



Priorities for Agricultural Research for Development in South Asia



**Asia-Pacific Association of Agricultural Research Institutions (APAARI)
and
International Food Policy Research Institute (IFPRI)**



Asia-Pacific Association of Agricultural Research Institutions

The Asia-Pacific Association of Agricultural Research Institutions is a regional association that aims to promote the development of National Agricultural Research Systems (NARS) in the Asia-Pacific region through inter-regional and inter-institutional cooperation. The overall objectives of the Association are to foster the development of agricultural research in the Asia-Pacific region so as to promote the exchange of scientific and technical information, encourage collaborative research, promote human resource development, build up organizational and management capabilities of member institutions and strengthen cross-linkages and networking among diverse stakeholders. To meet these needs, the Association: i) convenes General Assembly once in two years, holds regular Executive Committee meetings yearly and organizes consultations, workshops, trainings, etc., ii) collects, collates and disseminates research findings, iii) maintains links with other fora in the region and outside through meetings, participation and information exchange, and iv) promotes need based collaboration in research projects among member institutions, analyzing priorities and focusing on regional agricultural development. For details, please visit: www.apaari.org



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Disclaimer

This publication is based on the synthesis report "Prioritization of Demand-Driven Agricultural Research for Development in South Asia" based on policy dialogues held in Bangladesh, India and Nepal. It is intended to promote further discussion and policy formulation for agricultural research and development in South Asia. Any opinions stated herein are based on those provided by participants during the country dialogues organized by APAARI, in collaboration with IFPRI. However, it has not been peer reviewed and does not necessarily reflect the views of IFPRI.

Priorities for Agricultural Research for Development in South Asia

South Asia: A Global Hotspot of Poverty and Hunger

South Asia is home to 1.6 billion people, most of whom live in rural areas. Notwithstanding significant economic progress (exceeding 6 % annually) in recent years, it has the highest concentration of the world's hungry and poor, more than Sub-Saharan Africa. Close to half of the world's poor (more than 420 million people) and nearly one-third of the undernourished (about 299 million) reside in this region. The percentage of the population that suffers from hunger varies from 17 in Nepal to 30 in Bangladesh. According to the 2011 Global Hunger Index (GHI), South Asia was accorded the highest GHI score of 22.6 per cent, exceeding even the Sub-Saharan Africa score of 20.5 per cent. Thus, the region is one of the world's hotspots of poverty and malnutrition and needs priority attention by policy makers and donors.

Agriculture: The Mainstay of the People

Agriculture dominated by smallholders, who make up roughly 75 per cent of all farm holders, is an important component of the South Asian economies. Agriculture contributes one-third of gross domestic product (GDP) in Nepal, 20 per cent in Bangladesh, and 13 per cent in India.

Though the agricultural growth rate has improved in the last few years, it not only has been short of target but has fluctuated widely. The vast majority of the region's rural poor (nearly three-fourths of the whole population) depend on the production of rainfed crops, livestock, forestry, or casual, informal employment for their livelihoods. To provide such people a pathway out of poverty, hunger, and malnutrition being also MDGs and to reduce a widening rural-urban income gap, accelerated and inclusive growth of the agricultural sector is a must.

Agricultural Research: Key Driver of Development

Agricultural research as part of green revolution has been a major contributor to agricultural productivity increases across the globe, including in South Asia. But, as the green revolution has waned, new complex challenges such as climate change, price volatility, and energy crises have emerged to contribute to the stagnation or slowdown of agricultural production and productivity in recent years. Such conditions are persistent and are worsening on account of food price inflation, which affects the poor especially. A widespread general neglect of agricultural research for development (AR4D)—specifically, greater and stable investment—persists in the region, except for India, although the situation has improved slightly after the food crisis of 2008. All these issues need careful attention in the formulation of agricultural

policies for developing countries. Realizing this, the first Global Conference on Agricultural Research for Development (GCARD1) held from March 28 - 31, 2010 at Montpellier, France decided to study the situation and form an action plan with a focus on AR4D to remedy the malady and ultimately alleviate serious suffering in the region. The study was carried out during January-July 2012, using review of past studies, reports and individual country dialogue meetings.

The Study

The present study covers three South Asian countries, namely, Bangladesh, India, and Nepal, which together form nearly 90 per cent of the region's population. These countries share several common and some unique concerns, related to structural, institutional, funding, and technology delivery mechanisms, that hinder their realisation of optimal returns on investment and the attainment of a higher and inclusive agricultural growth trajectory. This study attempts to analyse the concerns, particularly in the area of AR4D, and to suggest a suitable strategic plan for accelerated and inclusive growth within and among countries through higher and stable investment by the national governments and donors and increased cooperation and collaboration in the region. It prioritizes agricultural research investments for the study countries and South Asia as a whole based on the needs of farmers and other stakeholders (that is, from a demand-driven perspective). Country-level priority reports were compiled first through a detailed review of agriculture and its subsectors, formal and informal discussions, and meetings with all concerned. The country-level policy-dialogue meetings were specially organized using expert communication facilitators to identify demand driven agricultural research priorities and well attended by representatives of all the stakeholder

categories. Based on the country-level priorities, the synthesis report identifying the priorities of the South Asian region was developed. When these priorities were presented at GCARD2 held during 29th October to 1st November, 2012 at Punta del Este, Uruguay, it was suggested that farmer-participatory research prioritization needs to be intensive with more involvement of farmers and other stakeholders at disaggregate levels of priority setting—from the national level to the state, district, taluka (a smaller geographical area than the district consisting of several villages), and lower levels. Because the present exercise is at the national level, involvement of stakeholders from each category was limited. But, a reasonable representation of all stakeholders was attained (34 % from the government/public sector, 31 % from civil society and non-governmental organizations (NGOs), 15 % from the private sector, 8 % from academia, and 12 % from the farmer category).

Major Highlights of AR4D Policies, Systems, and Concerns in South Asian Countries

Although their economies are in large part agriculture based, the South Asian countries did not have policies that specifically focused on agriculture until the 1990s. However, in the wake of stagnating agricultural productivity and worsening food and nutritional security during that decade, the countries in the region formulated specific policies covering various agricultural subsectors including agricultural research. They also formed some cross-cutting policies relating to land use, food, sugar, water, fertilizer, forestry and environment and others having

bearing on agriculture around this time. Although the countries' plans were generally compatible and synergistic with their stated objectives, they have demonstrated little coordination and convergence during implementation. The plans may be ambitious and well envisioned, but a gap between the envisioned plans and policies and their implementation exists on account of weaknesses in institutional capacity, irregular and inadequate funding, highly depleted human resources with limited skills, poor accountability in the National Agricultural Research System, and weak monitoring and evaluation practices.

Regarding AR4D in particular, the countries' agricultural policies emphasize AR4D and give a mandate to the national agricultural research systems (NARS) to increase the productivity, profitability, sustainability, employment, poverty alleviation, and livelihood security of small farmers, particularly those located in harsh ecologies, and to empower women and youth. But, the budgetary support for public sector AR4D has been inadequate, and variable, particularly in Bangladesh and Nepal (the agricultural research intensity is only 0.24 per cent in Bangladesh and 0.30 per cent in Nepal in 2009 as compared to 0.5 per cent in India and 1.04 per cent in Brazil; the annual growth in public agricultural spending in Bangladesh varied at 10.2 per cent during 1996-2001, 3.4 per cent during 2001-2006 and 2 per cent during 2006-09 and in Nepal it varied at 13 per cent during 1996-2001, -12.8 per cent during 2001-06 and 9 per cent during 2006-09 as compared to India where the annual growth rate varied at 10.6 per cent during 1996-2001, 4.2 per cent during 2001-06 and 9.9 per cent during 2006-09. Further, the involvement of the private sector is slowly improving in these countries particularly in terms of seed. The growth of private sector is relatively faster in India owing to growing demand for agricultural inputs, outputs and

favourable IPR policy regime. Countries such as Bangladesh and Nepal are also traditionally more dependent on donor funding for AR4D, especially in view of inadequate and variable public sector funding. The agricultural research intensity ratios are much below the ratios prevailing even in some of the developing countries. Other major funding issues confronting the NARS include: lack of systematic planning and prioritization; limited innovation in mobilizing new sources of funding; not following the best fund use practices like using an online financial management system, using simplified rules and procedures suitable to AR4D, and timely release of funds; outdated procedures like keeping the distinction between plan and non-plan expenditures; limited core funding from the government; and very low budgetary support for research contingencies and operational costs. Apart from budgetary and funding concerns, the NARS exhibit major structural and institutional weaknesses as well as declining quality in agricultural education and human resources development, development and use of new technology, and technology delivery.

Regarding structural issues and weaknesses, although the countries in the region follow varying forms of the NARS model with declared autonomous status on paper to function as an independent research body, all of the NARS face a variety of hassles and stresses relating to functional autonomy. For example, they face issues with budget making; resource allocation; rules regarding expenditures; recruitment, selection, and assessment of staff; personnel policy; and political interference. They also suffer from not having centralized and uniform acts and rules covering all agricultural research institutes. These serious challenges have made the NARS less efficient and have diminished their impact. They badly require functional autonomy through de-bureaucratization, professionalization, science-friendly rules and procedures,

progressive service conditions, and sufficient incentives for encouraging merit and performance. India's NARS is one of the largest in the world, but its size, spread, and diversity is constraining its performance, beside its insufficient functional autonomy.

The institutional issues that constrain the NARS' performance are several. They include weak prioritization of agricultural research, weak monitoring and evaluation mechanisms and practices, and insufficient and ambiguous decentralization of power. Regarding qualified human resources, the numbers of such people are decreasing, along with the quality. The systems lack innovative schemes to engage available national skill and expertise, and they lack good leadership owing to non-existent manpower planning, succession planning, and inadequate faculty development and training programs. Restrictive recruitment processes contribute to the faulty selection of senior research leaders. There is also a trend of establishing new institutions without providing for additional manpower and infrastructure resources. Finally, inadequate emphasis is placed on agricultural education, which results in production of human resource lacking quality, core technical skills and soft skills like communication and publicity skills; limited national, regional, and international linkages and partnerships, cooperation, and collaboration; and a lack of progressive policy including clear-cut intellectual property rights (IPR) policy to actively engage the private sector in AR4D as pursued in the developed countries. In the developed countries, private sector R&D efforts have expanded considerably by advances in biotechnology, strengthened IPRs like breeder's rights, utility patents, etc, globalization of markets and falling barriers of trade and new opportunities to collaborate with public research institutions mainly as a result of permitting private sector to ownership/exclusive licences of any inventions that result from public-private sector research.

Many new, potentially scalable technologies have appeared on the horizon and are deserving of careful evaluation and perhaps extensive use. These include nanotechnology, biotechnology, advanced processing and packaging technology, bio-risk management technologies, resource conservation technologies, mechanical technologies, information, communication, and remote-sensing technologies, and so forth. Some have proved their worth but, in many cases, have not been accepted by the public or the political system because of doubts about their health and environmental safety. Resistance to genetically modified crops by the public and the political and legal systems of India, Bangladesh, and Nepal has shaken the hopes of using modern technologies to improve livelihoods and food security. There is a lesson to be learned: such new technologies need to be deployed with open and transparent decision making only after rigorously establishing their credentials on human and environmental safety. Furthermore, such technologies are raising new issues for the NARS in the following areas: economies of size, international collaboration, public-private linkages, IPR issues, regulatory issues, commercialization issues, technology transfer issues, and funding issues. In this connection, there is an urgent need to strengthen translational research and technology management portfolio in the NARS so that technological breakthroughs from cutting-edge technologies will be available to the society quickly and safely.

The NARS face problems not only with adoption of advanced technologies, but also with the delivery of such technologies to the principal users. The major technology delivery issues the NARS face include the near collapse of the public extension system; inadequate funding to address manpower shortages in technology delivery activities (particularly in horticulture); livestock, poultry, fishery, and postharvest management and

agricultural engineering; agribusiness. In these new areas, there is not only shortage of manpower but also the existing public extension functionaries lack subject matter knowledge and skills. The underuse of such technologies as information and communications technology (ICT) due to mobility and e-connectivity constraints and the inability to link donor funding with development activities have resulted in the failure to replicate several promising extension models—such as the krishi vigyan kendras and the agricultural technology management agencies in India (ATMA - a registered society of agriculture and allied sector research and development officials and institutions at the district level to accelerate agricultural development at the district and below levels).

Research Prioritization Initiatives

The Asia-Pacific Association of Agricultural Research Institutions (APAARI) and other national and international organizations have pioneered several studies to prioritize agricultural research in the region. The studies use supply-driven as well as demand-driven analytical approaches using wider stakeholder consultations. Such exercises are relatively more frequent in India, but a trend toward using objective, formal exercises using supply driven approaches like congruence analysis, economic surplus methods or demand driven approaches like stake holder dialogues, e-consultation and others is visible even in Bangladesh and Nepal. Refinements in these exercises are possible and need consideration in the future. Further, in the countries where such initiatives are weak/non-existent, they have to be taken up with priority.

Strategy for Demand-Driven Research in South Asia

The strategic plan identifies demand-driven commodity, resource management, structural and institutional, funding, and technology delivery priorities for accelerated and inclusive growth in agriculture in the region. The strategic plan emphasizes the critical importance of regional research alliances and cooperation and greater funding for South Asia through Overseas Development Assistance for significant gains. This is especially necessary firstly as the spill-over effects of yield improvement technologies have significantly decreased under the new IPR regime restricting the free flow of technologies and developed countries have shifted the focus of research toward value and quality improvements rather than yield improvements, creating a technology shortage (often referred to as technology orphanage) condition in developing countries. Secondly, over the years the overseas aid flow has declined substantially for South Asia which is the global hotspot of poverty and hunger. For instance, the decline was very steep in South Asia (aid as a share of GDP was 1.4% in 1982-1990 periods but declined to 0.7% for 2005-2007 periods as compared to 6% and 4.5% during these periods for Sub-Saharan Africa). The underlying approaches emphasized in the strategic plan include research on farming systems rather than cropping system research in harsh ecologies (like dry land areas, hill and mountain areas, coastal areas, tribal areas), enterprise diversification (like horticulture, livestock, fisheries) including rural nonfarm enterprises (like vermin-composting, beekeeping, rural arts and crafts) , increasing public-private sector partnership, linking farmers with markets, and gainfully engaging rural youth and empowering women. For South Asia as a

whole, the strategic plan includes the following 10 priorities in descending order of importance:

1. Triple or quadruple AR4D spending in the coming years from current levels. South Asia has the highest concentration of the world's hungry and poor, more than Sub-Saharan Africa. Although agricultural research has significantly contributed to the reduction of hunger and poverty in the region, increased and stable investment in AR4D has not been forthcoming either from the countries themselves (except India to some extent) or donors. The increased AR4D spending we call for would amount to at least 1 per cent of agricultural GDP in the short run and 2 - 3 per cent in the medium and long run. It will require greater political will and a strong public support of the farming, scientific, and other communities. It will also require exploring innovative funding and fund use mechanisms, linking donor funding with national development plans, and implementing sound financial and procurement management practices.
2. Intensify agricultural research and innovations by building consortiums and partnerships with innovative incentives and with the involvement of knowledge providers including the private sector. There should be emphasis on both staple crops in marginal ecologies where the interest of the private sector has been minimal so far and higher-value horticulture, livestock, poultry, and fisheries. The private sector, often a leading player in these areas, must be encouraged through adequate incentives to become an active partner.
3. Place higher priority on research on management of natural resources, including adaptation to climate change; conservation of resources and efficient use of inputs, particularly soil and water; and management of genetic resources to sustainably raise yield ceilings, enhance biotic and abiotic stress resistance, and improve food quality and nutritional content.
4. Ensure the functional autonomy of the NARS through policy support and much needed de-bureaucratization and other O&M reforms. There is a need to professionalize the NARS as policymaking bodies, think tanks, and brain trusts with science-friendly, flexible financial and administrative rules and procedures. Competitive service conditions, merit and performance incentives with accountability, and other mechanisms and structures need to be introduced to contribute to excellence in science for development.
5. Strengthen human resources development nationally, regionally and internationally with liberal funding and progressive training policies.
6. Strengthen and reorient the current agricultural education systems to provide a continuous supply of quality human capital to the agricultural sector and agricultural research systems.
7. Strengthen translational, technology management and technology delivery systems and agro-advisory services to contribute to availability and access to technology breakthroughs, increased linkages of technologies and innovations, synergy, and convergence with stakeholders, which include scientists, extension workers, champion farmers (including women) and farm innovators, farmers' organizations, development agencies, the private sector, and NGOs. The use of modern innovations and technologies like ICT should be promoted through institutions like the krishi vigyan kendras and agricultural technology management agencies of India.

8. Strengthen soft skills of stakeholders with respect to research policy, long-term planning, visioning and policy, programme implementation, monitoring and evaluation, agribusiness planning and development, documentation, and communication and publicity to contribute to better implementation of programs. The role of IPR and technology commercialization in producing a systemwide impact and increased efficiency will further enhance the credibility and visibility of the NARS.
9. Strengthen research on value-chain systems, engaging the private sector and all other potential players. This would require creating enabling environment with clear cut IPR policy, innovative funding, tax policy and other incentives to strengthen public-private-partnership. The goal must be to address market integration with an efficient and dependable input and services delivery system in order to ensure inclusive producer oriented development.
10. Strengthen agricultural engineering research inputs and services covering primary processing, value addition, farm and rural storage, grading, rural energy use, small farm mechanization, and precision farming. The goal must be to improve efficiency, add value, remove drudgery, and overcome increasing labour scarcity.

The Way Forward

There are a number of ways by which the research priorities identified herein could be implemented. Organizations such as Global Forum on Agricultural Research (GFAR), APAARI, and the NARS must act as

facilitators to catalyze the stakeholders in order to inculcate the process of "foresight" (collective best bets on future needs recognizing the benefits and tradeoffs among potential policy options); undertake initiatives for research prioritization, monitoring and impact assessment; concerted efforts towards out-scaling of innovations, linking farmers to markets, strengthening and expanding IPRs, and promoting public-private partnership; and motivation of the national governments to formulate progressive policies, beside much needed increased investments in AR4D. Declining aid assistance in South Asia by Overseas Development Agencies is also an important concern to be addressed on priority. Major efforts are needed jointly by the national governments and the donor community, especially to achieve MDGs in the South Asia being the global hotspot of poverty, hunger and malnutrition. . The NARS must institutionalize the best practices for AR4D through dedicated technology foresight centres. Although such practices do exist in some of the South Asian countries, yet the levels, and frequencies, at which they operate are quite subjective and less effective in their implementation. Hence, efforts at the disaggregated level involving small holder farmers, NGOs, and other stakeholders are urgently needed to identify local needs, gaps, and priorities. The NARS in South Asia must reorient and strengthen their research and education systems to build a cadre of much enlightened practitioners, especially the youth in Agriculture. NARS must, therefore, look ahead, and bring in much needed reforms at all levels for promoting innovations that can make difference in the livelihoods of small holder farmers and lead to inclusive growth in agriculture for addressing both hunger and poverty in South Asia.

Important APAARI Publications

Expert Consultations/Meetings/ Training Programs

- Improving Wheat Productivity in Asia (2013)
- Stakeholder's Interface on Genetically Modified Crops: Proceedings and Recommendations (2013)
- Prioritization of Demand-driven Agricultural Research for Development in South Asia (2012)
- First Global Conference on Women in Agriculture : Proceedings (2012)
- Workshop on Climate-Smart Agriculture in Asia : Research and Development Priorities : Proceedings and Recommendations (2012)
- Regional Consultation on Improving Wheat Productivity in Asia : Proceedings and Recommendations (2012)
- Regional Dialogue on Conservation Agriculture in South Asia : Proceedings and Recommendations (2012)
- Expert Consultation on Agricultural Biotechnology, Biosafety and Biosecurity : Proceedings and Recommendations (2012)
- Workshop on Implementation of Suwon Agrobiodiversity Framework (2012)
- Stakeholders' Interface on GM Food Crops : Recommendations (2011)
- Expert Consultation Meeting on Postharvest and Value Addition of Horticultural Produce – Strengthening Technologies for Linking Farmers to Market : Proceedings and Recommendations (2011)
- International Symposium on Sustainable Agricultural Development and Use of Agrobiodiversity in the Asia-Pacific Region (2010)
- APAARI-ADB Asia-Pacific Consultation on Agricultural Research for Development (AR4D) in Asia and the Pacific-The Way Ahead (2009)
- Expert Consultation on Biopesticides and Biofertilizers for Sustainable Agriculture (2009)
- Symposium on Global Climate Change : Imperatives for Agricultural Research in Asia-Pacific (2008)
- Expert Consultation on Agricultural Biotechnology for Promoting Food Security in Developing Countries (2008)
- Workshop on Development and Management of ARD Information Resources (2008)
- Asia-Pacific Regional Workshop on Agricultural Research for Development (2008) (for establishment of NGO Consortium-NAARAP)
- Expert Consultation to Review Progress of Agricultural Research Networks and Consortia in Asia-Pacific (2007)
- ICT/ICM Sensitization and Awareness Building Workshop for NARS Leaders and Senior Managers (2007)

Success Stories

- Linking Farmers to Market : A Success Story of Lettuce Export from Chinese Taipei (2012), Mini-Chi Hsu *et al.*

- Biofuel Growers Market Network (2012), K. Narayan Gowda
- Short Duration Mungbean: A New Success in South Asia (2010), M.L. Chadha
- Taro Improvement and Development in Papua New Guinea (2009), Abner Yalu *et al.*
- Cotton-Wheat Production Systems in South Asia: A Success Story (2008), C.D. Mayee *et al.*
- Linking Farmers to Market: Some Success Stories from Asia-Pacific Region (2008), Rosendo S. Rapusas *et al.*
- Rainbow Trout (*Oncorhynchus mykiss*) Culture in the Himalayan Kingdom of Nepal (2005/1), A.K. Rai *et al.*
- Sustaining the Green Revolution in India (2004/3), S. Nagarajan
- Lentil Improvement in Bangladesh (2004/1), Ashutosh Sarker *et al.*
- Success Story on the Control of Newcastle Disease in Village Chickens (2003/1), Robyn Alders
- Hybrid Rice in China - A Success Story (1994), Lou Xizhi and C.X. Mao
- Tilapia Farming in the Philippines - A Success Story (1994), Rafael D. Gurrero III
- Dairying in India - A Success Story (1994), R.P. Aneja

Status Reports

- Micropropagation of Date Palms (2012), Dr. Nasser S. Al-Khalifah *et al.*
- Jackfruit Improvement in the Asia-Pacific Region – A Status Report (2012), A.S. Sidhu *et al.*
- Information and Communication Technologies/Management in Agricultural Research for Development in the Asia-Pacific Region : A Status Report (2011).
- Strengthening of Plant Genetic Resources for Food and Agriculture: Conservation and Utilization in the Pacific (2011).
- Bt-Cotton in India – A Status Report (2nd Edition) (2009).
- Production and cultivation of Virus-Free Citrus Saplings for Citrus Rehabilitation in Taiwan (2008)
- Biosafety Regulation of Asia-Pacific Countries (2008)
- Micropropagation for Quality Seed Production in Sugarcane in Asia and the Pacific (2008)
- Commercialization of Bt-Corn in the Philippines (2005)
- Information and Communication Technologies in Agricultural Research for Development in the Asia-Pacific-Region (2004)

Other Publications

- Fifteen Years of APAARI- A Retrospective
- APAARI Vision -2025
- APAARI Newsletter



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It is our expectation that this Policy Brief will catalyze all the stakeholders to accelerate activities relating to implementation of important recommendations for strengthening agricultural research for development in South Asia.

APAARI Executive Committee

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