Enhance socially based economic agro-enterprises through enhancing and empowering the farmers' cooperatives economical and marketing activities. -Establish long-term relationships, planning, technical cooperation and transparency are necessary throughout the supply chain between all the market participants

8- Recommendations

- Prioritize research and its programming, it is necessary to improve coordination in research and funding, prioritize and update drivers and research agendas, and improve civil society participation and research agenda setting,
- Undertake specific research on technology generated by farmers themselves, understand local modes of knowledge transmission, and adapt conventional research to the specific conditions of small farms. The objective is sustainable, economic intensification of the various categories of small farms.
- The representatives of countries should come forward for participation in common research with self motivation to achieve common goal to harvest the benefits of the research, using their wisdom in convincing their policy makers/ higher authorities the merits of common research/ network with confidence.Moreover, the national representatives should actively participate in periodic meetings-annual or bi-annual to review the progress of research implementation and discuss on its future line.
- Information and knowledge transfer could be achieved through the increase in financial support for knowledge transfer, enhancing the attraction of agricultural education in the region, helping farmers be better represented, providing incentives for innovation in rural areas including vocational training, supporting professionals involved in knowledge transfer, and fully exploiting existing knowledge. This could be strengthened through innovation systems with strengthened links to strengthened extension systems and dissemination of successful case studies resulting from agricultural research among farmers that could benefit them through adoption of new agricultural research technologies for sustainable development in the region.
- The research should focus on the needs of the poor though promoting people centered research, i.e. research that is demand driven and focused on the needs of the poor, empowering the voice of poor farmers by the involvement of stakeholders, collecting contemporary data on poverty in agriculture to ensure good monitoring and evaluation practices.
- Promote NGOs and farmers' organizations involvement to act as interface between poor farmers, women and research institutions. In addition, there is need to increase the administrative capacities of farmers' organizations and NGOs for research activities while avoiding "bureaucratization"

- There is also a need for substituting traditional extension systems with farmer participatory knowledge systems that are more gender sensitive. Community-based farmers' organizations must be established more widely and existing ones strengthened to facilitate the development of such farmer participatory knowledge systems and to promote value addition, agro-processing and marketing that can better exploit economies of scale and encompass vertical, horizontal and lateral integration from production to markets.
- There is need to design agricultural research strategy/s at the local, regional and international levels directed towards the poor, sustainable agriculture, and food security.

References

- Belaid, Adeerrezak, Mohammad Solh and Ahmad Mazid. Setting Agricultural Research Priorities for the Central and Wast Asia and North Africa Region (CWANA). Toward a New NARS/NARS and CGIAR/NARS Collaboration Spirit. ICARDA.Aleppo, Syria. 2003

- Brandsma, Judith & Deena Burjorjee. Microfinance In the Arab States Building inclusive financial sectors United Nations Capital Development Fund. UNCDF.2004

- Campesina, La Via. An Answer to the Global Food Crisis: Peasants and small farmers can feed the world. Grassroots International, 2009

- FAO. Agricultural Development Policies in the Near East: Situation, Issues, Institutional Requirements and Approaches. Proceedings of the Joint FAO/NAPC Regional Workshop on Institution Building for Agricultural Policies in the Near East. 6 - 7 December 2003. Damascus, Syria

- FAO. Hunger in the Face of Crisis- Global Economic Slowdown Underscores Urgency of Addressing Long-Term Challenges. Policy Brief 6. Sep. 2009.

- IAASTED. Agriculture at Cross road. International Assessment of Agricultural Knowledge, Science and Technology for Development. 2009

- Mahjoub, M.M, Wcpa North Africa / Middle East / West Asia. Iucn,

- Murphy Sophia and Tilman Santarius. The World Bank's WDR 2008: Agriculture for Development. November 2007.

- Richard Thomas, Aden Aw-Hassan, Abdul Bari Salkini and Roberto LaRovere. Minutes of Consultation for the CWANA region on the Proposed International Assessment of the Role of Agricultural Science and Technology in Reducing Hunger, Improving Rural Livelihoods, and Stimulating Environmentally Sustainable Growth. The Natural Resource Management Program of ICARDA. ICARDA, The World Bank and the Department of Agriculture and Land Reclamation, Egypt. 2003

- Shideed, K. *M. Solh, and I. Hamdan*. Revisiting CWANA Research Priorities and Needs Assessment. 11th General Conference of AARINENA, 12-14 October 2008, Damascus- Syria.