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This brief series was developed in preparation for the Foresight Breakout Session of the Global Conference on Agricultural Research for Development (GCARD 2012) and the Global Foresight Hub[1]. The briefs were written to communicate to a wider audience, such as policy makers, civil society organizations, researchers, and funders. The briefs were classified into three categories: Future Studies, Regional Update, and Visioning.

What research do we need to increase agricultural production? Stakeholders' perspectives

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This brief is based on regional consultations towards the first Global Conference on Agricultural Research for Development (GCARD). The GCARD Process in West Asia and North Africa: Final Synthesis Report. Rome: Global Forum on Agricultural Research (GFAR) and Amman: Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA).

"…Agriculture will continue to remain the backbone of developing countries … and farmers can always grow enough food to stave off hunger and malnutrition. Unfortunately, the official position of most governments and of international institutions serves powerful economic and political interests that perpetuate hunger, malnutrition and poverty globally."[2]

Getting closer to the edge of food insecurity

This brief is based on regional consultations towards the first Global Conference on Agricultural Research for Development (GCARD).[3] The Global Forum on Agricultural Research (GFAR) commissioned the Association of Agricultural Research Institutions in Near East and North Africa (AARINENA) to carry out a regional review to identify the key agricultural research priorities in the region. AARINENA handled all aspects of the review and co-financed this activity with GCARD. Its aim was to gather the viewpoints of stakeholders on research priorities to increase agricultural productivity in the West Asia and North Africa (WANA) region.

The WANA region is characterized by a Mediterranean climate with dry summers and winter rainfall that rarely exceeds 500 mm and greatly fluctuates within and between years. The region occupies 14 percent of the world's area, supports 10 percent of the world's population and possesses 2 percent of the total renewable water resources. Water overuse or misuse is exacerbating environmental degradation.[4]

Agricultural land in the region is limited and fragile; the arable lands occupy 8 percent of the total area, of which 24 percent (41 million hectares) is under irrigation; this is projected to increase to 51 million hectares in 2020. Rainfed areas occupy 76 percent of the arable lands, of which over 70 percent is rangeland, where traditional livestock provide the major support for livelihoods.[5] Irrigated lands contribute to 50 percent of agricultural production, compared with 40 percent and 10 percent for favourable and marginal rainfed areas, respectively.

[1]http://www.egfar.org/our-work/shaping-future-together/global-foresight-hub

[2] Shrivastava, A. Poverty and Food Insecurity in the Developing World: For Us, Tolls the Bell. Center for Research on Globalization, 2009.

[3] The GCARD Process in West Asia and North Africa: Final Synthesis Report. Global Forum on Agricultural Research for Development (GCARD) and Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA), 2010.

[4]Water Scarcity and Drought in WANA Countries. Proceedia Engineering, 2012; 33:14-29.

[5] Strengthening Partnership in Agricultural Research for Development in the Context of Globalization. West Asia and North Africa (WANA) Global Forum, 2000.

Agriculture is the primary source of livelihoods and revenue for many countries in the WANA region, where more than 70 percent of the poor people live in rural areas. Cereal yields in the region are currently half the world average, and almost all countries in the region are net importers of food.

The increasing human population in the region is placing greater pressure on natural resources and expansion of cultivated land. This is provoking land degradation and desertification, which are exacerbated by the growing livestock population.

The main conclusions from the AARINENA-facilitated regional review were that: (1) future expansion in arable lands is limited; and (2) further boosting of agricultural production should come from sustainable intensification of irrigated agriculture, and yield increases in rainfed areas.[6] In addition, resource-poor farmers should be supported (e.g. through technical support, access to credit, availability of infrastructure) to keep them in agricultural production.

The main identified challenge is to increase food production for a growing population who tend to live in urban centres, in a region that is highly vulnerable to the impact of climate change and whose natural resources are being continually degraded.

From farmers to decision makers

The regional review focused on extracting lessons learned from previous research strategies and assessments conducted in the region; national and institutional agricultural strategies and reports were used in the desk review. A survey on ongoing research programmes and current knowledge-sharing practices in agriculture and social sectors was conducted. The survey was distributed to researchers in universities, agricultural centres and research institutes, where 1400 research projects were reviewed. Research priorities that emerged from the desk review and survey were evaluated against a set of criteria: productivity, poverty alleviation, resource conservation, food security and contribution to development. The different agro-ecological zones in the region were also considered. The analysis resulted in the formulation of seven themes with key researchable issues, which would require further public consultation to determine whether their focus was relevant to the reality of resource-poor farmers. The themes were: food security, poverty reduction, protection of the environment, climate change, knowledge sharing, marketing and energy. Regional electronic and face-to-face consultations were conducted in 2009 to solicit the opinions of the agricultural research community on three issues: extent of expected development impacts of identified research priorities; mechanisms and partnerships to turn research results into innovations; and potential obstacles preventing research from benefiting the farmers.

The seven themes were used to kick-off the e-consultation. Around 180 stakeholders participated, with representatives from: agricultural research centres of the region, international agricultural research and development organizations, ministries, universities, non-governmental organizations, farmers' organizations, the private sector, and observers from the Global Forum for Agricultural Research (GFAR).

Can research provide solutions to different types of farmers?

Small-scale farmers are historically engaged in rainfed agriculture and pastoral or semi-intensive animal production. Therefore, research is needed on water management (e.g. supplemental irrigation); cropping patterns within the short growing season; improvement of local varieties to produce stable yields during long periods of drought and without additional irrigation; and efficient water-harvesting schemes in rainfed and rangeland areas.

To promote organic farming from indigenous (land races and wild relative) species, research is needed on including underutilized crop species in farming systems of rainfed areas and breeding technologies.

Natural rangelands occupy vast areas in the WANA region and they are important as storehouses of biodiversity, especially for the wild relatives of crops of global significance. They also represent the resource base for pastoral animal production. Research on approaches and policies to develop sustainable community-based management of grazing resources to ensure sustainable pastoral animal production is vital to develop sustainable goods and services from the fragile grazing ecosystems, which will enhance the food security of rural and pastoral communities.

[6]The Role of Rainfed Agriculture in the Future of Global Food Production. International Food Policy and Research Institute, 2002.

Research on improvement of flock husbandry to improve productivity and quality of traditional animal products is particularly relevant to small-scale farmers. Research on characterization of indigenous livestock breeds is important to develop integrated flock husbandry (e.g. vaccination, nutrition, management of reproduction) for the major ecological niches. Research on improving forage production using non-conventional water resources (e.g. treated sewage effluent and brackish water) is relevant for poor farmers who practice agro-pastoral animal production in countries with water scarcity.

Small-scale farmers are usually marginalized, and research on linking them to local markets is needed to derive the benefits of agricultural research.

Large-scale farmers get maximum efficiencies from all inputs in the agricultural production process. In the WANA region, farmers must increase production per volume of water. Research to develop new innovations in irrigation, use of fertilizers and integrated pest management is important to achieve sustainable intensification of irrigated agriculture. The current irrigated farming practices and/or systems (e.g. cropping patterns, types of grown crops and timing of cropping) may need to be adjusted or replaced to cope with limited natural resources. Deficit irrigation proved to increase production with less irrigation water and could be applied at large scale in irrigated agriculture. Similarly, supplemental irrigation could be applied at large scale in rainfed agriculture where rainfall is not sufficient to produce profitable and sustainable production.

Research on animal biotechnology in health, nutrition, breeding and reproduction is vital to improve productivity and profitability, especially for large-scale livestock enterprises, and to minimize the negative impacts on the environment.

All farmers need a way to market their products sustainably. Research is needed on the capacity of local and regional markets, diversification of animal products, and expected changes in diets and consumer behaviour.

In addition, research is needed on analysing current farming systems in relation to the availability of arable lands, irrigation water and agricultural labour in the future. For example labour-intensive crops such as vegetables and fruits may be promoted in countries where agricultural labour and water are available; high water requirement and low-value crops such as forages may be promoted in areas having intensive livestock production systems; and production of drought-tolerant staple food crops such as grain and oil seed crops may be relevant in rainfed areas with low to moderate rainfall.

Future agricultural research should result in new innovations that enable the use of all possible niches and agro-ecological zones in the region. Innovation in farming practices or systems would potentially reduce migration of people from the rural to urban areas, improve livelihoods and consequently enhance food security in the region.

Finally, research needs consider trends in climate change. Whereas some innovations may work well with rainfed agriculture in certain ecological zones in the near future, they may well be ineffective after 20 or 30 years.[7]

Impact on research community

The regional review revealed that there are sound visions (e.g. focusing on stable food crops, adopting technical packages to improve production) in the research conducted by National Agricultural Research Systems (NARS) and Agricultural Research Institutes (ARIs), which aim to increase agricultural production. Nevertheless, more effort is needed to clarify these visions (e.g. research on the impact of agricultural intensification on the sustainability of natural resources such as land and water; impact of current policies on agricultural production and food trade) and refine the priorities of agricultural research.

The regional review helped AARINENA and GFAR to develop a better understanding of the pressing issues which should be reflected in future agricultural research in the region. More collaboration between AARINENA and NARS in the WANA region is expected to result in shaping the national agricultural programmes to be more responsive to the technical needs of small-scale farmers, taking into consideration country and local contexts.

The findings of the regional review will only have a positive impact on national agricultural research programmes if three things are put in place: financial resources, strong commitment of national research institutions and strengthened capacities in research management and leadership. Responsible leadership is particularly important to cope with a context in which researchers have limited lobbying capacity with respect to future agricultural research priorities and policies.

[7]Climate Change: Impact on Agriculture and Costs of Adaptation. International Food Policy Research Institute, 2009.

Senior staff from NARS and ARIs must collaborate with think tanks to develop comprehensive research programmes in line with national needs and policies. To be effective, research programmes require leaders with top reputations in research management. The role of young researches, especially those coming from rural areas, should be recognized and supported to maintain agricultural activities in the rural areas.

In the future, research will have more impact on large-scale farmers than small-scale farmers, as long as the latter are not organized or capable of participating in such forward-looking processes. Better participation of small-scale farmers, especially those engaged in rainfed farming and pastoral animal production, is indispensable for the sustainable and viable revival of the rural economy.

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